

Poster Abstracts

Number

Symposium

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| 1 | <p>Arenaviruses and hantaviruses in small mammals of Eastern Africa J. Tesikova, (jana.tesikova@centrum.cz), Masaryk Uni., Brno, Inst.Vert.Biol.,Konesin, Czech Rep., Y. Meheretu, (meheretu@yahoo.com), Uni. Antwerp, Belgium, Mekelle Uni., Ethiopia, J. Bryja, (bryja@brno.cas.cz), J.G. de Bellocq, (joellegouy@gmail.com) Arenaviruses and hantaviruses are enveloped single-stranded RNA viruses, whose primary hosts are rodents and to a lesser extent soricomorphs and bats. Some representatives are important pathogens of humans and may cause serious health problems. The data about the diversity and distribution of these viruses in some regions are limited, especially in developing countries, where the risk of human infection is considerable and rodents have a major public health relevance. In this study we screened a comprehensive collection of rodent and soricomorph samples (dried blood and kidney) from Eastern Africa (Tanzania, Mozambique, Kenya, Ethiopia, DR Congo and Zambia) to investigate the presence of hanta- and arenaviruses. Among 3465 tested individuals, we detected new strains of Mobala and Mopeia arenaviruses from 4 host species in Ethiopia, Mozambique, DR Congo and Tanzania. Hantavirus-positive samples were found only in Ethiopia, from where we described a novel hantavirus, Tigray, hosted by the Ethiopian endemic rodent <i>Stenocephalemys albipes</i>.</p> | 1 |
| 2 | <p>Wildlife-livestock interactions: implications for disease transmission between Eurasian badger and domestic cattle D. O'Mahony, (declan.o'mahony@afbini.gov.uk), Agri-Food and Biosciences Institute, Belfast, UK. Bovine tuberculosis (TB) is a significant disease of domestic livestock, having considerable cost implications in its management. Wildlife species have been implicated in the transmission and maintenance of the disease in the rural environment with a particular focus on the Eurasian badger (<i>Meles meles</i>) in several countries. I utilised recent advances in technology to investigate interactions between badgers and cattle when animals are at pasture (proximity collars) and determined intrusion rates by badgers into farmyards (camera surveillance) in a 1,300 ha TB "hotspot". A range of other studies on badger ecology also occurred in the area including the use of GPS collars. Preliminary data analysis suggested that the level of direct contact between badgers and cattle is very limited both at pasture and in farm buildings. This suggests that indirect sources of contact may be more important as potential disease transmission routes in this system.</p> | 1 |
| 3 | <p>Quantifying and reducing indirect badger–cattle contact L. Ovens, (lo212@exeter.ac.uk), ESI, Uni. Exeter, Cornwall, UK, D. Hodgson, Daphne Du Maurier CEC, Uni. Exeter, Cornwall, UK, S. Carter, Nat. Wildl. Management Cent., Nympsfield, UK, Robbie McDonald Bovine tuberculosis (bTB) is a costly and problematic disease of cattle in the UK, caused by the bacterium <i>Mycobacterium bovis</i>. The European badger (<i>Meles meles</i>) is a well-known wildlife reservoir of bTB, but the route of disease transmission between badgers and cattle still remains unknown. At pasture, cattle contact with badger excretory products is thought to pose a high indirect transmission risk, with contact occurring more frequently than previously thought. However, a wide empirical study quantifying this contact is lacking. This poster presents a study currently in progress quantifying this indirect contact at farms across the South-West of England, utilising proximity logger technology. The efficacy of a simple and practical cattle exclusion technique, to reduce risk of transmission, is also being assessed</p> | 1 |
| 4 | <p>A study of parasite dynamics in cycling field vole (<i>Microtus agrestis</i>) populations in Finland P. Stuart, (peterdstuart@hotmail.com), Finnish Forest Res.Inst., Suonenjoki, Finland, K. Forbes, (kristian.forbes@metla.fi), H. Henttonen, (heikki.henttonen@metla.fi), O. Huitu (otso.huitu@metla.fi) The role of parasites in rodent population cycles has long been debated. Transmission of parasites should increase with host density if they are to regulate their hosts. Parasites are also affected by changes in their host population dynamics. This study aimed to track the prevalence and intensities of field vole gastrointestinal parasites over the course of a population cycle. Field voles (n=736) were trapped throughout Finland, in spring and autumn, from 2008 to 2011. Morphological measurements, sex, reproductive status and age were recorded for each vole. An abundance index (1 + number of voles trapped)/ (number of traps set) × 100) was calculated for each site sampling point. Index values observed ranged from 2 to 44.9. Eight species of parasite species were identified; 72% of voles were infected with at least one parasite species. Analysis is being carried out and key findings will be discussed.</p> | 3 |
| 5 | <p>Demography of the meadow vole, <i>Microtus pennsylvanicus</i>, in southeastern Virginia J. Eggleston, (jegg001@odu.edu), Old Dominion Uni., Norfolk, Virginia, USA, R.K. Rose, (brose@odu.edu) We conducted a mark-capture-release (MCR) monitoring program of meadow voles, <i>Microtus pennsylvanicus</i>, on two separate old field restoration sites owned by The Nature Conservancy, in the Northwest River basin, formerly a part of the Great Dismal Swamp in Chesapeake, Virginia. We established an 8 x 8 research grid, at 12.5m intervals, with two modified Fitch traps per station on the Su Tract from 2002 to 2005 and on the Stephens Tract from 2005 to 2012. Both grids were trapped for three days each month, averaging 4600 trap nights per year. The life history traits for these two populations were analyzed and compared with data throughout their range for yearly and seasonal changes in density, individual, survival and growth rates, mean body mass, sex ratios, transient/resident ratios, periods of reproduction, as well as lifespans.</p> | 3 |

- 6 **Densities and spatial behaviour of small mammals in an Austrian primeval forest** I. Kemptner, (iris.kemptoner@boku.ac.at), Univ. of Nat.Res. & Life Sci., Vienna, K. Heissenberger, (k.heissenberger@students.boku.ac.at), U. Nopp-Mayr, (ursula.nopp-mayr@boku.ac.at), K. Hackländer, (klaus.hacklaender@boku.ac.at) Forest rodents represent a seed predator and disperser guild in forest ecosystems influencing regeneration dynamics and tree species coexistence. Rodent population dynamics and their spatial behavior were observed in a primeval mountain forest in the Wilderness Area Dürrenstein, Lower Austria. Small mammals were captured in June, August, and October 2012, gathering a peak year of small mammals after heavy masting of European beech, *Fagus sylvatica*, in 2011. We selected five study sites representing different forest habitats: managed and primeval forest, a 20 year old uncleared windthrow, and an early succession area (avalanche 2009) within the primeval forest. Population density and home range size were estimated using program DENSITY 5.0 (Efford 2012). Differences in annual and seasonal density as well as moved distances were described for the two main species, the bank vole, *Myodes* (formerly *Clethrionomys*) *glareolus* and the yellow necked mouse, *Apodemus flavicollis*. 3
- 7 **Density of jaguars (*Panthera onca*) and pumas (*Puma concolor*) in El Eden Ecological Reserve, Quintana Roo, Mexico** D. Avila, (terapan@hotmail.com), Colegio de Postgraduados, Montecillo, Estado de Mexico, Mexico, C. Chavez, (j.chavez@correo.ler.uam.mx), Uni. Auto.Metropol., M. Lazcano, (mlazcanobarrero@hotmail.com), El Eden Ecol. Reserve The Yucatan Peninsula is home to the largest population of jaguars in Mexico. This study was conducted in El Eden Ecological Reserve, Quintana Roo from 2008 to 2012. Tropical forest and acahual are the dominant vegetation. The abundance of jaguars and pumas was calculated with CAPTURE, using increased probability of capture over five days as a sampling period. We used MMDM/2 MMDM and telemetry data to estimate the density. The sampling effort was homogenized at 2137 hours/trap/year. The capture probability was greater than 0.9. It marked the closed population assumption with $\alpha > 0.05$. Abundance of jaguars and pumas was greater in 2012 (6 +/- 2 and 12 +/-3 individuals respectively) and densities using MMDM (4,961 km and 7,877 km respectively), were 2/100 km² and 2.5/100 km² respectively. 3
- 8 **Effects of rainfall on population dynamics of Atlantic forest small mammals: evidence for a trade off between survival and reproduction** C. de Barros, (camiladebarros@uol.com.br), Uni.São Paulo, Brazil, T. Coulson (timothy.coulson@zoo.ox.ac.uk), Oxford Univ., UK, T. Puettker, (thomaspuettker@gmx.de), R. Pardini, (renatapardini@uol.com.br) The factors that affect population dynamics have been a major issue for population ecologists. Rainfall can be an important exogenous factor as it is commonly the main determinant of food availability, and is often positively related to population size. Energy obtained from food can improve body condition and then population survival rates, or be allocated into reproduction, increasing recruitment rates, via newborn individuals. However, the high physiological costs of reproduction in small mammals can lead to a decrease in survival, thus making survival rates negatively related to rainfall. To date few studies focused on the effects of rainfall on both survival rates and reproduction. Using a capture-recapture dataset, we investigated the importance of rainfall for population dynamics of four Atlantic Forest small rodents. We found that, for most species, rainfall decreases survival and increases reproduction, indicating a trade-off between these two critical population parameters. 3
- 9 **Habitat quality vs. landscape metrics as determinants of abundance and composition of small mammals in Atlantic Forest remnants Brazil** A.C. Delciellos, (anadelciellos@yahoo.com.br), Uni.Fed.do Rio de Janeiro, Brazil, M.V. Vieira, (mvvieira@biologia.ufrj.br), C.E. de Viveiros Grelle, (grellece@biologia.ufrj.br), P. Cobra, Ecotropica Ambiental (priscillacobra@gmail.com) The conceptual foundation of habitat fragmentation research is based on island biogeography and metapopulation theories, where fragment size and isolation are the most important determinants of species richness and composition. Habitat quality inside forest fragments has received considerably less attention. We determine how habitat structure, a measure of habitat quality, compares to fragment size, shape, isolation, and matrix properties as determinants of richness and composition of non-volant small mammals in a fragmented landscape of Atlantic Forest. Small mammals were surveyed in 25 fragments in Rio de Janeiro, Brazil. A total of 36 candidate models were compared by Akaike Information Criteria. Habitat structure was the main determinant of assemblages, which varied mostly along a gradient of canopy and understory openness, and presence of fallen logs. Traditional landscape geometric variables provided a smaller additional predictive ability. Habitat quality may be an unappreciated yet important determinant of assemblages. 3
- 10 **Long-term population and diversity trends across mammalian communities in a shifting conservation landscape in Kenya** A. Massey, (aimeelmassey@gmail.com), Uni.Michigan, Ann Arbor, USA We focus on community-level change in the Aberdare mountain range ecosystem, a matrix of tropical forests that support a high concentration of large-bodied mammalian species. Conservation efforts, particularly the construction of an electric fence around the entire perimeter of the ecosystem, have drastically changed the structure of the landscape. Many have hailed these changes as a win-win for wildlife and the communities that surround the protected area. However, little work has been done to document long-term trends in population and diversity of the highly-valued mammalian communities. Here we use exceptionally long-term datasets of daily observation data from two flagship wildlife lodges in Aberdare National Park to investigate spatial and temporal changes in this habitat. Our results show an overall decrease in wildlife population and significant differences between the population and diversity trends across the two study sites. We discuss the potential impacts of the Aberdare fence on these mammalian communities. 3

- 11 **Temporal variation on survival, and population dynamics of three sympatric rodents** C. Rocha, (rocha.clarisse@gmail.com), Uni.de Brasília, Brazil, R. Ribeiro, (rs.raquel@gmail.com), Uni.Cat.de Brasília, I. de Mattos, (mtt.ingrid@gmail.com), J. Marinho-Filho, (jmarinho@unb.br) We tested the hypothesis the abundance of rodents varies with dry and wet seasons, this variation remaining constant between years. A capture-mark-recapture program was performed at Aguas Emendadas Ecological Station, Federal District, Brazil. Two grids of baited live traps were set monthly in a grassland from March 2004 to April 2010. The abundance of each species was calculated using MARK. *Calomys tener* and *Thalpomys lasiotis* showed marked seasonal variation being more abundant in the early dry period. *Calomys* maintained numbers over time, while *Thalpomys* showed a population decline and was not captured in the last year of the study. *Necomys lasiurus* had no seasonal pattern but had a biannual fluctuation in abundance. Seasonality of *Calomys* and *Thalpomys* may result from an annual reproductive cycle associated with the rainy season, the recruitment occurring until mid dry season. Population cycles of *Necomys* seem to be explained by factors such as productivity, predation and competition. 3
- 12 **Variations of a small mammal community in a changing landscape in southeastern Virginia** K. Rogers, (kroge013@odu.edu), Old Dominion Uni. Norfolk, Virginia, USA, S. Crawford, (scraw020@odu.edu), J. Eggleston, (jegg1001@odu.edu), R.K. Rose, (brose@odu.edu) In 2005, an ongoing monitoring program of the small mammal community began on a secondary successional wetland site owned by The Nature Conservancy. We hypothesized the spatial distribution of the herbivorous small mammal community and populations would be related to that of vegetation. Our study site consisted of an 8 x 8 grid, at 12.5m intervals, and had two modified Fitch traps per station. We trapped for three days each month, averaging 4600 trap nights per year. After determining the spatial densities for the small mammal community and populations, we used ArcGIS to map and conduct cluster analyses using a combination of LiDAR data and ground surveys, with respect to the small mammal community and population densities. As succession continued, this site experienced a general and parallel decline of all old field species, both for vegetation and the small mammal community. 4
- 13 **Different patterns of populations outbreaks in two rodents from the Brazilian semiarid region** G. Sobral, (gisasobral@gmail.com), Mus.Nacional/UFRJ, Rio de Janeiro, Brasil, J. Alves de Oliveira, (jaoliv@mn.ufrj.br) Life histories comparisons may identify common components among different strategies. This study focuses on a comparison between life cycles of two rodent species of similar size living in the same region, *Wiedomys pyrrhorhinos* and *Necomys lasiurus*. Sampling comprised about 4500 individuals collected in semi-arid Brazil between 1951 and 1955. Both species had population booms with alternating densities during this period. *Necomys* but not *Wiedomys* showed a population outbreak seven months after an abnormal rain season (three times above average). A second synchronised outbreak occurred in both species, with *Wiedomys* showing a higher density. The a reproductive period in both species was concentrated in the months following the rainy season, but reproductive female *Wiedomys* were also captured during the dry season. Such strategy may have evolved as an adaptation to long periods of drought in semi-arid Brazil where *Wiedomys* is endemic, whilst *Necomys* is more generalist, inhabiting mesic microhabitats. 4
- 14 **Dynamics of a fluctuating vole population: effects of phase, density and climatic variation working in synergy** M. Oli, (olim@ufl.edu), Uni. Florida, Gainesville, Florida, USA, V. Goswami, (vgoswami@ufl.edu), L.L. Getz, (l-getz@life.illinois.edu), J.A. Hostetler, (Hostetler.J@si.edu) The role of density-dependent and independent processes in governing the dynamics of mammal populations that exhibit high amplitude, often multiannual, fluctuations in abundance, has been the subject of intense debate among ecologists. We address this long-standing issue by applying CMR analysis to 25 years of monthly trapping data of a fluctuating population of prairie vole *Microtus ochrogaster* in Illinois, USA, to estimate and model realized population growth rates and associated vital rates as a function of vole density and density-independent climatic variation. Phase-specific effects of vole density lagged by one month and mean monthly temperatures with no time lags were the primary drivers of variation in realized population growth rate. The underlying vital rates, survival and recruitment, were affected by phase of population fluctuations, vole density, mean monthly temperatures, and the additive and interactive effects of these variables. We conclude that the synergistic effects of density-dependent and -independent variables during each phase of density fluctuations drive the dynamics of our study population. 5
- 15 **Functional morphology of the quill vibrating mechanism as a sounding apparatus in the streaked tenrec** H. Endo, (hendo@um.u-tokyo.ac.jp), Uni. Mus., Uni. Tokyo, Tokyo, Japan, A. Matsui, (Amatsuidenshi@yahoo.co.jp), T. Yonezawa, (Tyonezawadenshi@yahoo.co.jp), Fudan Uni. A. Shinohara, (Ashinoharadenshi@yahoo.co.jp), Uni. Miyazaki The streaked tenrec (*Hemicentetes semispinosus*) possesses a quill vibrating mechanism in the dorsal side of the caudal trunk that has evolved as a specialized sounding apparatus for communication. An arrangement of 15-16 light-brown quills was observed in its dorso-caudal area. Thickened cutaneous muscles were revealed beneath the quills. We named this structure "quill vibrator disc (QVD)". QVD was found to be 16.8 mm in length and 8.55 mm in width in a typical adult. The longitudinal musculature was found to be symmetrical about the sagittal plane was developed in the QVD. Immunohistochemically, myocytes were found to contain mainly the fast myosin and not slow myosin. These findings indicate that QVD is an extraordinarily specialized apparatus consisting of the cutaneous myocytes that contributes to vibration of quills and to the production of noise for sound communication in this species. 5

- 16 **Morphological convergence and disparity in Malagasy tenrecs (Afrosoricida, Tenrecidae)** S. Finlay, (sfinlay@tcd.ie), Trinity Coll.Dublin, Ireland, N. Cooper, (ncooper@tcd.ie) Understanding patterns of morphological variation, such as convergence and disparity, remains a central challenge in evolutionary biology. Tenrecs appear to be both disparate from each other and convergent with other "insectivore" mammals. It is suggested that these morphological patterns may arise as a function of ecological similarities and differences among the species. However, previous studies have neither quantified morphological (dis)similarity in tenrecs nor attempted to identify reasons for the occurrence of these patterns. We collected morphological data from tenrecs and the mammals they resemble convergently. We use traditional and geometric morphometric techniques to assess the evidence for significant morphological disparity among tenrecs and convergences among tenrecs and other species. We also compare species' ecological niches using novel techniques and determine the influence of ecological similarity in contributing to morphological convergence. The methods developed in this work have useful applications in diverse research areas including functional diversity, biodiversity monitoring and conservation. 6
- 17 **Development of novel real-time TaqMan® PCR assays for the non-invasive genetic monitoring of otter (*Lutra lutra*) populations** D. O'Neill, (dfoneill@wit.ie), Waterford Inst.Technol., Waterford, Ireland, P.D. Turner, (pturner@wit.ie), D.B. O'Meara, (domeara@wit.ie), C. O'Reilly, (coreilly@wit.ie) Developing strategies to maintain biodiversity requires baseline information on the current status of each species. The development of genetic techniques and their application to non-invasively collected samples has the potential to yield information on the structure of elusive animal populations and so are important tools in conservation management. Using DNA isolated from faecal samples can be challenging owing to low quantity and quality of DNA recovered. This study presents the development of novel, real-time polymerase chain reaction assays using fluorescently-labelled TaqMan® MGB probes enabling species and sex identification of Eurasian otter using spraints (faeces). These assays can also be used in determining an optimum microsatellite panel and can be employed as cost-saving screening tools for downstream genetic testing including microsatellite genotyping and haplotype analysis. The techniques are shown to work efficiently with DNA isolated from otter tissue, hair, spraint, blood and anal jelly samples. 6
- 18 **Establishment of six large-scale vaccine intervention areas: opportunities for badger (*Meles meles*) ecological research** A. Byrne, (andrew.byrne@ucd.ie), Uni.Coll.Dublin, Dublin, Ireland, J. O'Keeffe, (james.okeeffe@agriculture.gov.ie), Cent. Vet.Epidem.& Risk Analysis, Dublin, D. Collins, (daniel.collins@ucd.ie), G. McGrath, (guy.mcgrath@ucd.ie) European badgers are the principal wildlife host species for bovine tuberculosis (caused by *Mycobacterium bovis*) in Ireland. Vaccination of badgers with Bacille Calmette Guerin (BCG), as an alternative to continued culling, may aid in disease eradication efforts within the national cattle herd population. The feasibility, and effects, of using injectable BCG in captured wild badgers will be assessed during a non-inferiority observational study in six areas (mean extent: 400km²; total: 2797 km²) in Ireland over a minimum of three years. During these studies, badgers will be captured, vaccinated and permanently marked, facilitating mark-recapture approaches to estimate relative abundance, apparent survival and movement metrics. Sett (burrows) surveys will also be undertaken and activity levels recorded. Here we present the extent and geographic characteristics of the proposed study areas. This project will provide an unprecedented opportunity to study badger populations at landscape scales. 6
- 19 **Evaluation of attractants for improving detection of Mediterranean carnivore communities in camera-trap studies** P. Ferreras, (pablo.ferreras@uclm.es), Inst. de Invest. Recursos Cinegéticos, Ciudad Real, Spain, F. Díaz-Ruiz, (pacodi1480@hotmail.com), P. Monterroso, (pmonterroso@cibio.up.pt), Porto Uni., Portugal, P.C. Alves, (pcalves@fc.up.pt) Camera trapping methods provide valuable tools for monitoring carnivore communities, but detection rates are usually low due to these species low density. We assessed the detectability of Mediterranean carnivores by camera traps for several attractants in two study areas in Central Spain, analyzing the data with occupancy models. The combination of lynx urine (LU) and valerian extract (VE) provided for all the carnivore species higher detectability than any of these scents in isolation, increasing detectability between x 2 and x 7, depending on the species. The combination LU + VE produced higher detection probability for red foxes, Egyptian mongooses and Eurasian wildcats than a bait lure (raw chicken). However, raw chicken yielded a higher detectability for stone martens, common genets and Eurasian badgers. These results suggest valuable recommendations for new studies depending on whether the aim was to maximize the detectability of a particular species or to monitor the whole mesocarnivore community. 6
- 20 **Population structure and dietary analysis of pine marten (*Martes martes*) and stone marten (*Martes foina*) in the Nietoperek bat reserve** J. Power, (johnpowerwit@yahoo.ie), Waterford Inst.Technol., Waterford, Ireland, C. O'Reilly, (COReilly@wit.ie), P. Turner, (pturner@wit.ie), H. Schofield, The Vincent Wildlife Trust, (henryschofield@vwt.org.uk) Nietoperek is a NATURA 2000 site in Western Poland. Two marten species are present in the area. Recent evidence has revealed that marten may be involved in bat predation. To investigate the potential impact of marten, a non-invasive genetic study is being conducted to determine the population density and distribution of both marten species, and assess if both species are preying on bats. Scats are collected both in the bat reserve and above ground. DNA is extracted and subjected to molecular analysis for species identification, sex determination, individual identification and dietary analysis. Marten distribution is mapped within and above the system to assess the spatial distribution and investigate territorial behaviour. Initial results have shown individuals from both marten species present in the tunnels, and preliminary analyses have found scats containing bat DNA. Future work will include identifying which bat species are present in these scats. 6

- 21 **Summer precipitation predicts spatial distributions of semiaquatic mammals: implications for climate change** 6
 E. Heske, (eheske@illinois.edu), Illinois Nat. Hist. Survey, Champaign, Illinois, USA, A. Ahlers, (aahlers2@illinois.edu), Uni. Illinois, P. Wolff, (pjwol21@gmail.com), R. Schooley, (schooley@illinois.edu) Anthropogenic climate change is predicted to cause an increased frequency of both droughts and flooding in the Midwestern USA. Semiaquatic mammals dependent on highly-altered riparian habitats may be especially sensitive to these changes. We used 6 years of presence-absence data, spanning years of record-breaking drought and flood conditions, to evaluate occupancy dynamics of American mink (*Neovison vison*) and muskrats (*Ondatra zibethicus*) in an agricultural region. Occupancy of stream segments was correlated positively with summer precipitation for mink and muskrat. During a severe drought in 2012, site occupancy was low for mink (0.55) and especially for muskrats (0.08). Mink are generalist predators that may use upland habitat during droughts, but experience greater risk of mortality away from streams. Muskrats are more restricted to aquatic habitats and likely suffered high mortality during the drought. Urban watersheds may serve as refugia for muskrats during drought because of higher base flows.
- 22 **The use of hair tubes to detect presence of stoats and weasels** K. McAney, (katemcaney@vwt.org.uk) The Vincent Wildl. Trust, Headford, Galway, Ireland, J. MacPherson, (jennymacpherson@vwt.org.uk), C. O'Reilly, (coreilly@wit.ie), D. O'Meara, (domeara@wit.ie) Little is known about the population status of stoats and weasels in Britain as they are difficult to monitor; they do not leave obvious field signs and are seen rarely. Present monitoring on a large scale is by using records from gamekeepers of the numbers of animals trapped and shot, collected as part of the National Game Bag Census (NGBC). These data have been used to describe national trends in the abundance and distribution of weasels and stoats since 1961; however it is recognized that there is an urgent need for increased detection, and new techniques are required to survey and monitor these species. In 2010, a pilot project was carried out to investigate the effectiveness of hair tubes deployed by volunteers to detect the presence of Irish stoats (a recognized sub-species) in county Galway. The success of this led to the current study carried out in west Wales as part of the Mammals in a Sustainable Environment (MISE) project. 1 km² in each 10km² is surveyed with the help of local volunteers, using baited hair tubes. DNA extracted from hair samples is then used for species identification. 7
- 23 **A one-generation difference in genetic spatial structure between the sexes in the Asian black bear** N. Ohnishi, (bigwest@affrc.go.jp), Tohoku Res. Cent. Forestry & Forest Products, Nabeyashiki, Morioka-city, Iwate, Japan, T. Osawa, (arosawa@affrc.go.jp), Nat. Inst. Agro-Environ. Sci. To reveal the one-generation difference in genetic structure between sexes in Asian black bears, we examined the difference in the distribution of mitochondrial DNA and compared the genetic effective distance between sexes using microsatellite DNA. From sequences of 758 bears from continuous population, we examined 326 sequence data in ten haplotype groups that were distributed locally. The estimated pair-wise rectilinear distances indicated that males tended to distribute on the periphery of the observed area of the locally distributed haplotypes. Distribution range analysis showed that both the maximum and average ranges of males in eight haplotype groups were larger than those of females. Spatial autocorrelation analysis using genotype data for microsatellite DNA revealed that the genetic correlation coefficients were significantly higher than expected within the 0-10km distance class for females and the 0-20km distance class for males. These results revealed that males expanded the haplotype distribution and mediated gene flow. 7
- 24 **Assessment and improvement of the accuracy of assignment test to identify immigrants in a grey-sided vole population in a continuous habitat** T. Yamada, (toshiya10480909@fsc.hokudai.ac.jp), Sapporo, Hokkaido, Japan, T. Saitoh, (tsaitoh@fsc.hokudai.ac.jp) Assignment test (AT) has been widely used to estimate immigration in a population. AT can identify immigrants in high accuracy between genetically distinct populations. However, most populations mutually show some genetic similarity, and it is particularly so in a continuous habitat. We assessed the accuracy of AT in a continuous habitat, by comparing the results of AT with mark-recapture records in a grey-sided vole population, and explored a solution to increase the accuracy. AT was not able to identify most immigrants, probably because most immigrants came from outside the population but within the same random mating group, in which immigrants had little genetic differences from residents. High frequency of dispersal that genetically homogenizes population causes low accuracy of AT. Since grey-sided voles usually disperse in relation to reproduction, AT accuracy was increased using allele frequency of the population before the breeding season. 7
- 25 **Ecological determinants of home range size and microhabitat utilization by two sympatric Atlantic forest rodents (Cricetidae: Sigmodontinae)** R. Bovendorp, (bovendor@usp.br), CENA-ESALQ, Uni.São Paulo, Brazil, P. Jordano, (jordano@ebd.csic.es), Estación Biol.de Doñana, CSIC, Sevilla, Spain, A. Reis Percequillo, (percequillo@usp.br) Habitat use is considered one of the main dimensions of niche partitioning among sympatric species, determining many ecological and evolutionary interactions with the environment. Spatial data were obtained by the spool-and-line method in Morro Grande Forest Reserve, southeastern Brazil and analyzed through the Local Convex Hull through R software to evaluate space use by *Euryoryzomys russatus* (endangered) and *Sooretamys angouya* (data deficient). The home range area for *S. angouya* (n = 3) was 2,255±379m², a species with scansorial habits, and *E. russatus*, with strictly terrestrial habits, home range area was 1,330±560m² (n = 23). The results suggest that differences in home range size and use of different levels of forest would minimize the competition between these species, allowing coexistence in the same habitat through niche differentiation. 7

- 26 **Patterns of transience in four species of oldfield herbivorous rodents in the USA** R.K. Rose, (brose@odu.edu), Old Dominion Uni., Norfolk, Virginia, USA, S.E. Rice, (srice001@ucr.edu) The dogma of population sub-structure assumes that rodents live their lives in circumscribed (natal) areas, with males and juveniles being more prone to disperse than females or adults. To test these assumptions, we examined records of geographic populations of 4 rodent species obtained through capture-mark-recapture methods from long-term studies in Kansas, Illinois and Virginia. We evaluated proportions of residents and transients (1 capture), adults and juveniles, and males and females for differences among seasons, years, and geographic locations. *Sigmodon hispidus* and *Oryzomys palustris* exhibited seasonal transience, with residents and transients of similar body mass. Meadow and prairie vole populations had seasonally significant transience, with geographic variation in the density dependence of transience and differences in body mass between residents and transients. Six of 7 populations had >50% transients. In brief, none of these populations fulfilled the expectations of the current model of population sub-structure; perhaps a new model is needed. 7
- 27 **Seasonal change of anthropogenic barrier influence on long-distance migratory ungulates in Mongolia** T. Ito, (ito@alrc.tottori-u.ac.jp), Tottori Uni., Tottori, Japan, B. Lhagvasuren, Mongolian Acad. Sci., Mongolia, A. Tsunekawa, M. Shinoda. Mongolian gazelles and Asiatic wild asses in Mongolia are facing habitat fragmentation by anthropogenic barriers. We tracked 24 Mongolian gazelles and 12 wild asses near the Ulaanbaatar–Beijing Railroad and the fenced international border between Mongolia and China between 2002 and 2012. None of the tracked gazelles and asses crossed the railroad and the border. The both species used the areas within 10 km from the anthropogenic barriers more frequently during winter than summer. Ungulates would seek areas where plants are more available during winter, and be impeded to move ahead by and wonder along the barriers. It may cause higher mortality of ungulates due to that ungulates cannot reach areas of enough plant availability to survive until spring. To conserve long-distance movement of the ungulates in this area, it will be necessary to remove or mitigate the barrier effects of the existing and planned roads and railroads. 7
- 28 **Spatial-temporal use of a coastal sand dune by mammals in western Japan 2. Temporal activity patterns of mammals** Yanfei Wu, (wuyanfei@bre.soc.i.kyoto-u.ac.jp), Kyoto Uni., Kyoto, Japan, L. Koyama, (linak@bre.soc.i.kyoto-u.ac.jp) A coastal sand dune located in Tottori Prefecture, Japan, was invaded by plants in the past few decades. As a result, mammals such as foxes and wild boars settled down in the dune. To study temporal patterns in mammal activity, 11 cameras with PIR sensors were set to shoot 10-sec. videos 24 h day-1 from Aug. 2012. By Jun. 2013, eight mammal species had been detected more than 500 times. Both the numbers and species composition of detected mammals varied seasonally. Diurnal patterns in mammal activity also changed seasonally. During the warm-hot seasons, mammals tended to be nocturnal, while in the cool-cold seasons, daytime activities increased. 7
- 29 **Spatial-temporal use of a coastal sand dune by mammals in western Japan I. Spatial distribution of mammal trails** L. Koyama, (linak@bre.soc.i.kyoto-u.ac.jp), Kyoto Uni. Kyoto, Japan, Yanfei Wu, (wuyanfei@bre.soc.i.kyoto-u.ac.jp) This study is located in one of the largest sand dunes in Japan, the Tottori Sand Dunes facing the Sea of Japan. Recently, coastal plants started covering the dunes due to less sand accumulation in the dune under the influence of a windbreak plantation with a consequent increase in the number of sightings of mammals and their trails. Few scientific investigations on these animals have been made in this area. We conducted a route census in which we recorded the positions, types and numbers of the mammal trails at monthly intervals to understand the spatial use of mammals in the dune. The trails were categorized into several types, and spatial association between types and continuity were estimated. We discuss their distribution patterns and the seasonal changes in distribution. 7
- 30 **Use of space by the marsupial *Gracilinanus agilis* in the Brazilian Cerrado: influence of sex, food availability, and reproductive status** J. Ribeiro, (jufernandesribeiro@gmail.com), Uni.de Brasília, Darcy Ribeiro, Brasília, Brasil, E.M. Vieira, (emerson.emv@gmail.com) Patterns of use of space by male and female mammals may vary to optimize the reproductive success of each sex. We evaluated the effects of sex, season, and resource availability on home-range size of the didelphid marsupial *Gracilinanus agilis* in the Brazilian Cerrado. Our results indicated an interaction between sex and time of year ($P=0.02$). Males increased their home ranges in the pre-breeding period (dry season), probably for enhanced foraging during a season of low resources and also for searching for available females. During the lactation period (rainy season), the females increased their home ranges possibly to meet their increased food requirements, considering the high energetic demand of lactating and caring for young. For both sexes, the average distances traveled between trap stations was positively related to the availability of fruits and negatively related to population density. 8
- 31 **An introduced species helping another: dispersal of a rose seed infesting wasp by a marsupial in New Zealand** G. Norbury, (norburyg@landcareresearch.co.nz), Landcare Res., Alexandra, New Zealand, C. Rouco, (roucoc@landcareresearch.co.nz) Fruit-infesting insect species that survive passage through the digestive tract of frugivorous vertebrate species are generally dispersed over greater distances than would occur otherwise. However, there is little field evidence of fruit-infesting insect species surviving passage through the digestive tract of frugivorous mammal species. We collected brushtail possum faecal pellets from the wild and demonstrated emergence of adult Torymid wasps from *Rosa* seed without removing the seeds from the pellets. Nineteen percent of possum dung pellets were infested by adult wasps, and a large proportion (85%) of wasps survived. Survival rates were high considering that gut passage time in possums averages 50 hours. This period potentially allows greater dispersal distances of wasps than would occur otherwise. This insect-plant-vertebrate triad was studied in New Zealand where both brushtail possums and briar rose are invasive species that did not co-evolve. 8

- 32 Effects of small mammals on seedling establishment in burned and unburned desert plant communities** 8
T. Sharp, (rose72003@yahoo.com), Brigham Young Uni., Provo, Utah, USA , B. McMillan, (brock_mcmillan@byu.edu)
Small mammals influence and can even regulate the composition of plant communities in desert systems. However, increasing frequency of fire in deserts of the western United States is altering small mammal communities. We used a randomized complete block design to evaluate the interactive effects of fire and small mammals on survival of seedlings of common plant species in the Mojave and Great Basin Deserts. Seedlings in plots with small mammals experienced percent increases in weekly mortality over plots without small mammals of 0-170% (mean 54%) in the Mojave and 0-117% (mean 37%) in the Great Basin. Our results illustrate that the role of granivorous small mammals extends beyond dispersal and granivory to the seedling stage of plant life cycles. Moreover, small mammal-mediated folivory during the seedling stage may be equally or more important for plant survival than both dispersal and granivory of seeds.
- 33 Effects of food quality and availability on food habits, body size and pregnancy rate of Sika deer in central Japan** 8
T. Seto, (seto.takayuki@gmail.com), Tokyo Uni. Agriculture & Technol., Japan, N. Matsuda, (matsudan01@pref.tochigi.lg.jp), Tochigi Pref., Japan Nikko and Ashio areas of central Japan are contrasting habitats in food quality and availability for sika deer (*Cervus nippon*). In Nikko, the main food plant has high nutritive value and small biomass, and is overgrazed. In Ashio, the main food plant has low nutritive value with large biomass. Deer density in Ashio was about 5 times higher than that in Nikko until pest control started. Winter food habits in Nikko were susceptible to changes in snow depth and deer density. On the other hand, winter food habit in Ashio was relatively stable despite of changes in snow depth and deer density. The deer in Ashio had smaller body size and lower pregnancy rate than those in Nikko. These results suggest that greater quantity of biomass available in Ashio can support a higher deer density than the better nutritive quality but lower quantity of biomass in Nikko.
- 34 Explosive opening of *Mucuna macrocarpa* by flying-fox on Okinawajima Island, Japan** S. Kobayashi, 8
(Cheirotonus.jambar@gmail.com), Uni. Ryukyus, Okinawa, Japan, A. Nakamoto, (dasymallus@gmail.com), T. Denda, (denda@sci.u-ryukyu.ac.jp), M. Izawa, (izawa@sci.u-ryukyu.ac.jp) *Mucuna macrocarpa* is a vine plant distributed discontinuously from Southeast Asia to Kyushu, Japan. The stamens and pistil of this plant are covered by hard petals (carina), so it cannot cross-pollinate unless an animal opens its flowers. This process is called explosive opening. We showed that Orii's flying fox is the only explosive opener in subtropical region of Okinawajima Island from field and captive observations. There is a pair of hooks on the basal part of the banner (enlarged upper petal) and these hooks prevent nectar from flowing down and the carina from opening. Orii's flying-fox pushed up the banner using its snout skilfully and released the hooks to feed on nectar. The structure of this flower complements the behaviour of this flying-fox. Furthermore, much pollen is attached to the face of Orii's flying fox which is an effective pollinator of *M. macrocarpa*.
- 35 Investigating the use of medicinal plants by orangutans (*Pongo pygmaeus* ssp.) to combat parasitic infection** 8
P. Stuart, (peterdstuart@hotmail.com), Masaryk Uni., Brno, Czech Rep., I. Foitová, (ivona_foi@hotmail.com) All species of orangutans (*Pongo pygmaeus* ssp.) are endangered. The study of the epidemiology of orangutan parasitic infection is required for successful conservation planning and wildlife management of the remaining fragmented populations. This includes understanding orangutan behaviour influencing parasitic infection. Zoopharmacognosy is the term that describes the behaviour of wild animals using specific wild plants with medicinal effects. This project aims to evaluate the hypothesis that the eating of specific plants, or their parts, by orangutans corresponds to a decrease in parasite load. This will be investigated by testing selected plant compounds for antiparasitic activity on selected parasite cultures, using *in vivo* and *in vitro* models. Identifying antiparasitic plants utilised by orangutans will improve the knowledge of plant species required by wild and captive orangutans, aid teaching possibly reintroduced orangutans to utilise these plants and possibly identify plant compounds with pharmaceutical medicinal purposes for humans.
- 36 Microhabitat selection for caching and use of potential landmarks for seed recovery by the Azara's agouti (*Dasyprocta azarae*)** E. Vieira, (emvieira@unb.br), Uni.de Brasília, Brasília, Brazil, J.F. Ribeiro, 8
(jufermandesribeiro@hotmail.com) We investigated the use of structural characteristics of the forest by a scatter-hoarder rodent (the Azara's agouti *Dasyprocta azarae*) in the Brazilian Araucaria Forest. The relation between microhabitat characteristics and caching sites and also the selection of potential landmarks as cues for seed recovery was evaluated by following threaded seeds of *Araucaria angustifolia* (Araucariaceae). Agoutis significantly selected caching sites with higher canopy cover, closer to tree trunks, and with greater herbaceous cover in comparison with randomly selected sites. We also detected that these rodents cached seeds closer to fallen logs and to tree seedlings than expected by chance. Moreover, seeds buried near young trees and fallen logs were recovered more frequently in comparison to seeds cached near tree trunks or exposed rocks. The proximity of potential landmarks, however, did not influence seed removal from artificial caches, suggesting that visual cues do not enhance seed location by naive foragers.
- 37 Small mammals and grassland integrity, South Africa** N. Avenant, (navenant@nasmus.co.za), Nat. Mus., 10
Bloemfontein, South Africa, and Uni. of the Free State, Bloemfontein, South Africa The expansive Grassland Biome is one of South Africa's most extensively transformed and threatened habitats. This contribution explores the value of small mammal surveys in the assessment of grassland ecosystem integrity. It combines 15 years' results from various short and long term studies, and re-evaluates the parameters of trap success, species richness, diversity, evenness and individual species as bio-indicators. Results suggest that: small mammal species richness and diversity consistently decline with habitat degradation; generalist species dominate community numbers at low ecological integrity; the number of specialist species increases towards ecological climax; and, specific species act as indicators during the successional process. As such, it suggests that small mammal communities are effective indicators of habitat integrity in southern African grassland ecosystems. The study further provides a benchmark against which future small mammal assessments and monitoring can be measured.

- 38 Reproductive physiology of nulliparous captive reared collared peccary (*Pecari tajacu*), in the Brazilian Amazon** 10
A. Silva Botelho, (agathabotelho@gmail.com), Uni. Federal do Pará Augusto Correa, Belem, Brazil, S. do Socorro Bastos da Silva, (suleima_silva@yahoo.com.br), Y. Le Pendu, (yvonnickuesc@gmail.com), Uni. Estadual de Santa Cruz, Brazil, D.A. Guimarães, (diva@ufpa.br) Suppression of inbreeding is a method to avoid consanguinity between individuals of the same family group. This could explain the reproductive failure of nulliparous, female collared peccaries (*Pecari tajacu*) in captivity. The reproductive cycles of 14 females, distributed in four families, were monitored in two groups: control and experimental (60 days each). The nulliparous females were removed from the control group and mated with two unrelated males (experimental phase). Oestrous cycles were monitored by plasma progesterone and colpocytological analyses. Most females (57.1% of control group), demonstrated anoestrous and irregular oestrous cycles. Neither copulation nor clinical signs of pregnancy were observed. In the experimental group, spermatozoa were verified in the colpocytological samples and ultrasonography diagnosed pregnancies 30 days after copulation. This evidence suggested that nulliparous females do not reproduce in groups with close relatives, with reproduction monopolized by an older couple, suggesting a mechanism of reproductive exclusion in the family group.
- 39 The effects of malnutrition on reproductive characteristics in Sika deer inhabiting Shikotsu-Toya National Park, Japan** 10
M. Azumaya, (s20814101@yahoo.co.jp), Sapporoshi, Hokkaido, Japan, Y. Matsuura, (ymtur@affrc.go.jp), Forestry & Forest Prod. Res. Inst., Sapporo, Japan, H. Igota, (igoto@rakuno.ac.jp), Rakuno Gakuen Uni., T. Yoshida, (yoshi-ty@rakuno.ac.jp) Reproductive characteristics are often used as indicators of quality in ungulate populations, because they vary depending on physical condition of female. We evaluated the influence of degradation of population quality on reproductive characteristics of Sika deer on Nakanoshima Island in Shikotsu-Toya National Park, Japan, where the food is limited because of excessive deer density. We used vaginal implant transmitters (ATS M3930) and captured eight neonates in 2010 and 2011. Parturition began later and the birth weights tended to be lighter compared to another high quality population. We also analyzed fetal sizes from culled females and made a fetal age estimation model. Fetal growth was depressed and the gestation period was estimated to be 238 days, which was longer than that of the other population by 24 days. These results suggest that gestation period under malnutrition were extended to compensate depressed fetal growth but still resulted in light birth weights.
- 40 Timing of puberty and its relationship with body growth in feral raccoons (*Procyon lotor*)** M.W. Okuyama, 11
(okuyama.M@vetmed.hokudai.ac.jp), Hokkaido Uni., Sapporo, Japan, M. Kajita, (minstrel8710@yahoo.co.jp), M. Shimozuru, (shimozuru@vetmed.hokudai.ac.jp), T. Tsubota, (tsubota@vetmed.hokudai.ac.jp) The raccoon (*Procyon lotor*) has naturalized and its population size has been increasing in Japan. The age of attaining puberty is important in estimating individual lifetime reproductive success and population growth. This study investigated the timing of puberty and potential factors affecting its onset in raccoons in Hokkaido, Japan. Reproductive organs were collected from 216 females and 129 males. Parturition period ranged from late March to early July. Almost all female yearlings were pregnant (94.3%), and 59.2% of juvenile females were also pregnant. Mean body length and body weight of non-pregnant individuals were significantly smaller than parous individuals. For the majority of males, prepubertal development began in yearling period, but some juvenile males (18.6%) captured in barns in agricultural fields, attained puberty earlier with larger body size, further suggesting differences in body growth rate can influence onset of puberty and timing of parturition.
- 41 A landscape of risk – unpredictable predator activity in semi-arid Australia** C. Price, 11
(catherine.price@sydney.edu.au), Uni. Sydney, New South Wales, Australia, P.B. Banks, (peter.banks@sydney.edu.au) The “landscape of fear” concept reflects spatial heterogeneity in predation risk perceived by prey, often attributed to patchiness in refugia. However, predators may also have non-random distributions, creating ‘hotspots’ of risk for prey in areas with high rates of predator visitation that should then be avoided. Conversely, areas with relatively infrequent predator visitation may be unpredictably risky making accurate estimations of risk challenging for prey. We examined the spatial and temporal distribution of introduced (red fox *Vulpes vulpes* and feral cat *Felis catus*) and native (dingo *Canis lupus*) predators within a semi-arid wildlife reserve in central Australia. Daily visitation rates of predators and the large primary prey species (kangaroos, feral goats, rabbits) were measured using sand pads. The visitation rates of predators and prey were negatively correlated, with predator visitation also spatially patchy. We interpret the unpredictability of predator activity across the landscape from the perspective of predator-prey foraging games.
- 42 Convergent rodents disparate spatial risk assessments** S. Bleicher, (bleicher.s.s@gmail.com), Uni. Illinois at 11
Chicago, Chicago, Illinois, USA Gerbils in the Negev Desert and heteromyids in the Mojave Desert are evolutionarily convergent. I exposed two species of each group to predators that are evolutionarily known and novel to them in an experimental arena. Based on optimal patch use theory and using distance weighted least squares (DWLS) smoothing statistics, I mapped the landscape of fear for each of the species. The raster topographic maps show different patterns of safe and risky habitats within the same environmental set-up. The different patterns suggest a behavioural strategy divergence in the convergent species. Average size matters (within family comparison) in the willingness to take risk in the presence of vipers. In the presence of owls all species reduced foraging in a similar pattern.

- 43 **To dare or not to dare? Risk management by owls in a predator-prey foraging game** K. Embar, (embarkeren@gmail.com), Sede Boker Campus, Ben-Gurion Uni. of the Negev, Israel, A. Raveh, (ashael@bgu.ac.il), D. Burns, (darrenjo@bgu.ac.il), B. Kotler, (Kotler@bgu.ac.il) In foraging games, predators must catch elusive prey while avoiding injury. Daring behavior - the willingness to risk injury - may increase predator's hunting success. If so, daring should be state-dependent: hungrier predators should be more daring. In a vivarium we allowed barn-owls to hunt gerbils from a choice of safe and risky patches. Owls were either well-fed or hungry. We predicted that hungry owls would be more daring. Owls preferred to hunt in the safe patches, managing risk of injury by avoiding risky patches. Hungry owls performed more attacks, but mostly towards safe patches and the safer, open areas within the risky patch. Even when hungry, owls do not increase daring. Instead, owls risk failing more often in their attacks rather than risk injury. We conclude that daring is a strategic tool, and that owls preferred instead to increase the use of other behavioral tools, investing more efforts in safer habitats. 12
- 44 **Links between parasitism and life history strategies in the European badger (*Meles meles*)** E.A. Magowan, (emagowan02@qub.ac.uk), Queen's Uni.Belfast, Northern Ireland, UK, N. Marks, (n.marks@qub.ac.uk), R. Skuce, (Robin.Skuce@afbini.gov.uk), Agri Food & Biosciences Inst., Belfast, UK, D.M. Scantlebury, (m.scantlebury@qub.ac.uk) Restrictions in the amounts of resources wild animals can obtain from the environment inevitably mean that there must be tradeoffs in energy investment into various life history characteristics. Frequently cited examples of such life history tradeoffs are between growth and reproduction; or between size and number of offspring. The energy costs of dealing with infectious agents, such as parasites, might be expected to reduce the amounts of energy available to hosts, limiting their ability to invest in various somatic functions and affecting their life-history. Indeed, various morphological, physiological and behavioural characteristics are associated with parasitism. Here we investigate the associations between ecto- and endoparasite load and various morpho-metrical and physiological features that might be expected to vary with life history. Significant effects involving ectoparasites include: zygomatic arch width, body mass, sex, season and testes mass. Parasitism could be an important factor defining badger behaviour and life history. 12
- 45 **A new species of the Genus *Heterakis* (Nematoda, Heterakidae), parasite of African rodents** A. Ros, (aribas@ub.edu), Uni. Barcelona, Spain, J. Goüy de Bellocq, Uni. Antwerp, Belgium, C. Feliu, A. Ribas Two parasitic, nematode species of the genus *Heterakis* are reported from continental Africa: *H. dahomensis*, a parasite of the Gambian giant rat *Cricetomys gambianus*, recently described from Senegal, and *H. spumosa* associated with the cosmopolitan invasive *Rattus* and *Mus* species, and also reported from native rodents although this identification is doubtful. A small-mammal capture campaign was conducted in Kenya during the summer of 2010. The rodents *Lophuromys zena* and *Praomys* sp. from Mount Kenya harboured a nematode belonging to the genus *Heterakis*. Other species of rodents (genera *Dendromys*, *Otomys* and *Rhabdomys*) from the same locality were negative for this nematode. A metrical, morphological (SEM microscopy) investigation allowed characterisation of the Mount Kenyan nematode and differentiated it from *H. dahomensis* and *H. spumosa*, and from other *Heterakis* species found in rodents worldwide. A genetic study was performed to complete this study. Study partially supported by 2009-SGR-403. 12
- 46 **Coronulidae (Cirripeda) recorded from western gray and killer whales in Japan-conservation and veterinary considerations** M. Asakawa, (askam@rakuno.ac.jp), Rakuno Gakuen Uni.Ebetsu, Hokkaido, Japan All species of the family Coronulidae including genera *Chelonibia*, *Platylepas*, *Coronula*, *Cryptolepas* and *Xenobalanus*, have been recorded from skin of whales, and are regarded as examples of phoresy. However, it has been suggested that settlement of cirripedians on whales might increase because of reduced movement and/or impaired regenerative and immune functioning of the skin prior to death. Recently, in Japan, *Cryptolepas rachianecti* and *Xenobalanus globicipitis* (Coronulidae: Cirripeda) with *Cyamus* spp. (Cyamidae: Amphipoda) were recorded from western gray and killer whales, respectively. Histopathological examination of the former species provides no clear evidence of high pathogenicity to the host. On the other hand, whale lice species seem to be omnivorous and eat both fibrous algae and the cutaneous scales of their host, burrowing and penetrating the horny layer of the hosts' epidermis and/or cracks between sessile barnacles. It is unknown if they could be carriers or vectors of micropathogens to whale hosts. Hence, monitoring of cirripedian and amphipodian species attached to whale is needed. 12
- 47 **Distribution of ticks infesting camels in south-west Saudi Arabia** A. Shati, (aaalshati@kku.edu.sa), King Khalid Uni, Saudi Arabia This survey was performed to find out distribution of ticks infesting camels in two areas in south-west Saudi Arabia: Abha (~2800 m above sea level) and Jazan, (on the sea level) during 2011–2012. Monthly total body tick collections were made from 16-20 camels. Collected ticks were identified to species level using valid identification key. A total of 631 hard ticks were collected. Three dominant tick species were found: *Hyalomma dromedarii* (71.8%), *H. excavatum* (4.8%), *H. impeltatum* (14.4%). The highest seasonal tick activities occurred in summer. There were more male than female ticks. Female camels had higher tick burden than males and old camels had higher tick burden than younger ones. Results of this study may provide a clue for vectors of tick-borne diseases in the region and implementation of disease control. 12

- 48 **Fecal analysis as a new method for ectoparasite studies in mammals** T.R. Diniz Reis, (thaisdinizreis@usp.br), CENA Uni. Sao Paulo, Brazil, T.F. Martins, (thiagodogo@hotmail.com), E.R. Matushima, (ermatush@usp.br) Ectoparasites are important vectors for zoonoses and wildlife diseases, but the relationship between them and their wild hosts are poorly known. Studies about this relationship are mainly based on ectoparasites found on the skin of captured animals. We demonstrate a new method to collect ectoparasites using scats. 524 mesocarnivore scats were collected in a landscape composed of Eucalyptus plantations as a matrix for remnant, native vegetation (comprising Cerrado and semideciduous forest in variable stages of succession) in Southern Sao Paulo State, Brazil. Of these, 227 scats contained ticks, mites and/or fleas (43.32%). Mites were the most common ectoparasite (88.54%), followed by fleas (9.25%) and ticks (8.81%). Studies addressing health issues are extremely important since these ectoparasites are vectors, for example, for rickettsial pathogens that cause spotted fever and typhus. This finding demonstrates an interesting new method for disease studies and for studying the more complex network of ectoparasite-predator-prey interactions. 12
- 49 **New data on *Malayometastrongylus diardinematus* (Metastrongyloidea:Angiostrongyloidea) a lungworm occurring in *Rattus tanezum* from south east Asia** M.Veciana, (aribas@ub.edu), Uni. Barcelona, Spain, K. Chaisiri, Mahidol Uni., Bangkok, Thailand, O. Phuphisut, A. Ribas A survey of the lungs of 95 rodents belonging to 7 genera (*Bandicota*, *Berylmys*, *Cannomys*, *Leopoldamys*, *Maxomys*, *Mus*, *Rattus*) from Luang Prabang Province (Laos) was conducted in February 2010 and May 2012. The helminth *Malayometastrongylus diardinematus* (Nematoda: Metastrongylidae) was identified from *Rattus tanezumi* living in close contact with humans beings, which is the first report after its original description in *Rattus tanezumi* from Malaysia. A molecular study using mitochondrial gene cytochrome c oxidase subunit I (COI) of *M. diardinematus* placed the genus *Malayometastrongylus* in a separate clade in comparison with *Angiostrongylus cantonensis* (subgenus *Parastrongylus*) and other representatives of this genus also present in rodents of South East Asia. Study partially supported by 2009-SGR-403. 12
- 50 **Parasite loads in two sympatric species of hedgehogs** S. Dziemian, (sylwia.dziemian@gmail.com), Adam Mickiewicz Uni., Poznan, Poland, R. Zwolak (rafal.zwolak@gmail.com), B. Pilacinska, (piryn@amu.edu.pl), J. Michalik (michalik@amu.edu.pl) Until 1967 the European hedgehog *Erinaceus europaeus* and the northern white-breasted hedgehog *E. roumanicus* were not recognized as separate species and very little is known about possible differences in their biology. We investigated ectoparasite loads (ticks and fleas) of two species of hedgehogs living sympatrically in an urban environment in western Poland (city of Poznań). Both hedgehog species were infested almost exclusively by ticks *Ixodes ricinus* and *I. hexagonus*, and flea *Archeopsylla erinacei*. Infestation by *Ixodes ricinus* depended on hedgehog species (higher in *E. roumanicus*), sex (higher in males), and season (lowest in the fall). Factors that influenced infestation by *I. hexagonus* changed among seasons in a complex fashion. Flea infestation was affected by season (flea loads lowest in the spring), hedgehog sex (males had more fleas than females) and body mass (heavier individuals carried more fleas), but did not differ between hedgehog species. 12
- 51 **Patterns of nematode infection in a free-ranging population of Eastern grey kangaroos** J. Cripps, (crippsj@unimelb.edu.au), Uni. Melbourne, Victoria, Australia, I. Beveridge, (ibeve@unimelb.edu.au), J. Martin (j.martin1@unimelb.edu.au), G. Coulson, (gcoulson@unimelb.edu.au) Eastern grey kangaroos (*Macropus giganteus*) defecate throughout their foraging areas and are susceptible to parasitism by gastrointestinal helminths via the faecal-oral route. Epidemiological studies on the patterns of helminth parasite infection in eastern grey kangaroos are limited to one investigation into mass mortality at a single site in 1972. We collected monthly grass samples at a golf course at Anglesea (Victoria, Australia) and estimated the number of infective-stage larvae on the pasture. We also collected monthly faecal samples from individually-tagged free-ranging eastern grey kangaroos on the golf course and recorded stongyloid faecal egg counts. Both the abundance of infective stage larvae on the pasture and faecal egg counts showed a seasonal pattern. This seasonal pattern of infective larvae is similar to that observed in infective strongyloid larvae of domestic sheep, and suggests that infection in eastern grey kangaroos is closely tied to environmental conditions. 12
- 52 ***Plagiorchis muris* (Digenea, Plagiorchidae) from *Rattus tanezumi* (Temmik, 1844) (Rodentia Muridae) in Laos** A. Ribas, (aribas@ub.edu), Uni. Barcelona, Spain, K. Chaisiri, Mahidol Uni., Bangkok, Thailand, N. Pakdeearong, Uni. of Maha Sarakham, Thailand, B. Douangboupna, Nat. Agricult. & Forestry Res. Inst., Vientiane, Lao PDR Several species of *Plagiorchis* are responsible of human infections in Asia, particularly in Indonesia, Korea, Philippines and Thailand. Previous reports on this trematode in murids of Southeast Asia are scarce, with only one report in *Rattus rattus sladeni* (i.e. *Rattus tanezumi*) in Vietnam. An inornate species of *Plagiorchis* was also recorded in *Rattus rattus diardii* (i.e. *Rattus tanezumi*) in Malaysia (Leong *et al.* 1979). During February 2010, 39 guts of the Asian house rat (*R. tanezumi*) were dissected in order to examine the helminths in Luang Prabang Province (Lao PDR). *Plagiorchis muris* was recorded in this material. We present morphological and metrical data on this trematode. 12
- 53 **Zonal types of host-parasite complexes of arthropods and small mammals in the plains of the West Siberia** M. Malkova, (malkova@oniipi.org), Omsk, Russia, M. Makenov, (mmakenov@gmail.com) We made comparative analyses of: the qualitative composition, structure and features of the landscape, in the plains of West Siberia; the distribution of small mammals; and, the occurrence of their parasitic arthropods (Acari: Mesostigmata, Ixodidae; Insecta: Siphonaptera). We identified four types of host-parasite complexes (HPC) of small mammals and arthropods, confined to particular landscape zones or subzones. Parasitic specificity of the each type of HPC was determined by arthropods of different systematic and ecological groups: tundra HPC was characterised by epizoite gamasid mites associated with subarctic species of rodents; forest and forest-steppe HPC was comprised of ticks and fleas associated mainly with forest rodents and their nests; steppe HPC was determined by fleas and nidicolous gamasid mites – specialized parasites of steppe rodents and their nests. 12

- 54 **The effects of parasites on population abundance, survival and reproduction in *Apodemus semotus*** P.J. Shaner, (pshaner@ntnu.edu.tw), Nat.Taiwan Normal Uni., Taipei, Taiwan Parasites have been shown to reduce survival and reproduction of rodent hosts and thereby play a role in host population regulation. Here we reported the results of an experiment conducted from June to November of 2012 comparing the effects of "supplemental food with parasite removal" (FP), "supplemental food" (F), and "control" (C) treatments on population abundance, survival and reproduction of the Taiwan field mouse (*Apodemus semotus*). Three habitat types were included in this study: an evergreen forest, a fir plantation and an old-field. In addition to oral administration of Ivermectin (parasite removal medication), we also provided supplemental food mixed with Ivermectin for the FP treatment. We found that parasite prevalence, load and richness were lowered by parasite removal. The abundances of *A. semotus* were more stable in FP and F grids, suggesting food supplementation, but not parasite removal, stabilized their populations. Parasite removal increased *A. semotus* survival in the old-field. Food supplementation, but not parasite removal, increased *A. semotus* reproduction in the forest. Our results suggest an overall stronger influence of food supplementation comparing to parasite removal on *A. semotus* populations. 13
- 55 **Evolutionary history of Dipodoidea and Pteromyini and their response to global environmental change** Q. Yan+L126g, (yangqs@ioz.ac.cn), Inst.Zool., Chinese Acad.Sci. (CAS), Chaoyang, Beijing, China, Deyan Ge, Lin Xia Dipodoidea is a diverse rodent group. Each of the three ecological groups of the extant Dipodoidea (sicistines, zapodines, and jerboas) has its distinctive phylogenetic construction and distribution. The origin of Dipodidae can be traced back to Middle Eocene (~42.7 Ma). The first important diversification phase occurred during Oligocene to Early Miocene. The second adaptive radiation occurred within jerboas, which was associated with expansion of open habitat since late Middle Miocene. Flying squirrels (Sciuridae: Pteromyini) are strictly arboreal squirrels. The origin center and evolutionary process of these animals were deduced from fossil records and the Dispersal-Vicariance Analysis. Results showed that flying squirrels probably originated in the Oligocene-Miocene transition from Europe and immediately dispersed to Asia and North America. The densely forested South and Southeast Asia were supposed to be the refuges and diversification center for flying squirrels during the transition from Tertiary to Quaternary and the glacial period. 13
- 56 **Evolutionary history of lagomorphs in response to global environmental change** Deyan Ge, (gedy@ioz.ac.cn), Inst. Zool., Chinese Acad.Sci., Chaoyang, Beijing, China, Q. Yang, (yangqs@ioz.ac.cn), Lin Xia, (Xial@ioz.ac.cn) Lagomorph species are derived from a common ancestor, but the distribution and body size of its two extant groups are quite distinct. We compiled and updated all fossil records of Lagomorpha for the first time, to trace the evolutionary processes and infer their evolutionary history using mitochondrial genes, body length and distribution of extant species. Within ochotonids, more than 20 genera occupied the period from the early Miocene to middle Miocene, whereas most of them became extinct during the transition from the Miocene to Pliocene. The peak diversity of the leporids occurred during the Miocene to Pliocene transition, while their diversity dramatically decreased in the late Quaternary. The forage selection of extant pikas features a strong preference for C3 plants, whilst the diet of leporids features more than 16% of C4 plant species. Expansion of C4 plants in the late Miocene is suggested to be one of the major 'ecological opportunities', which probably drove large scale extinction and range contraction of ochotonids, but promoted diversification and range expansion of leporids. 13
- 57 **Late Cenozoic history of the genus *Micromys* (Mammalia, Rodentia)** M. Knitlová, (kmitlova@natur.cuni.cz), Charles Uni.Prague, Prague, Czech Rep., J. Wagner, (orksos@seznam.cz), Inst.Geology, Czech Rep., I. Horáček, (horacek@natur.cuni.cz) Molecular phylogeography suggests that *Micromys minutus* colonized its extensive range during the Late Pleistocene-Holocene period. The European Pliocene and Pleistocene fossil record indicates rather continuous and gradual phenotype rearrangements from the Pliocene to Recent. We re-examined a considerable part of the European fossil record (14 sites from MN15 to Q3, including the type series of *M. praeminutus*), and concluded that: (a) The European Pliocene form, *M. praeminutus*, differs significantly from the extant species; (b) it exhibits a phenotypic variation covering the diagnostic characters of *M. caesaris*; (c) the Early and Middle Pleistocene forms seem to be closer to *M. praeminutus*; (d) the extinction of *M. praeminutus* during Q3 and re-colonization by *M. minutus* from Eastern sources cannot be excluded. Furthermore, we propose; (e) the distinct history of the West and East Palearctic clade; and, (f) the possible identity of the former with the Late Miocene genus *Parapodemus*. 14
- 58 **Bat community in ecotone of Cerrado and Atlantic Forest, Jequitinhonha basin, southeastern Brazil: expansion of distribution and cytogenetic data** B. Almeida, (brunninhaas@gmail.com), Uni.Veiga de Almeida, Rio de Janeiro, Brazil, M. Agueiras, (marcinha.agueiras@gmail.com), R. Leonan, (roberto_leonan@yahoo.com.br), M. Novaes, UNIRIO, L. Geise, (lenageise@gmail.com) The hydrographic basin of Jequitinhonha river (16°/18°S and 39°/44°W) encompasses climates varying from the semi-arid to humid. The vegetation varies along the Valley, with transition areas, from Cerrado to the Atlantic Forest. In March 2011 and 2012, bats were captured in six localities of different phytophysiognomies, identified through morphology and karyotype. 35 species of five families were captured, 23 in Cerrado, 13 in the Dry Forest and 18 in the Atlantic Forest. New karyotypes, geographic distribution extension also to different biomes (ecoregions) are given for *Centronycteris maximiliani* (Emballonuridae), a rarely captured species, *Cynomops paranus* (Molossidae), found in sympatry with *C. planirostris*, *Lonchophylla bokermanni*, *Xeronycteris vieirai* (Phyllostomidae) and *Myotis lavalii* (Vespertilionidae). The Jequitinhonha Valley showed high species richness, possibly due to the presence of three distinct vegetation physiognomies. 14

- 59 **Biogeographical patterns of energetic compensation in desert small mammal assemblages** D. Kelt, (dakelt@ucdavis.edu), Uni., California, Davis, California, USA, P.L. Meserve, (pmeserve@niu.edu), J.R. Gutierrez, (jgutier@userena.cl), J.R. Aliperti, (jraliperti@ucdavis.edu) Understanding how species coexist remains central to ecology. Research in the Chihuahuan Desert has provided evidence of energetic compensation and zero-sum dynamics; Bailey's pocket mouse consumed up to 90% of the energetic resources left unused when kangaroo rats were experimentally excluded from replicate plots near Portal, AZ. To assess the generality of this we excluded the ecologically dominant degu (*Octodon degus*) from replicate sites in north-central Chile and documented no energetic compensation by other small mammals over 19 years. A trenchant difference between our site and that near Portal is the number of Potential Energetic Equivalent (PEE) species; whereas North American sites boast species pools with an average of 8 heteromyid PEEs, 14 cricetid PEEs, and 7 arvicoline PEEs, our site boasts only 3-4 folivorous PEE species. We predict that further analyses will highlight the novelty of the heteromyid radiation and associated trophic redundancy in North American deserts, and that zero-sum ecological dynamics may be more limited elsewhere. 14
- 60 ***Cabassous tatouay* and *Tamandua tetradactyla* current and future potential distribution: preliminary results** F. Montenegro, (bonesarte@gmail.com), Mus.Nacional de Historia Natural, Montevideo, Uruguay, H.I. Coitiño, (hcoitino@gmail.com), Ecol. y Conserv. de la Biodivers. de Uruguay, D. Hernandez, (gallegodez@gmail.com), Uni.de la República, Uruguay *Cabassous tatouay* and *Tamandua tetradactyla* are two of the five living species of Xenarthra in Uruguay. Because of their rarity, there are few specimens in scientific collections and few publications about them. The IUCN categorized them as least concern, but both are considered locally threatened and priority species for conservation declared by the National System of Protected Areas of Uruguay (SNAP). The aim of this work was to model current and future potential distributions in order to evaluate the impact of global climatic change in their geographic range. We conducted a bibliographic search and different biodiversity records were checked. We used the software Maxent and 19 environmental variables to create the models. The models ECHAM5 and HadCM3 and the scenario A1B were utilized for future potential distribution. The results show that there is a high probability of a reduction in the southernmost distribution limits on both species. 14
- 61 **Contrasting phylogeographic patterns in two Neotropical species of procyonids: *Nasua nasua* and *Procyon cancrivorus*** M.T.N. Tsuchiya, (tsuchiya@si.edu), Smithsonian Inst., Washington, DC, USA, George Mason Uni., Fairfax, Virginia, USA, Pontificia Uni.Catolica do Rio Grande do Sul, Porto Alegre, Brazil., K.-P. Koepfli, (klauspeter.koepfli527@gmail.com), Saint Petersburg State Uni., Russia, E. Eizirik, (eduardo.eizirik@puccrs.br) Comparative phylogeographic analyses are useful to shed light on common historical processes affecting regional faunas, as well as to identify species-specific life history features that may influence their genetic legacy. Here we performed phylogeographic analysis of two medium-sized Neotropical carnivores, the brown-nosed coati (*Nasua nasua*) and the crab-eating raccoon (*Procyon cancrivorus*), using mitochondrial DNA and microsatellite markers, in order to characterize and compare their patterns of genetic diversity and underlying evolutionary history. Analyses of both markers yielded contrasting patterns of genetic diversity and population structure. Brown-nosed coatis presented levels of mtDNA diversity that were up to ten-fold higher relative to crab-eating raccoons, and microsatellite analysis recognized five distinct populations for coatis but not for raccoons. These results highlight the evolutionary complexity of the Neotropical biota, and underscore the need for multi-species analyses employing comparable data sets so that common and contrasting patterns can be adequately investigated. 14
- 62 **Evolutionary history of Dipodoidea and Pteromyini and their response to global environmental change** Q. Yang, (yangqs@ioz.ac.cn), Inst. Zool., Chinese Acad. Sci., Chaoyang, Beijing, China, Deyan Ge, (gedy@ioz.ac.cn), Lin Xia, (Xial@ioz.ac.cn) Dipodoidea is a diverse rodent group. Each of the three ecological groups of the extant Dipodoidea (sicistines, zapodines, and jerboas) has its own distinctive phylogenetic construction and distribution. The origin of Dipodidae can be traced back to Middle Eocene (~42.7 Ma). The first important diversification phase occurred during Oligocene to Early Miocene. The second adaptive radiation occurred within jerboas, which was associated with expansion of open habitat since late Middle Miocene. Flying squirrels (Sciuridae: Pteromyini) are strictly arboreal squirrels. The center of origin and evolutionary process giving rise to these animals were deduced from fossil records and the Dispersal-Vicariance Analysis. Results showed that flying squirrels probably originated in the Oligocene-Miocene transition from Europe and immediately dispersed to Asia and North America. The densely forested south and southeast of Asia regarded as refuges and centers of diversification of flying squirrels during the transition from Tertiary to Quaternary and the glacial period. 14
- 63 **Genetic diversity of Eastern African gerbils of genus *Gerbilliscus* reveals history of Somali-Maasai savanna** T. Aghová, (tatiana.aghova@gmail.com), Masaryk Uni., Brno, Czech Rep., R. Šumbera, (sumbera@prf.jcu.cz), Uni.South Bohemia, České Budějovice, Czech Rep., J. Bryja, (bryja@brno.cas.cz), Inst.Vert. Biol., Acad.Sci.Czech Rep., Brno, Czech Rep. Somali-Maasai bioregion is one of the least studied parts of Africa from a biogeographical point of view. This region has a unique fauna, including cryptic species, which are detectable mainly by genetic methods. Gerbils are typical inhabitants of savanna in sub-Saharan Africa and phylogeographical studies of this group may provide detailed insights in the history of this biome. In this study, we performed genetic analysis of the so-called Eastern group of *Gerbilliscus* that includes four valid species: *G. robustus*, *G. vicinus*, *G. phillipsi* and *G. nigricaudus*. Using mitochondrial (cytochrome b) and nuclear markers (BRCA1), we have detected five main genetic lineages, corresponding to four known taxa and another probably new species from eastern Ethiopia. *G. nigricaudus* forms the basal lineage, while the evolution of remaining four lineages can be explained by allopatric speciation in savannah refuges. Phylogeographical structure within species has been significantly influenced by the Great Rift Valley lakes and savannah refuges in humid periods of Pleistocene. 14

- 64 **Mitochondrial genetic diversity and evolutionary history of Eurasian red squirrel (*Sciurus vulgaris*) populations** 14
 Mi-Sook Min, (minbio@yahoo.co.kr), Seoul Nat. Uni., Gwanak-gu, Seoul, South Korea, Seo-Jin Lee, (seojin0911@gmail.com), Mu-Yeong Lee, (muyeong@gmail.com), Hang Lee, (hanglee@snu.ac.kr) Eurasian red squirrels are distributed throughout coniferous and mixed deciduous forests in the northern parts of the Eurasian continent, Britain and Ireland. The cytochrome b gene (1,140 bp) was examined to investigate the phylogenetic relationships and genetic diversity of the species in different parts of its range. We obtained 80 haplotypes from 260 individuals in South Korea, Russia, China, Mongolia, Finland, and Portugal. The overall observed haplotype diversity (h) and nucleotide diversity (π) were 0.936 and 0.0024, respectively. The average pairwise genetic distance for *S. vulgaris* was <0.002 (0.000-0.011). There was no significant level of genetic differentiation among populations of Eurasian red squirrel. Median-joining network show a star like pattern, an indicator of population expansion. This could have resulted from contraction of the range of Eurasian red squirrels to a single refugium in the past, followed by a demographic expansion.
- 65 **Molecular phylogeny of *Gerbillus* (Rodentia: Gerbillinae) using mitochondrial and nuclear genes: taxonomic and biogeographic implications** 14
 A. Ndiaye, (arame.ndiaye@ird.fr) IRD, UMR & Uni. Cheikh AntaDiop, Dakar, Senegal, P. Chevret, (pascale.chevret@univ-lyon1.fr), Uni. Lyon, Villeurbanne, France, G. Dobigny, (gauthier.dobigny@ird.fr), Intern. de Baillarguet, Montferrier-sur-Lez, France, L. Granjon, (laurent.granjon@ird.fr) The systematics of the arid-adapted and very speciose genus *Gerbillus* (>45 species) remains quite unclear. We used a molecular approach to reconstruct the phylogeny of the genus, to estimate divergence times between the main lineages and to propose a new taxonomic arrangement. We sequenced the complete mitochondrial cytochrome b (87 samples) and partial nuclear IRBP (71 samples) genes in 20 species, thus covering most of the geographic distribution of the genus as well as previously proposed subgeneric assemblages. Phylogenetic reconstructions support the presence of three major clades that may correspond to sub-genera, namely *Gerbillus*, *Hendecapleura* and *Dipodillus*. The content and relationships of these lineages as well as biogeographic implications are discussed.
- 66 **Panbiogeography of *Didelphis*, *Philander*, *Metachirus*, *Chironectes* and *Lutreolina* (Didelphimorphia: Didelphidae)** 14
 V.de Ferran, (veradeferran@gmail.com), Uni. do Estado do Rio de Janeiro, Rio de Janeiro, Brasil, L. Geise, (lenageise@gmail.com), V. Gallo, (galloval@gmail.com) The distribution of 16 species of five Didelphidae genera was analyzed to identify their distributional patterns, using panbiogeographical track analysis: *Chironectes minimus* (350 localities), *Didelphis albiventris* (650), *D. aurita* (450), *D. imperfecta* (40), *D. marsupialis* (1290), *D. pernigra* (155), *D. virginiana* (2520), *Lutreolina crassicaudata* (260), *Metachirus nudicaudatus* (570), *Philander andersoni* (75), *P. deltae* (15), *P. frenatus* (260), *P. mcilhennyi* (14), *P. mondolfii* (40), *P. olrogi* (3), *P. opossum* (910). Three generalized patterns (Mesoamerican/northwestern South America, central Bolivia/Argentine Pampa and Atlantic Forest) and two foci (Pune and Misiones) were obtained. Four species did not fit any generalized pattern due to their restricted distributions. Some species presented distinct patterns throughout their distributions in accordance with their subspecies distribution. The generalized patterns are coincident with those found for *Heterolinus* and *Homalolinus* (Coleoptera), trichodactylids (Crustacea), *Bombus* (Hymenoptera) and Asteraceae species. This method can be used to propose protected areas. Distribution foci revealed here are where conservation areas already exist.
- 67 **Past climate and species ecology drive nested species richness patterns along an east-west axis in the Himalaya** 14
 K. Tamma, (priya.tamma@gmail.com), Nat. Cent.Biol.Sci. Bangalore, India, U. Srinivasan, (umesh.srinivasan@gmail.com), U. Ramakrishnan, (uramakri@ncbs.res.in) The Himalayas are amongst the most species rich regions in the world, harbouring high diversity of endemic and cosmopolitan mammal and bird species. We explored the patterns of mammal and bird richness across the east-west gradient of the Himalayas at a 1° x 1° scale. Using nested analyses, we demonstrate that the observed patterns are consistent with a hypothesis of the Eastern Himalayas having been a glacial refuge in the past, with subsequent coloniation of the western Himalayas. However, the diversity in the Himalayas may be under-represented, and there may be many more species in the region. We conducted field research in eastern Himalayas, to quantify the genetic diversity of the region as it is a gateway for many species from Southeast Asia, South China and Tibetan plateau to colonize the Indian subcontinent. We present preliminary data that suggests that there may be further unidentified diversity than that known in these regions.
- 68 **Phylogenetic and population genetic study of raccoon dog (*Nyctereutes procyonoides*)** 14
 Mi-Sook Min, (minbio@yahoo.co.kr), Seoul Nat.Uni., Seoul, South Korea, Yoon Jee Hong, (bio1004@hotmail.com), Sang-In Kim, (bambi1108@naver.com), Obihiro Uni. Agricult. & Vet. Med., Hokkaido, Japan, Hang Lee, (hanglee@snu.ac.kr) Raccoon dogs are distributed in the various parts of East Asia and Europe. This species is currently described as six subspecies, but its subspecies status is still debated. To examine the phylogenetic relationship and genetic diversity as well as population structure, we analyzed three mitochondrial regions (cyt b, COI, control region sequences) and 16 microsatellite loci of raccoon dog populations from Korea, Russia, China, Finland, Vietnam and Japan. Both mitochondrial and microsatellite analysis showed two genetic groups; continental populations (Korea, China, Russia, Finland and Vietnam) and a Japanese one. There was a significant level of genetic differentiation [$d=0.024(mt_cytb)$, $0.011(mt_COI)$, $0.039(mt_con)$ and $FST=0.380(microsat)$] between continental and Japanese raccoon dog populations. We confirmed that the Korean population has relatively low level of genetic diversity [$\pi=0.297(con)$] compared to others, but there is differentiation within them. Moreover, moderate but significant differentiation was detected among continental populations, as well as among Japanese populations.

- 69 **Phylogenetic relationship and genetic diversity of *Crocidura shantungensis* in northeast Asia inferred from mitochondrial cytochrome b gene sequences** Seo-Jin Lee, (seojin0911@gmail.com), Seoul Nat. Uni., Seoul, Korea, Mu-Yeong Lee (muyeonglee@gmail.com), Mi-Sook Min, (minbio@yahoo.co.kr), Hang Lee, (hanglee@snu.ac.kr) *Crocidura shantungensis*, the Asian lesser white-toothed shrew, is widely distributed in Northeast Asia. The sequences (1,140 bp) of mitochondrial cytochrome b gene were analyzed in individuals from South Korea, Russia, Mongolia, and Taiwan to investigate the phylogeographic relationships within the species. We obtained 89 haplotypes from 230 *C.shantungensis* individuals, which could be divided into 4 groups. Group A was comprised of haplotypes from the South Korean peninsula and some islands, Russia, and Mongolia. Group B consisted entirely of haplotypes from only Taiwan. Haplotypes from individuals of Jeju island in South Korea made up group C, while Group D was composed of haplotypes from islands off the Southern coast of South Korea. This study supports wider phylogeographic studies of small mammals. More samples from other regions e.g. Japan and China, are required to elucidate a complete evolutionary history of *C.shantungensis*. 14
- 70 **Phylogenetic structure among pocket gopher populations, genus *Thomomys* (Rodentia: Geomyidae), on the Baja California Peninsula** S. Ticul Alvarez-Castañeda, (sticul@cibnor.mx), Inst. Politecnico Nacional, Baja California Sur Mexico, A. Trujano, (ana-trujano@utulsa.edu), Uni.Tulsa, Oklahoma, USA We determined the phylogenetic relationships, population history, and hierarchical structure of genetic variation in pocket gophers distributed on the Baja California Peninsula (BCP), based on extensive geographic sampling. Using mitochondrial gene cytochrome b, we found three latitudinal structured geographic clades. The northern clade occurs in the border area of the USA and the north of BCP, the central clade occurs from the peninsular highlands through the Central Desert of Baja California, and the southern clade is distributed south of the San Ignacio Lagoon. AMOVA showed that genetic variation is higher among clades (64%) than within populations (18.1%). The deepest divergence among clades is very shallow (~300000 years), which suggests that climatic changes during the Pleistocene or some inhospitable habitats have affected the structure of this group, rather than influences from older marine transgressions. Phylogenetic groups disclosed by our results do not coincide with the current infraspecific classification; therefore, we propose a change of epithet for BCP gophers (*Thomomys nigricans*) and a new subspecific taxonomic arrangement with four subspecies. 14
- 71 **Phylogeographic patterns of Mesamerican small mammals: molecular evidence for recognition of *Neotoma ferruginea* Tomes 1861** N. Ordonez-Garza, (nicte.ordonez-garza@ttu.edu), Texas Tech Uni., Lubbock, Texas, USA, M.K. Unkefer, (munkefer@masonlive.gmu.edu), C.W. Edwards, (cedward7@gmu.edu), R.D. Bradley, (robert.bradley@ttu.edu) Inferences of phylogenetic relationships and divergence times for lineages of highland rodents identify broad-scale historical events that have shaped the evolutionary history of Mesoamerican small mammal taxa. Phylogenetic analyses of the mitochondrial cytochrome-b gene obtained from members of the *Neotoma mexicana* species group were used to determine levels of genetic differentiation within the group. The pattern observed within the genetic clades of this group was similar to that of other vertebrate taxa co-distributed in south of the Mexican Transvolcanic belt and the highlands of Chiapas and Central America. Samples of *N. isthmica*, *N. mexicana*, and *N. picta* indicated 3 well-supported clades, including a clade containing samples from southern Mexico and Mesoamerica that historically have been referred to as *N.isthmica*, *N.ferruginea*, and *N.mexicana*. The monophyletic nature of this clade, its genetic divergence from other species of woodrats, the genetic species concept, and priority (zoological nomenclature), woodrats from southern Mexico, Guatemala and El Salvador, should be referred to as *N. ferruginea*. 14
- 72 **Population structure and gene flow of Siberian weasel (*Mustela sibiricus*) populations from Korea** Hang Lee, (hanglee@snu.ac.kr), Seoul Nat.Uni., Seoul, Korea, Seon-Mi Lee, (chikichiki02@naver.com), Mu-Yeong Lee, (muyeonglee@gmail.com), Seo-Jin Lee, (seojin0911@gmail.com) Understanding population structure and gene flow among populations is extremely important in setting up conservation and management policy as well as describing evolutionary history. The Siberian weasel is found in Asia. We collected samples in South Korea. Using nuclear microsatellite genotyping at 10 loci, we investigated population structure and gene flow of Siberian weasels between Jeju Island and the Korean peninsula (GW and JL population). Bayesian structure analysis identified two genetic groups according to the geographical origin, Jeju Island and mainland populations (GW and JL), which could be explained by a geographical barrier. Based on heterozygosity, the Jeju Island population showed a lower level of genetic diversity comparing to the two populations of the mainland. This may reflect the effect of an isolated environment. 15
- 73 **Differentiation of cold tolerance in the Soricidae** K. Atsuhira, (s12zm03ka@std.ous.ac.jp), Kita-ku Okayama-shi, Okayama, Japan, T. Jogahara, (jogahara@zool.ous.ac.jp), Okayama Uni. Science, O.B. Mock, (omock@atsu.edu), Kirksville Coll. Osteopathic Med., K. Koyasu, (k0yasu@dpc.agu.ac.jp), Aichi-Gakuin Uni. The Soricidae are divided into the Soricinae and Crocidurinae found in the high land and the subarctic regions, and tropical and subtropical regions, respectively. SUNCUS (*Suncus murinus*) belonging to Crocidurinae loose about 75% individuals in non-acclimated cold (8°C), but PARVA (*Cryptotis parva*) belonging to Soricinae survive in acclimated cold (4°C). This study aims to understand the difference for cold hardness between subfamilies. We performed cold exposure tests for SUNCUS and PARVA that were acclimated, cold environment (4°C, 8°C) and non-acclimated, cold environment (4°C), respectively. SUNCUS survived in acclimated, cold environment in 8°C, but a half individuals died at 4°C. In contrast, all individuals of PARVA survived in non-acclimated, cold environment. We conclude that SUNCUS is cold intolerant and PARVA is cold tolerant. 15

- 74 **Microstructural differences between white and brown winter fur of the Japanese hare, *Lepus brachyurus*** 15
M. Nunome, (mtnunome@agr.nagoya-u.ac.jp), Nagoya Uni., Chikusa-ku, Nagoya, Japan The Japanese hare has two morphotypes which are distinguishable according to their coat color in winter; one shows white furs in winter and the other shows brown furs. I assessed structural differences between white and brown winter furs by light microscope observation. Guard hairs were collected from animals in three zoos in January and July in 2012. Shaft widths (which includes cuticle, cortex and medulla) and medulla widths at the widest point of the fur were measured. Thickness of cortex was calculated by subtracting the medulla width from the shaft width. Shaft and medulla widths were thicker in winter than in summer in all animals. White winter furs have significantly thinner cortex than brown winter fur. Although there were no significant differences in shaft and medulla widths between white and brown winter fur, white winter fur might increase its medulla volume by decreasing the thickness of cortex.
- 75 **Using the extended Price equation to analyze patterns of body size change in mammals across the Paleocene-Eocene thermal maximum in North America** 16
J. Theodor, (jtheodor@ucalgary.ca), Uni. Calgary, Calgary, Canada, B. Rankin, (bdrankin@ucalgary.ca), J.Ludtke, (joshualudtke@gmail.com), C. Barron-Ortiz, (crbarron@ucalgary.ca) An adaptation of the Price equation to analyze dwarfing in mammalian communities of the Bighorn and Clarks Fork Basins of Montana and Wyoming over an interval of global warming 56 million years ago, partitions variation into three components: non-random speciation and extinction of resident taxa, non-random immigration of taxa, and anagenetic changes (biased ancestor/descendant transmission). A well known decrease in mean mammalian body size during the earliest Wasatchian is principally driven by the many small-bodied taxa that make their first appearance during this time (primates, perissodactyls, artiodactyls, hyaenodontid creodontans). Our results reveal that non-random selection acting on resident taxa during the middle Clarkforkian to the middle Wasatchian generally favored smaller body sizes. In contrast, anagenetic changes favored larger body sizes over the same interval. Following the earliest Wasatchian, body size changes resulting from the non-random immigration of taxa was minimal.
- 76 **An analysis of contact zone between *Aegialomys* (Sigmodontinae: Oryzomyini) populations** 16
J.R. Prado, (joycepra@gmail.com), Uni.de São Paulo, Piracicaba, São Paulo, Brazil, A. Reis Percequillo, (percequillo@usp.br), Uni.de São Paulo, São Paulo, Brazil The genus *Aegialomys* exhibits consistent qualitative and quantitative differences between northern and southern populations, with a contact area near the Ecuador and Peru boundary. Our goal was to test if this contact area is solely the limit of distribution between parapatric populations, or whether there is intergradation. Some samples in this zone have mean values for quantitative morphological variables that fit into the northern population whilst other samples fit into the southern population with the exception of the Positos sample, which shows intermediate mean values. Qualitatively, the same population may have characters similar to the northern group and to southern group. Some populations present morphometric means similar to one latitudinal group whilst its morphologic traits are similar to the other. These results suggest that the variation observed is likely resultant from intergradation between two different species which maintain their phenotypic integrity even with gene flow, but have diverged sufficiently recently that the reproductive isolation is not complete.
- 77 **Chromosomes and speciation in common shrews: meiotic and fertility studies of natural hybrids between the Moscow and Neroosa chromosomal races** 16
S. Pavlova, (swpavlova@mail.ru), A.N. Severtsov, Inst.Ecol.Evol., Moscow, Russia, S. Matveevsky, (sergey8585@mail.ru), N.I.Vavilov, Inst.Gen.Genetics, Moscow, Russia, O.L. Kolomiets, (olkolomiets@mail.ru), J.B. Searle, (jeremy.searle@cornell.edu), Cornell Uni., Ithaca, USA There are over 70 chromosomal races of the common shrew (*Sorex araneus*) distinguished by Robertsonian and WART chromosomal rearrangements, forming a spectacular model to study the role of chromosomes in speciation. When neighbouring races come into contact, interracial hybrids are produced with different sets of rearranged chromosomes in their karyotypes. We are carrying out sophisticated cytogenetic and immunocytochemical studies to investigate meiosis and fertility in such hybrids (initiated in Matveevsky *et al.*, 2012), which is the key to understand evolving reproductive isolation between chromosomal races. We report on hybrids from the first of several hybrid zones that we will investigate that between the Moscow and Neroosa races in central European Russia. These hybrids produce a ring-of-four configurations at meiosis I (gm/go/no/mn) and we have demonstrated that male meiosis and fertility are not unduly affected, reducing the opportunity for speciation in this case. The study was supported by RFBR (12-04-31200, 12-04-31425).
- 78 **Cryptic Divergence and ancestral hybridization among North American hares (*Lepus* spp.)** 16
J. Melo-Ferreira, Uni. do Porto, Agrário de Vairão, Vairão, Portugal, F. Seixas, Uni. do Porto, Porto, Portugal, E. Cheng, Uni. Montana, Missoula, Montana, USA, L. S. Mills, North Carolina State Uni., Raleigh, North Carolina, USA, P.C. Alves The three most widespread North American hare species, the snowshoe hare (*L. americanus*), the white-tailed jackrabbit (*L. townsendii*) and the black-tailed jackrabbit (*L. californicus*) have parapatric distributions and are key species for ecosystem dynamics. While its ecology has been fairly studied, the evolutionary history of these species is mostly unknown. We studied the history of speciation of these hares, using both nuclear and mitochondrial DNA loci (8 markers; 6765 bp) and multilocus coalescent-based approaches. We confirmed the existence of three major evolutionary units within *L. americanus* and found deep cryptic divergence comparable to that found between *L. californicus* and *L. townsendii* (ca. 2 Mya) of one of these groups, which is widely distributed along the Boreal region. Moreover, coalescent simulations of mtDNA divergence revealed that massive ancient mtDNA introgressive hybridization occurred 680 kya from *L. californicus* into the Pacific Northwest populations of *L. americanus*.

- 79 **Introgression among species of northeast Asian hares (*Lepus*) inferred from nuclear and mitochondrial DNA sequences** G. Kinoshita, (gohta_kinoshita@ees.hokudai.ac.jp), Hokkaido Uni., Sapporo, Hokkaido, Japan, M. Nunome, (mtnunome@agr.nagoya-u.ac.jp), Nagoya Uni., Nagoya, Japan, H. Suzuki, (htsuzuki@ees.hokudai.ac.jp) To clarify the phylogenetic relationships among *Lepus* species in northeastern Asia, we determined sequences of six nuclear DNA (nDNA) genes and the mitochondrial DNA (mtDNA) gene (Cytochrome b) in *L. timidus* from Hokkaido, Sakhalin and eastern Russia, *L. coreanus* from Korea and *L. brachyurus* from the main islands in Japan. Phylogenetic analyses with the sequences of other species from the databases suggested the involvement of multidirectional introgressions among the continental populations of *L. timidus* and other species both in nDNA and mtDNA. In contrast, no sign of introgression was detected in the Japanese endemic species *L. brachyurus*. Interestingly, *L. coreanus* was shown to be closely related with *L. timidus* from Hokkaido and *L. mandshuricus* in mtDNA and nDNA loci, respectively. These results imply that *Lepus* species have experienced the reticulate evolution in continental northeastern Asia, though the intensity of the introgression differs species to species and locus to locus. 16
- 80 **Karyological diversity and two distinct pathways driving karyotype evolution in the monotypic *Thaptomys nigrita* (Rodentia, Sigmodontinae)** V.H. Colombi, (vcolombi@gmail.com), Uni.Fed. do Espírito Santo, Brazil, K. Ventura, (kabiousp@yahoo.com.br), Uni.de São Paulo, São Paulo, Brazil, M. Passamani, (MARCELO PASSAMAMPassamani@dbi.ufpa.br), Uni.Federal de Lavras, Brazil, V.Fagundes, (vfagunde@gmail.com) *Thaptomys*, endemic to Atlantic Forest, has currently being associated to seven karyotypes: 2n=52/FN=52 with acrocentric autosomes, except to one small metacentric pair; 2n=50a/FN=48 with acrocentric autosomes; and 2n=48, 49a, 49b, 50b and 51/FN=52, with variation of 1-4 biarmed autosomes, one small metacentric and acrocentrics. ZOO-FISH with whole chromosome probes evidenced two evolutionary pathways: (I) 2n=52 to 2n=50a: complex rearrangements involving one Robertsonian fission of the small metacentric pair followed by two tandem fusion with distinct acrocentric pairs; (II) 2n=52 to 2n=48-51: two Robertsonian rearrangements, that retained pericentromeric telomeric signals, involving four acrocentric pairs, varying from homo (2n=48) to heterozygous (2n=49a, 49b, 50b and 51) conditions. The derived karyotypes of each pathway (2n=50a/FN=48 and 2n=48-51/FN=52) are not sympatric to each other or to 2n=52/FN=52. These two patterns of karyotype divergence could represent full reproductive barriers by leading to errors in meiotic segregation on hypothetical hybrids, calling for taxonomic and phylogenetic evaluation. 16
- 81 **Nuclear genetic structure of the bank vole (*Myodes glareolus*) in Fennoscandia with an emphasis on the mitochondrial contact zones** P. ulie, (pisano.julie@gmail.com), Uni.Liège, Liège, Belgium, Cent.de Biol.et de Gestion des Populations (INRA) Campus Int.de Baillarguet, Montferrier-sur-Lez, France, J. Michaux, (michaux@supagro.inra.fr) Besides the fact that the bank vole, *Myodes glareolus* is already a biological model in several studies, it is also the natural and specific host of the PUUV that causes, every year, many cases of nephropathia epidemica. In Fennoscandia, three mitochondrial lineages of *M. glareolus* that meet at two mitochondrial contact zones have been identified. The aim of this study is to better understand the hybridisation process at the Fennoscandian contact zones between these distinct lineages by developing a multi-marker approach. Thus, the goals are to: (1) elucidate the nuclear genetic structure of *M. glareolus* in Fennoscandia; and, (2) assess putative co-evolution between lineages of *M.glareolus* and PUUV in Fennoscandia. Preliminary results seem to show that: (1) the nuclear genetic structure of *M. glareolus* differ from the mitochondrial one; (2) the Swedish contact zone seems to be a barrier to mitochondrial AND nuclear gene flow, while a nuclear gene flow has been highlighted in the Finnish mitochondrial contact zone; and (3) two distinct species can be easily differentiated by microsatellite analyses in Fennoscandia (*M. glareolus* and *M. rutilus*). 17
- 82 **A non-invasive genetic survey of a free-ranging deer population** C. Powell, (ciarapowell@gmail.com), Waterford Inst. Technol., Waterford, Ireland, C. O'Reilly, (coreilly@wit.ie), F. Butler, (f.butler@ucc.ie), Uni.Coll. Cork, Cork, Ireland, R. Carden, (rcarden@ucc.ie) Estimating population parameters of free ranging animals living within forest landscapes can be difficult. This is the case for three deer species in Ireland, red deer (*Cervus elaphus*), sika deer (*Cervus nippon*) and fallow deer (*Dama dama*). The objective of this study was to develop a suite of molecular tools to assess the population parameters of deer living within concealed habitats. A pilot study was conducted to establish the baseline seasonal distribution of the three deer species within two study sites in County Cork, Ireland. During December 2012 and May 2013, fecal pellets surveys were conducted in the study areas. Real-time polymerase chain reaction assays were developed to identify the species and sex of samples and suitability for individual analysis through genotyping. The results of these surveys will be used to inform a fine scale capture mark re-capture survey to estimate deer densities in the study area. 17
- 83 **Are remote hair-capture tubes an effective technique for investigating the landscape ecology of water voles (*Arvicola amphibious*) in England?** R. Baker, (rjb22@uni.brighton.ac.uk), Uni. Brighton, Brighton, UK., D. Scott, (dawn.scott@brighton.ac.uk), A.Overall, (a.d.j.overall@brighton.ac.uk) Non-invasive genetic sampling is becoming an increasingly used tool in landscape ecology. DNA fingerprints obtained from hair, feather or faecal samples can be used to determine how animal populations are structured across large spatial scales. This information can reveal much about the effect of landscape features on species distribution and is particularly important for declining populations affected by habitat loss and fragmentation. The European water vole has undergone a dramatic decline across its UK distribution with many extant populations occupying fragmented and often isolated wetlands located within perceptively hostile agricultural landscapes. We are trialling the use of specially designed hair-capture tubes to obtain genetic profiles of water vole populations for modelling the effects of landscapes on population structure and gene flow. Due to inherent technical limitations associated with non-invasive genetic samples, we are investigating the effectiveness of this method by comparing the quality of genetic information obtained via invasive and non-invasive techniques. 17

- 84 **Assessing metapopulation processes using noninvasive genetics: the case of the Cabrera vole** C. Ferreira, Uni. Porto, Vairão, Portugal, J. Paupério, S. Barbosa, Cornell Uni., Ithaca, New York, USA, H. Sabino-Marques, Uni. Évora, Évora, Portugal, P. Costa, C. Encarnação, R. Pita, P. Beja, A. Mira, P. C. Alves The Cabrera vole (*Microtus cabreræ*) is a threatened Iberian endemic, which often shows a metapopulation-like spatial structure. Cabrera voles are difficult to study because they occur at low density, are difficult to capture, and they cannot be tracked during extended periods. Here we show that non-invasive genetics may provide a practical tool to overcome these problems. Field sampling focused on a patch network (78 ha), where we collected faecal samples at 18 patches occupied by Cabrera voles. We developed 23 microsatellites, from which we selected 11 with high amplification rate, high diversity, and small size. Unique genotypes retrieved from faecal samples provided a minimum estimate of population size at each patch. Genetically inferred family relationships were used to estimate reproduction parameters, and to identify dispersal movements across patches. We suggest that non-invasive genetic monitoring may help elucidate metapopulation processes in the Cabrera vole and other endangered rodents. 17
- 85 **Towards the conservation of the Cabrera vole (*Microtus cabreræ*): phylogeography and population genetic structure in Iberia** S. Barbosa, CIBIO-UP, Uni. Porto, Vairão, Portugal, Uni. Porto, Porto, Portugal, Cornell Uni., Ithaca, USA, J. Paupério, C. Ferreira, R. Pita R, CIBIO-UE Uni. Évora, Évora, Portugal, A. Mira, P. Beja, J.B. Searle, P.C. Alves, (pcalves@fc.up.pt) The endangered Cabrera vole (*Microtus cabreræ*) is an Iberian endemic with a fragmented distribution. Little is known about the species-wide patterns of genetic variation. We estimated within-population genetic diversity, levels of genetic differentiation among populations, and overall phylogeographic structure, by sequencing cytochrome-*b* and typing 23 microsatellites in 50 individuals from 11 localities covering the species range in Iberia. Our analysis identified at least four genetically distinct populations that likely used different (glacial) refugia within Iberia. From a conservation perspective, we highlight the populations in northeast and southeast Spain, which are the most divergent and geographically isolated, as in need of particular protection. With impending habitat loss and climate change, these distinct genetic units may go extinct. Rodents have a low profile with regards to conservation, and endangered rodents require special attention to prevent biodiversity loss. 17
- 86 **Development of species-specific real-time PCR assays for Irish bat species** A.P. Harrington, (andrewharrington2003@yahoo.co.uk), Waterford Inst. Technol., Waterford, Ireland, D.B. O'Meara, (domeara@wit.ie), C. O'Reilly, (coreilly@wit.ie) Species-specific real-time PCR assays have been successfully developed for many wild mammal species in Europe including pine marten, otter and red squirrel, and are useful tools for gathering data to inform conservation measures for these species. Such tests would be useful tools for bat species, particularly in the case of distinguishing between cryptic species, identifying species use of roosts from faecal pellet samples where bats cannot be found, and identifying cases where multiple species are using a single roost. Species-specific primers have thus far been developed for common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*), and it is planned to develop similar tests for the remaining bat species known to occur in Ireland. 17
- 87 **Genetic tools to aid red squirrel conservation** D. O'Meara, (domeara@wit.ie), Waterford Inst. Technol., Waterford, Ireland P. Turner, (pturner@wit.ie), C. O'Reilly, (coreilly@wit.ie) Efforts to conserve the red squirrel (*Sciurus vulgaris*) in Britain and Ireland include the establishment of conservation groups and translocations to grey squirrel (*S. carolinensis*) - free areas such as Anglesey in Wales and the west of Ireland. One of the problems facing these groups is that some rely on volunteers to monitor the squirrels, and due to licensing and training issues, most are restricted to using hair-tubes. In comparison to direct observation and trapping, the information obtained is quite limited. To improve the information yielded from indirect observation, we have developed a genetic toolbox that can identify the species and individual from hair samples. This allows us to identify individual squirrels and estimate the genetic diversity, and can also be used to infer the genetic history of the population (obtained from the mitochondrial DNA haplotype). Such information can help develop conservation plans, as well as monitor relocated and remnant populations. 17
- 88 **Identifying the source of the Kildare dormouse: a genetic analysis** D. Glass, deborah_glass@hotmail.co.uk, Uni. Brighton, Sussex, UK, A. Overall, (a.d.j.overall@brighton.ac.uk), D. Scott, (dawn.scott@brighton.ac.uk) The hazel dormouse (*Muscardinus avellanarius*) was recently discovered in Co. Kildare, Ireland. There are no other records of the hazel dormouse being present in Ireland and as such, it is being considered a non-native species and potentially invasive. We employed genetic information to ascertain the origin of the Kildare dormouse, its estimated time of arrival and population size in order to inform how best to proceed with the potential management of this species. Cytochrome b sequence data is available for individuals throughout the species range and was compared with novel sequence data from populations collected from throughout the British Isles to determine the most likely population founders of the Irish dormouse. 17
- 89 **Investigation of immune gene diversity in a global species: red fox (*Vulpes vulpes*)** S. Harrison, (stephen.harrison@ntu.ac.uk), Nottingham Trent Uni. Brackenhurst, UK Among the potential consequences of population bottle necks and founder events are the reduction of genetic heterozygosity and an increase in regional genetic differentiation. Levels of heterozygosity and allelic diversity of protein coding genes of the Major Histocompatibility Complex (MHC) have been identified as possible measures of population fitness and are thought to be highly susceptible to the influences of reduced population size. As such MHC profiles have been suggested as suitable markers for estimating adaptive variability within populations. The aim of this project is to investigate how the expression of MHC profiles for a given species are influenced by a variety of potentially negative external factors. These factors include: isolation, disease threats, climate, human altered environments and low founder numbers. The project will investigate variation in levels of allelic expression and heterozygosity at the MHC in populations of red fox (*Vulpes vulpes*) sourced from locations throughout their global distribution. 17

- 90 Landscape genetics, territorial management and protected areas network: Uruguayan mammals and their input to construct national conservation policy** M. Cosse, (marianacosse@gmail.com), Uni.de la R. Av., Montevideo, Uruguay, P. Aristimuño, (piaristi@gmail.com), F. Grattarola, (flograttarola@gmail.com), S. González, (sugonza9@yahoo.com) Uruguay will suffer greater change in land-use patterns and less than 3% of continental areas will be added to National System of Protected Areas (SNAP). Our purpose is to assess the Uruguayan landscape functional connectivity. We analyze effect of population fragmentation on mammal indicator species: *C.thous*, *L.geoffroyi*, *M.gouazoubira*. We created a GIS and conducted genetic analysis using highly polymorphic markers. Preliminary results show that gray brocket deer has a limited distribution in native forest, mainly in the eastern region. The other species have a wider distribution. The analysis of D-loop for *M.gouazoubira* revealed the existence of clades north and south of Río Negro. Conversely, *C.thous* do not show similar population genetic structure. We are developing microsatellite sets for these species to reach at fine spatial scales. Detection of relevant areas for connectivity or fragmentation will allow implementation of management actions within the land-use plans and SNAP. Proj. FCE_2_20011_1_5700 financed-ANII. 17
- 91 Noninvasive genetics versus camera trapping: estimating population density of an elusive carnivore *Leopardus pardalis*** T. Rodgers, (trodders@illinois.edu), Uni. Illinois at Urbana-Champaign, Urbana, Illinois, USA, J. Giacalone, (squirrelmsu@yahoo.com), Montclair State Uni. & Smithsonian Tropical Res. Inst., Robert L. Schooley, (schooley@illinois.edu), E.J. Heske, (eheske@illinois.edu), Illinois Nat.Hist. Survey Estimates of population density are essential for the effective conservation and management of any species. For elusive animals, however, accurately estimating density can pose a serious challenge. One technique that is currently increasing in usage to estimate density of elusive species is integration of DNA collected noninvasively from faeces with capture-recapture modeling. To date, however, the bias and precision of this technique has seldom been evaluated in the field. We conducted a study to compare density estimates of ocelots (*Leopardus pardalis*) from noninvasive genetic techniques with density estimates from camera trapping in the same population on Barro Colorado Island, Panama. We found that density estimates from the two techniques were highly comparable, with density estimates from the program DENSITY of 1.74/km² (SE = 0.584) from noninvasive genetics and 1.64/km² (SE = 0.331) from camera trapping. These estimates also represent the highest reported ocelot population density from anywhere within their range. 17
- 92 Phylogeography and population genetic structure of wild boar (*Sus scrofa*) in Eurasia** S.K. Choi, (abroadsk@hotmail.com), Seoul Nat.Uni., Gwanak-gu, Seoul, S. Korea, K.-S.Kim, (kkssky@gmail.com), Hang Lee, (hanglee@snu.ac.kr) To determine the pattern of genetic diversity, population genetic structure and phylogeography of wild boar in Eurasia, genetic data from three genetic markers, 16 microsatellite loci, mtDNA D-loop(1014bp) and Y-chromosome(AMELY&USP9Y, 968bp) were analysed for wild boars from Russian West to Eastern and Southeastern Asia. The analysis of nuclear markers detected seven inferred genetic populations and showed heterogeneous genetic diversity among wild boar populations from most part of Eurasia. Wild boars from Japan shared mitochondrial haplotypes with wild boars from northeastern Asia except Korean population, whereas in Y-chromosome haplotype they formed the same branch with groups of western part of Eurasia. Analyses of mtDNA D-loop and nuclear marker which reflect recent history suggested the pattern of genetic diversity and differentiation among wild boars from Eurasia appeared to be correlated with geographical distances. Mixed patterns of paternal lineage indicated that male wild boars were more widely dispersed than female wild boars. 17
- 93 Population genetic monitoring of maned wolves (*Chrysocyon brachyurus*) from eastern Bolivia, Santa Cruz** N. Mannise, (natymanni@gmail.com), Uni.de la República, Montevideo, Uruguay, S. González, (sugonza9@yahoo.com), L. Emmons, (EMMONSL@si.edu), Nat.Mus.Nat.History, Smithsonian Inst., Washington DC, USA, J.E. Maldonado, (MaldonadoJ@si.edu), Smithsonian Conserv. Biol. Inst., Nat. Zool. Park, Washington DC, USA Maned wolves are large canids occurring in the cerrado, chaco and pampas regions of South America. Habitat loss is one of the main threats to their populations. Our objective was to develop methods to monitor the patterns of population genetic variability of maned wolves from eastern Bolivia (Santa Cruz). We cross-amplified eleven microsatellite loci, developed for domestic dog, from 30 fecal samples and 7 blood samples collected from 2001 to 2011. The results of a Mark- Recapture analysis revealed a total of 23 individuals and estimated a population size of 51 individuals. Mean kinship and inbreeding coefficient were 0.089 and 0.297 respectively. Kinship analysis allowed us to identify an offspring and their possible parents. This population showed low levels of mean kinship and moderate levels of inbreeding. Genetic monitoring of this population will be useful in assessing the effects of anthropogenic pressures. 17
- 94 Population genetic structure of maned wolf (*Chrysocyon brachyurus*).** N. Mannise, (natymanni@gmail.com), Uni.de la República, Montevideo, Uruguay, M.Cosse, (marianacosse@gmail.com), S. González (sugonza9@yahoo.com), J.E. Maldonado, (MaldonadoJ@si.edu), Smithsonian Conserv. Biol. Inst., Nat. Zool. Park, Washington DC, USA The maned wolf is the largest South American canid species categorized as near threatened in the IUCN Red List. We sought to determine the patterns of population genetic structure of maned wolves by including samples from throughout their range. We cross-amplified eleven microsatellite loci in 61 maned wolf samples collected from Argentina, Bolivia, Brazil and Uruguay. The set of loci proved to have enough power to perform studies on population genetic structure, individual identity and kinship. We detected genetic structuring with two genetic clusters one of them included samples exclusively from Bolivia. One migrant per generation was found between the two subpopulations revealing connectivity for maintaining genetic variability, local adaptation and inbreeding avoidance. Kinship analysis revealed family groups in the Uruguayan, Bolivian and Argentinean samples. It is extremely important to increase sampling efforts to deeply understand their genetic dynamics and patterns of population sub-structuring. Proj. FCE 2 20011 1 5700 financed-ANII 17

- 95 **Population structure in spotted seals, *Phoca largha*, of East Asia** H.Jeong Kim, (hyeonjeongkim28@gmail.com), Seoul Nat.Uni., Seoul, Rep. Korea, Xiang Li (xiang.dolphin@gmail.com), Hang Lee, (hanglee@snu.ac.kr), M.Yeong Lee, (muyeong@gmail.com) *Phoca largha* are a pagophilic pinniped species widely distributed around the Northern Pacific Ocean. The population in the southern end of its distribution in Asia is comprised of three breeding sites and causes concern due to poaching, pollution and increase in human development. Furthermore, the seals of Peter the Great Bay have been documented to reproduce on shore rather than ice unlike seals of its neighboring breeding sites. To determine the population structure among these breeding sites, we analyzed 534-bp sequence of the mitochondrial DNA and 9 microsatellite loci from 186 spotted seals collected from Liaodong Bay, Peter the Great Bay and Sea of Okhotsk. The results indicate limited genetic structure across the breeding sites except for Liaodong Bay. We suggest that there is reduced gene flow into the Liaodong Bay while the high migration capabilities reduces signatures of structure in the remaining breeding sites. These results provide necessary background information for future management and conservation efforts for the spotted seals in East Asia. 17
- 96 **Presence of Andean Bear (*Tremarctos ornatus*) in Argentina: non-invasive genetic tools for determining the southernmost record of the species** M. Cosse, (marianacosse@gmail.com), Facult. de Ciencias, Montevideo, Uruguay, N. Mannise, (natymanni@gmail.com), M. Acosta, Proyecto Juco, Salta, Argentina, F. Del Moral, (jfdelmoral@gmail.com) The Andean bear is the only living bear species in South America and is cataloged as Vulnerable (IUCN). It is distributed throughout Andes from Venezuela to Bolivia. Its presence in The Argentine is debated despite being reported in the northwest. Our objective was to develop a genetic marker for species identification of Andean bear from non-invasive samples. We designed a primer pair to amplify an 113pb fragment of cit-b region (mitDNA). We successfully amplified seven samples from Salta and Jujuy (Argentina). Six of them showed an identical haplotype to one registered in Genbank. Another one revealed a new haplotype with three unique changes. These results highlight the efficiency of molecular techniques to reliably detect this rare and elusive species. Finally, as this species is declining faster than any other neotropical carnivore it is critical to develop molecular toolkits to further obtain information about Andean bear populations. 17
- 97 **The wildcat (*Felis silvestris silvestris*): a test for a multidisciplinary method of population study** E. Velli, (edoardo.velli@hotmail.it), Uni. Roma Tre Dipart.di Scienze, Roma, Italy, M. Alberto, (bologna@uniroma3.it), E. Randi, (ettore.randi@isprambiente.it) Istit.Superiore per la Protezione e la Ricerca Ambientale, ISPRA The wildcat is one of the most elusive mammalian carnivores in the Italian peninsula. The main threats for its conservation are the habitat fragmentation and especially the hybridization with the domestic cat. Efforts for its conservation are strictly related to a good knowledge of its ecology and genetic status. The aim of the project was to define a well replicable and standardized method for the study of the Italian peninsular population of the wildcat. The study had two main goals: (i) to set up a functional sampling method trying to mix up different strategies (hair-trapping with scent marked lures, scat sampling, cameratrapping) in the study area of Foreste Casentinesi National Park; and , (ii) to enhance the power of hybrids detection by using new genetic markers such mtDNA (ND5 region) and Y linked markers (one STR and one SNP). 20
- 98 **How do fossils change our interpretations of present-day biodiversity patterns ? Using primates as an example** T. Guillerme, (guillert@tcd.ie), Trinity Coll.Dublin, Ireland, N. Cooper, (ncooper@tcd.ie) Studies of extant species only focus on less than 0.1% of the true species richness in a lineage. In some clades, ignoring extinct species neglects the true evolutionary history, species richness, biogeography or ecological diversity of that clade. Therefore, including fossils in phylogenetic studies is essential to understand the evolutionary history of lineages. In this study, we constructed a new primate phylogeny based on Ronquist *et al.*'s (2012) Total Evidence Method. We used 69 genes from 284 extant primates and >600 morphological characters from ~250 extant and extinct species. We then used phylogenetic comparative methods to investigate evolution of body mass variation through time. We show that taking account of extinct species body mass affects the estimation of evolutionary rates especially among Lemuriforms (Strepsirrhini) where the evolutionary rates are highly increased. 20
- 99 **Phylogenetic position of *Wilfredomys oenax* (Rodentia, Cricetidae, Sigmodontinae), and comments on the tribe Wiedomyini** L. Machado, (leoferreiramachado@yahoo.com.br), Darcy Ribeiro, Asa Norte Brasília, Brazil, V.H. Valiati, (valiati@unisinob.br), F.P. Rodrigues, (fprodrigues@unb.br), A.U. Christoff, (auchrist@ulbra.br) The systematics of the Neotropical cricetid rodents of the subfamily Sigmodontinae lacks more detailed investigations. We applied phylogenetic methods based on DNA sequences in order to access for the first time, the phylogenetic position of the enigmatic *Wilfredomys oenax*, and test hypotheses concerning the taxonomic composition of the tribe Wiedomyini. All Bayesian and Maximum Likelihood approaches applied to individual and concatenated matrices of the Interphotoreceptor Retinoid Binding Protein and cytochrome b genes corroborated the sister relationship between *Wilfredomys* and *Wiedomys*. Concatenated matrix resulted in phylogenies with *Juliomys* a sister group of the clade formed by *Wilfredomys* and *Wiedomys*. Individual gene analyses sustained the position of *Juliomys* as a sister group of the Andean clade composed by *Irenomys*, *Euneomys* and *Neotomys*. Our results indicated that *Wiedomys* and *Wilfredomys* are members of the tribe *Wiedomyini*, and that *Juliomys* is another member of this tribe needs further investigation. 20

- 100 Phylogenetic study of the tribe Akodontini (Rodentia, Sigmodontinae) using cytogenomic data** K.Ventura, (kabiousp@yahoo.com.br), Uni.de São Paulo, São Paulo, Brazil, Y. Yonenaga-Yassuda, (yyassuda@ib.usp.br) Cytogenomic data were included in a cladistic study designed to retrieve information on the phylogenetic relationships of Akodontini, the second most speciose tribe of sigmodon+L97tine rodents. Complete genome homology was determined by ZOO-FISH among *Akodon* (6 species), *Blarinomys*, *Deltamys*, *Necromys*, *Thalpomys* and *Thaptomys*. The observed chromosomal rearrangements allowed the proposal of 55 characters, included in a matrix, and submitted to MP phylogenetic analysis using TNT 1.1. The most parsimonious tree presented 66 steps, with *Blarinomys* and *Thaptomys* as basal. The clade (*Thalpomys* (*Necromys Deltamys*)) resulted as sister-group of a monophyletic *Akodon*, with *A. cursor* and *Akodon* sp. n. as the most derived species. Phylogenetic relationships suggest unidirectional pathway of reduction of diploid number due to tandem and Robertsonian fusions, and complex rearrangements in this lineage. These are preliminary results, and further cytogenomic data on *Brucepattersonius*, *Kunsia*, *Oxymycterus* and *Scapteromys* plus outgroups will yield more information on *Akodontini* phylogenetic relationships. **20**
- 101 Systematic study of extinct Japanese otter based on mitochondrial DNA sequences** D. Waku, (daisk.waku.kawauso@gmail.com), Tokyo Uni. Agriculture, Atsugi-shi, Japan, T. Sasaki, (t4sasaki@nodai.ac.jp) The Japanese otter was announced as extinct by the Japanese government in 2012. However, systematics of the Japanese otter is still controversial. In this study, we tried to clarify its phylogenetic status based on mitochondrial DNA sequences. We extracted genomic DNA from stuffed specimens and determined partial mitochondrial sequences (7,325bp) using the Multiplex PCR method. In addition, we also determined complete mitochondrial genome sequences of two Eurasian otters (*Lutra lutra*) that were caught in Sakhalin and China. When we compared the sequences of the Japanese otter and three Eurasian otters (China, Sakhalin and South Korea), the Japanese otter sequences showed 7 diagnostic nucleotide substitutions in ND1, co2 and co3 regions. To estimate systematic status of the Japanese otter, we analyzed phylogenetic relationship between the Japanese otter and three Eurasian otters by using maximum likelihood method. **20**
- 102 Systematics of *Rhinolophus pearsonii* in Southeast Asia** H. Huynh, (howard.huynh@ttu.edu), Texas Tech. Uni., Lubbock, Texas, USA, J. Eger, (judithe@rom.on.ca), Roy. Ontario Mus., Toronto, Canada Horseshoe bats (*Rhinolophidae*) represent a diverse and broadly distributed family of bats in the Old World. *Rhinolophus pearsonii* forms a widely distributed species complex, particularly in Southeast Asia. We examined specimens of *R. pearsonii* from Laos (n=14), China (n=21), and Vietnam (n=19). Bivariate plots and univariate statistical tests of craniometric data showed that specimens from Laos were smaller than those from China and Vietnam. Principal component analysis also showed that most character variation (with the exception of interorbital breadth) was related to size (PC1 = 81%). Preliminary genetic analysis of the COI gene revealed some phylogeographic structuring with specimens from Vietnam and China clustering separately from one other, but most specimens from Laos have yet to be genetically assessed. Our results showed that specimens from Laos were craniometrically distinct and may represent an undescribed taxon in the *R. pearsonii* species complex in Southeast Asia. **21**
- 103 Sexually antagonistic effects of vasopressin receptor gene (avpr1a) on reproductive success revealed by manipulation of social environment** E. Koskela, (esa.m.koskela@jyu.fi), Uni.Jyväskylä, Jyväskylä, Finland, E. Lönn, (eija.h.lonn@jyu.fi), T. Mappes, (tapio.mappes@jyu.fi), P.C. Watts, (P.C.Watts@liverpool.ac.uk), Uni.Liverpool, Liverpool, UK Vasopressin modulates a range of socio-reproductive behaviour in mammals, largely through its interaction with expression of the arginine vasopressin receptor 1a (avpr1a). In microtine voles, the length of the microsatellite locus situated in the avpr1a promotor region regulates expression of this gene and this has a concomitant effect upon a variety of behaviours. We quantified the effect of variation in the length of this microsatellite upon reproductive success in semi-natural populations of bank voles (*Myodes glareolus*) with manipulated population densities. Our study revealed a sex-by-density interaction for avpr1a microsatellite length, such that males with longer- and females with shorter- avpr1a microsatellite alleles enjoyed greater reproductive success in low density populations; conversely, males with shorter- and females with longer- avpr1a alleles produced more offspring in high density populations. Both sexually antagonistic selection and density dependent selection are reasonable candidate mechanisms behind the maintenance of variation in microsatellite allelic diversity in avpr1a. **24**
- 104 Thermoregulation in Asian Elephants, *Elephas maximus*** I. Maguire, (imaguire05@qub.ac.uk), Queen's Uni.Belfast, Belfast, Northern Ireland, UK, D.M. Scantlebury, (m.scantlebury@qub.ac.uk), N. Marks (n.marks@qub.ac.uk) Asian elephants are naturally distributed throughout Southeast Asia and the Indian Subcontinent. Due to their extreme size they face a range of thermoregulatory challenges necessitating adaptations, such as large ears to act as “thermal windows”. Many captive Asian elephants face additional challenges due to: (i) confinement in zoos and use in circuses worldwide; and, (ii) location in environments which are different from the wild (e.g. North-temperature Europe). Measurement of core body temperature (Tb) daily rhythms provides one indication of how animals can be adapted or acclimatized to different surroundings. We measured the Tb daily rhythms in captive Asian elephants to determine whether they may be influenced by various environmental and housing/welfare conditions (e.g. season, age, dominance rank, housing use). Initial results reveal potential differences in Tb rhythm related to season, daily changes in ambient temperature and possible variation between individuals related to dominance rank, housing use and stress. **25**

- 105 **Energy allocation in two species of *Peromyscus* in a coniferous forest of Mexico City** J. Vergara-Huerta, (biojvh@yahoo.com.mx), México City, Mexico, J. Ramírez-Pulido, (jrp@xanum.uam.mx), Uni. Autónoma Metropol., Mexico, A. Castro-Campillo, (acc@xanum.uam.mx), A. Salame-Méndez Based on the concentration of intermediate metabolism indicators (IMI) both in plasma and faeces, we examined the metabolic behavior of two species of *Peromyscus*. The animals were captured for a year in a temperate forest in Mexico City. During the second half of that period both species showed significant increases of glucose, triglyceride and cholesterol in plasma, which are closely related to the acquisition and use of potential energy. Even though annual behavior is similar, interspecific differences exist as a result of the difference in size. Temperature is the main factor in regulating the concentration of IMI, since energy requirements increase significantly when it is cold. It is likely that reproduction and abundance decrease towards the coldest part of the year. The significant correlations between plasma and faecal concentrations make it possible to propose future non-invasive studies. Results emphasize the importance of ecophysiological studies of populations in free-living conditions. 25
- 106 **Reproductive seasons in mammals: the case of the woolly opossum, *Caluromys philander* (Didelphimorphia, Didelphidae)** D. Loretto, (diogoloretto@gmail.com),. Cidade Uni. CEP, Rio de Janeiro, Brasil, M.F. Dalloz, (mfdalloz@gmail.com), M.V. Vieira, (mvvieira@gmail.com) Photoperiod and resource availability are considered major determinants of the timing of reproduction in mammals. Their effect on reproduction is usually evaluated on a geographical scale, in species distributed from the tropics to temperate regions, where the importance of photoperiod and resources is inversely related. Here, we studied the effects of photoperiod and resources on the timing of reproduction in a local scale, in a population of *C.philander* (ca. 200g), a species restricted to the tropical region. From 2003 to 2010, thirteen litters were monitored, when all females synchronized their reproduction with the winter solstice within a 10 day interval, a period of reduced resource availability. Their young were weaned in February and March, during the super humid season, the peak of fruit production in the study area. On this local scale, reproductive activity was timed by photoperiod and resource availability to optimize their energy budget. 25
- 107 **The influence of pregnancy on internal organ weight, plasma glucose level and hormonal characteristics of female water voles (*Arvicola amphibius* L)** E. Yuzhik, (infuturo@mail.ru), Inst. Syst. & Ecol. of Animals, Siberian Branch Russian Acad. Sci., Novosibirsk, Russian Fed., L.P. Proskurnyak, G.G. Nazarova The aim of this study, conducted on captive-bred water voles, was to estimate the effect of pregnancy on weight of internal organs, plasma glucose, thyroxin and testosterone levels. The results indicated that weight of abdominal fat, intracapsular brown adipose tissue, liver, adrenals, spleen, and gestational weight gain (excluding uterus/embryos weight), depend on female reproductive state. Fat deposit weight tended to increase until day 14 and then decreased to the control level. Spleen weight reached maximum value on day 10. Adrenal weight rapidly increased during early pregnancy, decreased in middle pregnancy and increased again in late pregnancy. Liver weight increased 1.4 times during pregnancy. Plasma glucose level steadily decreased in late pregnancy. Pregnant females in comparison to unmated ones, had lower plasma thyroxin (16.2±0.8 vs. 21.7±1.4 pmol/l) and higher testosterone (1.29±0.19 vs. 0.83±0.09 nmol/l) levels. Morpho-physiological indicators change during pregnancy show adaptive physiological response providing for embryo growth and preparing for lactation. This study was supported by RFBR, grant 11-04-00277 27
- 108 **Exploratory behavior and basal metabolic rate in rodents with sensibilities to habitat fragmentation** M. Góes, (ariovaldopacruz@gmail.com) Uni.de São Paulo, São Paulo, Brasil, G. Ambar, (guilhermeambar@gmail.com), UNESP, A.P. Cruz-Neto, (ariovaldopacruz@gmail.com) Some rodents seem to be more sensitive than others to the effects of habitat fragmentation. Studies suggest that these differential responses could be associated with adjustments in energy expenditure and exploratory behavior. We investigated the relationship between exploratory behavior and basal metabolic rate (BMR) in three rodent species classified as sensitive (*Euryoryzomys russatus*) and tolerant (*Oligoryzomys nigripes* and *Akodon montensis*) to habitat fragmentation. There was no significant difference between exploratory behaviors between these species. We verified that the two most tolerant species showed reductions of up to 43% in their BMR during the winter, whilst the sensitive species was unable to change its BMR. We also found that, for *A. montensis*, BMR showed a negative relation with exploratory behavior ($r^2=0.210$, $P=0.028$). Thus, downregulation of energy needs, and the ability of divert energy from maintenance to exploratory behavior, may provide advantages in unpredictable environments such as fragmented areas. 27
- 109 **Pikas on ice: the presence of sub-surface ice is associated with lower stress in the American pika** J. Wilkening, (Jennifer.Wilkening@colorado.edu), Uni.Colorado, Boulder, Colorado, USA, C. Ray, (cray@colorado.edu), J. Varner, Uni.Utah, (Johanna.varner@utah.edu) Climate change is projected to dramatically reduce the range of the American pika (*Ochotona princeps*), a cold-adapted species commonly associated with sub-surface ice features. Ongoing research suggests pikas are disappearing from locations that are losing sub-surface ice. However, no study has demonstrated the pika's physiological response to sub-surface features. We present the first analysis of physiological stress in pikas living in and adjacent to habitats underlain by ice. Fresh fecal samples were collected non-invasively from two adjacent sites in the Rocky Mountains: one with sub-surface ice (Boulder watershed) and one without (Niwot ridge). Samples were analyzed for glucocorticoid metabolites (GCMs), a common metric of stress. Validated results indicate lower GCM levels in samples from the Boulder watershed, suggesting that pikas are less stressed in favorable microclimates resulting from sub-surface ice features. Additional stressors will be addressed by planned analyses of pika samples from throughout the western USA. 28

- 110 **Climate factors influencing home range size of Sika deer at different spatiotemporal scales** T. Murai, (21231018@stu.rakuno.ac.jp), Rakuno Gakuen Uni., Ebetsu, Hokkaido, Japan, T. Hino, (hinotaka@rakuno.ac.jp), Y. Tachiki, (tachiki@env.gr.jp), EnVision Conserv. Office, Japan, T. Yoshida, (yoshi-ty@rakuno.ac.jp) To understand space use of mammal such as home range is an important factor on ecology and wildlife management. We examined climate effects on deer home range size at different spatiotemporal scales. We estimated home range size by GPS telemetry data from 11 female Sika deer in the Sikotsu-Toya National Park, Japan. Home ranges were estimated at four temporal scales (daily, weekly, biweekly and monthly) at two different spatial scales, core area and total home range. Climate factors included snow depth, temperature and precipitation. Snow depth had a negative effect on home range size across all spatiotemporal scales. Temperature and precipitation had less influence on home range size. Our study indicated that in Sika deer, climate effects on home range size were scale dependent. Moreover, climatic factors such as snow depth are significant in understanding space use in deer and their management. 28
- 111 **Do national distribution models capture the environmental response of species better than regional ones?** R. Real, (rrgimenez@uma.es), Uni. Malaga, Teatinos, Malaga, Spain, A.L. Marquez, (almarquez@uma.es) We modelled the ecogeographical favourability for 11 threatened mammal species in Andalusia (Spain), under the climate change scenario GGCM2-A2. We considered three approaches: a) Using national models trained in mainland Spain and projected on Andalusia (NAT model); b) constructing a new model for Andalusia only (REG-model); and, c) recalibrating national models with the presence/absence data for Andalusia (UPD-model). For all models we assessed their calibration power by calculating the Root Mean Square Error (RMSE) of their predicted and observed presences in probability intervals, and their parsimony, discrimination and classification power and the probability function domain. For each species we selected for projection to the future the model approach with the best assessment scores. Approaches b) and c) were usually the best. We propose to take advantage of national species distribution models by updating them to the regional target area before projecting them to the future. 28
- 112 **Exploratory behavior and basal metabolic rate in Atlantic Forest rodents: relation with different sensibilities to habitat fragmentation** M.B. Góes, (marianabentim@gmail.com), Uni. São Paulo, Brazil, G. Ambar, A.P. Cruz-Neto, (ariovaldopacruz@gmail.com) Some rodents seem to be more sensitive than others to the effects of habitat fragmentation. Studies suggest that these differential responses could be associated with adjustments in energy expenditure and exploratory behavior. We investigated the relationship between exploratory behavior and basal metabolic rate (BMR) in three rodent species classified as sensitive (*Euryoryzomys russatus*) and tolerant (*Oligoryzomys nigripes* and *Akodon montensis*) to habitat fragmentation. No significant interspecific difference between exploratory behaviors were found. We verified that the two most tolerant species showed reductions of up 35% in their BMR during the winter, whilst the sensitive species were not able to change its BMR. We also found that, in *A. akodon*, BMR showed a negative relation with exploratory behavior ($r^2=0.210$, $P=0.028$). Thus, downregulation of energy needs and the ability of divert energy from maintenance to exploratory behavior may provide advantages in unpredictable environments such as fragmented areas. 28
- 113 **Foraging energetics and the biogeography of marine endotherms** J. Grady, (jgrady@unm.edu), Uni. New Mexico, Albuquerque, New Mexico, USA The diversity of many marine endothermic taxa, such as pinnipeds, shows a striking anti-tropical distribution that cannot be explained by patterns in ocean productivity. Instead, it has been suggested that temperature-dependent foraging success drives this pattern. However, there is no mechanism proposed to support this hypothesis. I present data supporting a strong theoretical and mechanistic linkages between temperature and velocity in ectotherms. I assess theoretical implications in relation to global richness of pinnipeds and cetaceans, and fish, shark and avian competitors. Thermal constraints on metabolism may ultimately explain general biogeographic patterns of large marine predators. 29
- 114 **Burrowing of blind mole rats (*Spalax galili*) under contrasting ecological conditions** J. Skliba, (jskliba@yahoo.com), Uni. South Bohemia, Ceske Budejovice, Czech Rep., M. Lovy, (mates.lovy@gmail.com), R. Sumbera, (sumbera@prf.jcu.cz), E. Nevo, (nevo@research.haifa.ac.il), Uni. Haifa, Israel Burrowing of subterranean rodents is affected by food supply and soil type. Where food is sparse they must burrow at a higher rate, but the rate is constrained by soil hardness. We investigated activity and burrow architecture in the blind mole-rat (*Spalax galili*) in a steppe locality in northern Israel subdivided into microsites with contrasting soils. The microsite on basalt had a higher food supply, whereas the microsite on chalk had softer soil. We predicted that mole rats from chalk would: 1) construct longer, but less complex burrow systems; 2) be more active; and, 3) construct more molehills, than those from basalt. The first prediction was met by our data, whereas the data clearly contradicted the other two. We propose that the higher activity, especially molehill building, was connected with a higher population density (and territoriality) in basalt. The soil perturbation, therefore, could grow disproportionately with the mole rat population density. Funding GACR-P506/11/1512. 29

- 115 **Evaporative water loss and metabolic parameters under variations in ambient temperature and humidity, for the subterranean rodent *Ctenomys talarum* (tuco-tuco)** D. Antenucci, (antinu@mdp.edu.ar), Uni. Nacional de Mar del Plata, Mar del Plata, Argentina, M.B. Baldo, (mmbaldo@mdp.edu.ar), F. Luna, (fluna@mdp.edu.ar) Although subterranean rodents usually inhabit stable environments, they are exposed to ambient variations during foraging, mating and dispersal. This is so for *Ctenomys talarum* whose burrows are characterized by stable temperature, high relative humidity (RH), hypoxia and hypercapnia. They are exposed not only to variation in these variables when leaving the nest, but also may be affected by annual climatic fluctuations. We evaluate how ambient temperature (T) and relative humidity (RH) influence water and energy balance, by estimating evaporative water loss (EWL), basal metabolic rate (BMR), and associated parameters. As expected, body temperature (Tb) and conductance were positively, and BMR negatively correlated with T ($p < 0.001$). Although EWL did not differ with T, it was positively correlated with Tb ($p < 0.005$). RH was evaluated by analyzing the response to high or low RH in individuals which were acclimated at low or high RH. Differences were observed after 10-days treatment. 29
- 116 **Northern pocket gopher (*Thomomys talpoices*) use of magnetic and olfactory cues** M.O. Connell, (moconnell@ewu.edu), Eastern Washington Uni., Cheney, Washington, USA, D.C. Cousins, (dbioewu@hotmail.com) The fossorial niche provides protection from elements and some predators but reduces or alters sensory cues. We examined the use of magnetoreception and olfaction by northern pocket gophers, *Thomomys talpoices*. Magnetoreception was tested using three manipulative experiments: 1) field homing of displaced animals; 2) nest location in an 8-arm maze; and, 3) movement through complex labyrinths. Homing results indicated that gophers displaced from their burrow systems relied on magnetic cues for homing orientation. Although analysis of 8-arm maze tests showed limited significance, gophers tended to nest in the conditioned direction and shift direction with altered fields. Performance measures in the complex labyrinth did not differ between conditioned and test trials. Use of olfaction was tested in T-maze trials with soils containing carrot kairomone versus control soil. In all tests, gophers disproportionately selected the carrot soils. Results suggest *T. talpoices* uses magnetic and olfactory cues, depending on the situation. 29
- 117 **Subterranean sympatry: an investigation into diet using stable isotope analysis** G. Robb, (gnrobb@zoology.up.ac.za), Uni.Pretoria, Hatfield, Pretoria, South Africa, N. Bennett (ncbennett@zoology.up.ac.za), S. Woodborne, (Swoodborne@tlabs.ac.za), iThemba Lab. In the Western Cape three species of mole-rat, the common mole-rat (*Cryptomys hottentotus hottentotus*), the Cape mole-rat (*Georchus capensis*) and the Cape dune mole-rat (*Bathyergus suillus*) occur in sympatry; however, little is known about differences in their dietary preferences. Diets of the three species were examined using stable isotope analysis. Blood, fur and claw samples were collected, as well as potential food items, to assess food selection under natural conditions. There was a significant difference in the isotopic composition ($\delta^{13}C$ and $\delta^{15}N$) between all three species. There were also significant differences between tissues in all three species suggesting temporal variation in diet. The small size and colonial lifestyle of the common mole-rat allows it to feed almost 100% on bulbs, while the solitary and larger species, the Cape mole rat and the Cape dune mole-rat, fed to a greater extent on other resources such as grasses and clover. 29
- 118 **Thyroid hormone levels do not explain the divergent ageing rates of breeders and non-breeders in the Ansell's mole-rat *Fukomys anselli* (Bathyergidae, Rodentia)** P.Dammann, (philip.dammann@uk-essen.de) Uni. Duisburg-Essen, Essen, Germany, Y. Henning, (y.henning@yahoo.de), C. Vole, (christiane.vole@uni-due.de), S. Begall, (sabine.begall@uni-due.de) African mole-rats of the genus *Fukomys* live in multigenerational families where reproduction is monopolized by few individuals (usually one founder pair). The other family members do not reproduce. The pace of ageing is strongly status-dependent, with breeders living about twice as long as non-breeders. The mechanisms underlying this unusual ageing pattern are largely unknown. Since thyroid hormones are thought to be involved in the ageing process, we investigated whether reproductive status is related to serum levels of fT3 and fT4 in the Ansell's mole-rat. We could not find any relationship between thyroid hormone levels and reproductive status, gender or age. Interestingly, levels of fT4 were more than 10 times lower than those of euthyroid control species (guinea pigs and rats). Levels of fT3 did not differ significantly from controls. Our study suggests that thyroid hormones do not play a major role shaping the peculiar ageing scheme of Ansell's mole-rats. However, *F. anselli* seem to be partly hypothyroid, which is in line with results obtained in other bathyergid mole-rat species and probably linked to the subterranean lifestyle of these animals. 29
- 119 **Visitors of giant armadillo burrow (*Priodontes maximus*) in Cerrado Biome, Brazil** C. Franco Esteves, (carolfestev@ gmail.com), Casa da Floresta, Brasil, D.H. Homem, (daniel@casadafloresta.com.br), E. Fernandes de Lima, (elson@casadafloresta.com.br) Despite its wide distribution in South America, the giant armadillo (*Priodontes maximus*) occurs at low densities and is under threat but poorly studied. Their burrows are important because these provide shelter, thermal regulation, cub protection and a food reservoir. Because of their size (40-45cm wide x 30-31cm high), these burrows are supposed to be used opportunistically by other medium sized animals. A camera-trap was installed for five days in front of a giant armadillo burrow on a dirt road located between Eucalyptus plantations and 'cerradão' (savannah) vegetation at Verde Mar I Farm, eastern Mato Grosso do Sul State, Brazil. We recorded the visit of two tayras (*Eira barbara*) and four crab-eating fox (*Cerdocyon thous*), and a male *P. maximus* in burrow of a female giant armadillo. This provides important evidence on the behavior of terrestrial mammals within the community. 30

- 120 Anthropogenic factors affecting mammal abundance in grasslands and savannas** D. Lima, (daniela.ol.lima@gmail.com), Uni. Fed.do Rio de Janeiro, Rio de Janeiro, Brazil, M.L. Lorini, (marialucia.lorini@gmail.com), M.V. Vieira, (mvvieira@gmail.com) Grasslands and savannas are under a high degree of anthropogenic disturbance. We examined the effect of anthropogenic factors on mammal abundance in grasslands and savanna habitats by a meta-analysis. A total of 42 z-transformed effect sizes (ES) were compared for five anthropogenic factors: agricultural intensification (12 ES), shrub encroachment (8), grazing (7), urbanization (5) and fire (10). Mammal abundance generally decreases under anthropogenic disturbance (ES: -0.23; 95% CI: -0.34 to -0.11), but only agricultural intensification (ES: -0.29; 95% CI: -0.53 to -0.05) and shrub encroachment (ES: -0.57; 95% CI: -0.90 to -0.25) affected mammals significantly, reducing their abundance. The negative general effect size highlights the requirement for more severe conservation programs in grasslands and savannas. Extensive cattle raising could be an alternative to agricultural intensification, since grazing did not affect significantly mammals and it can also reduce shrub encroachment. **30**
- 121 Determining the instream water requirements for South African dryland rivers: do mammals have a role to play?** M. Avenant, (AvenantMF@ufs.ac.za), Uni. of the Free State, Bloemfontein, South Africa, N. Avenant, (navenant@nasmus.co.za), E. Prinsloo, (PrinslooHS@ufs.ac.za) Nearly half of South Africa's rivers are temporary – a function of the semi-arid/arid climate prevailing over much of the region. Temporary rivers are distinguished by highly variable and unpredictable hydrological regimes, large disturbances and the loss of surface water connectivity - confining surface water to isolated pools. Instream water requirement (IWR) assessments developed for perennial rivers are poorly equipped to deal with these factors and have been adapted for use in South Africa's temporary rivers. The newly developed IWR-method (Seaman *et al.*, 2010) uses several driving (e.g. hydrological) and responding (e.g. fish) indicators to predict ecological and socio-economic impacts to hydrological changes. Even though terrestrial vertebrates' life histories are known to be significantly affected by hydrological changes, the inclusion of mammals as indicators have been largely neglected. This contribution considers the viability of incorporating otters and water mongoose into the suite of indicators for an ephemeral river in central South Africa. **30**
- 122 Foraging ecology of endangered Eld's deer and hog deer inhabiting the floating meadows of Barak - Chindwin river basin** S.A. Hussain, (hussain@wii.gov.in), Wildl. Inst.India, Chandrabani, Dehra Dun, India, C. Tuboi, (chongpituboi@gmail.com), N. Vaiphei, (thngai3@gmail.com) We examined the foraging ecology of endangered Eld's deer (*Rucervus eldi*) and hog deer (*Axis porcinus*) inhabiting the floating meadows of Keibul Lamjao National Park, India. The amount of available forage biomass was estimated by Harvest Method and the diet composition was determined by microhistological examination of pellets. The overall forage biomass of the 20 forage species was $2764.3 \pm 139.9 \text{ g/m}^2$. Among the individual forage species, *Z. latifolia* showed the highest biomass ($599.8 \pm 70.1 \text{ g/m}^2$) and contributed nearly one third to the diet of Eld's deer. Graminoids contributed more than 80% to the diet of both Eld's deer and hog deer. *Capillipedium* spp, *Oryza rufipogon* and *Carex cruciata* were the most preferred forage species for Eld's deer whereas *Alternanthera philoxeroides*, *O. rufipogon* and *Setaria* spp. were the most preferred forage species for hog deer. There was no significant variation in the nutrient quality of forage species. More than 80% diet overlap was observed between these two species. Forage availability, however, did not seem to be a limiting factor because of high productivity of the meadows. **32**
- 123 Distribution, ecology and conservation of the acrobatic cavy *Kerodon acrobata* in central Brazil** A. Portella, (alexandre.xexa@gmail.com), Uni.de Brasilia, Darcy Ribeiro, Brasilia, Brazil, E.M. Vieira, (emvieira@unb.br) The rodent *Kerodon acrobata* is considered endemic from seasonally dry tropical forests associated with limestone outcrops in central Brazil. It is known from only three locations and since its description, little information on its biology has been obtained. The aim of this study was to investigate new locations of occurrence and basic information on the ecology and conservation of this caviomorph rodent. We obtained new records of *K. acrobata* from Monte Alegre de Goiás and its presence was confirmed in Tocantins state, in Aurora do Tocantins municipality, expanding its distribution in approximately 50 km west and 90 km north. We observed individuals in the wild feeding mainly on leaves of a variety of plants, but also on flowers, fruits and bark of woody plants. Currently, the conservation of this charismatic mammal with its restricted distribution is threatened by deforestation, hunting and exploitation of limestone and it is present in only one protected area. **32**
- 124 Estimating roe deer abundance from a random sample of vantage points** M. Zaccaroni, (marco.zaccaroni@unifi.it), Uni.,Florence, Italy, F. Dell'Agnello, (filippo85.da@hotmail.it), F. Giovannelli, (francesca.giovannelli@unifi.it), F. Riga, (francesca.riga@isprambiente.it), Inst. Environ. Res.& Protection, Ozzano Emilia, Italy In recent years Italian roe deer populations have shown a continuous increase in population size and distribution. At present, in Tuscany, which is one of the regions where roe deer hunting is managed, the most used census methods are driven censuses and observation from vantage points. Although driven census is frequently used to estimate the size of roe deer populations in forests, it is incorrectly applied wherever the woodland percentage is lower than 50%. In this situation, the recommended method is the vantage point census, but difficulties arise because it is quite difficult to count the entire population, due to the huge number of observers needed to cover all the observable areas. The aim of this study is to test, through an exhaustive count on open areas, a statistical model, based on the minimum percentage area needed to obtain a reliable minimum density population estimate. **32**

- 125 **Estimating wild boar density and spatial use by dung count in a forest environment** Radim Plhal, (r.plhal@seznam.cz), Mendel Uni. Brno, Czech Republic, M. Homolka, (homolka@ivb.cz), P. Janata, (premysl.janata@mendelu.cz) Wild boar is becoming a problematic game species both in the Czech Republic and in other European countries due to its harmful impacts, particularly in the form of damage to field crops and increasingly frequent wildlife-human conflicts. This study employed faecal pellet group count to estimate wild boar density in a forest environment. The whole study area was covered by the network of line transects with distance 100 m from each other. Faecal pellet groups were counted at the distance of one meter on both sides of each line transect. The field data were analyzed by the Geographic Information Systems (GIS). The GIS data analysis confirmed differences in utilization of different habitats. The resulting wild boar density was estimated at 64.3 (± 8.9 ; 95% CI) individuals/km². It represents an extremely high population density which has a highly adverse effect on the surrounding farmland by causing damage to farm crops. 32
- 126 **Hunting activity in a protected area in the Amazon** D. Ferreira, (masto.dayse@gmail.com), Uni.District, Macapá, Brazil, M. Vergara, (micheline.vergara@gmail.com), E.D. Sotta, (eleneide.sotta@embrapa.br) We collected data from June to October 2011 in the State Forest in Amapá state, Brazil. Fifty-four hunters were interviewed, disclosing information on the frequency, quantity, price, sale/purchase and disposal of species hunted. We identified four profiles in the hunting practice: i) commercial hunting; ii) subsistence hunting; iii) hunting for supplementary income; and, iv) hunting for pleasure. The species most frequently taken were paca (*Cuniculus paca*), collared peccary (*Pecari tajacu*) and deer (*Mazama* spp.). We estimated 1,752 paca are slaughtered annually (13,170 kg biomass); 1,177 peccaries (27,071 kg biomass), and 578 deer (14,450 kg biomass). Applying currency values obtained from the average kilogram of bushmeat for purchase/sale (in USD, conversion rate January/2012), regardless of having been traded or not, we estimated the total biomass as equivalent to USD 235,974. We note that commercial hunting is commonly practiced on the Brazilian international border with French Guiana. 32
- 127 **Mitochondrial DNA sequences based forensic identification of the sea cow, *Dugong dugon* (Müller, 1776) from the Gulf of Mannar marine national park, India** B. Kinattumkara, (kkbineesh@gmail.com), Nat.Bureau Fish Genetic Res., CMFRI, Kerala, India, A. Goopalakrishnan, (agopalkochi@gmail.com), V.S. Basheer, (basheervs@rediffmail.com), J.K. Jena, (jkjena2@rediffmail.com) The dugong is found in the coastal waters in the Palk bay, the Gulf of Mannar and in the Saurashtra coast. Although commercial hunting is now banned, dugong products from indirect takes are still highly valued, and there is traditional hunting of the species by the indigenous peoples of India. In an effort to establish a comprehensive identification data set, we have generated a species-specific partial sequence data of the mitochondrial genome, covering the 16S rRNA (546bp), COI (600bp) genes as the reference genetic profile helping in accurate identification of any body parts. In 2013, flesh suspected as that of the protected dugong was seized from fishermen by the Forest Range Officer, Gulf of Mannar and was brought before the Judicial First Class Magistrate. Based on DNA sequencing of 16S rRNA (545bp) and COI (655bp) genes and comparing with the sequences, the suspected sample was identified as that of dugong and the result was communicated to the court. 32
- 128 **Population control of Sika deer in a special hunting area in Hokkaido, Japan** Y. Matsuura, (ymtur@affrc.go.jp), Forestry and Forest Prod. Res. Inst., Sapporo, Japan, H. Igota, (igoth@rakuno.ac.jp), Rakuno Gakuen Uni., Japan, J. Igota, (junp@vill.nishiokoppe.hokkaido.jp), Nishiokoppe Wildl. Assoc. Sika deer population in Hokkaido Island has been increasing and become overabundant. Population control is usually performed by recreational hunting but the target population level has not been accomplished yet. A special hunting area (SHA) was established in whole Nishiokoppe village (308 km²), located in northern Hokkaido. The number of deer harvested is fully recorded here, a rarity in Japan, and a single population control method can be applied. We divided the SHA into four fragments to set up the regional management goal in each unit. In each unit, we performed spotlight counts from 2005 and estimated the population density by distance sampling method. About 1000 deer were shot in 2012 and the population density varied from 19.7 to 48.1 deer/km² depending on units. The number of deer harvested differed among units. More culling pressure is needed in high density units. 33
- 129 **Activity patterns of *Neotoma micropus* along a wildland-urban gradient: females dominate access to anthropogenic resources** D. Post, (post_d@utpb.edu), Uni.Texas-Permian Basin, Odessa, Texas, USA, B.L. Hawkins, (Brandon.Hawkins@tetrattech.com), J.A. Eldridge, (eldridge_j@utpb.edu) In many wildland communities, species richness decreases as human density increases along the wildland-urban gradient. However, natural populations do not always respond negatively to human influence. The present study examines the effect of the availability of anthropogenic food sources on the activity patterns of populations of the Southern Plains woodrat, *Neotoma micropus*. We found that the area of nightly activity increased significantly as distance from the interface increased. Further, we found that females were significantly more likely to occupy middens close to the interface and to access anthropogenic resources than were males. 33

- 130 Bat habitat and landscape associations in high wind resource areas of Ireland: implications for wind energy** 33
U. Nealon, (unanealon@gmail.com), Uni. Coll. Dublin, Dublin, Ireland, L. Defernez, (lucie.defernez@hotmail.fr), Uni. Montpellier, Montpellier, France. W.I. Montgomery, (i.montgomery@qub.ac.uk), Queen's Uni. Belfast, Belfast, UK, E. Teeling, (emma.teeling@ucd.ie) Bat fatalities have been recorded at wind energy facilities worldwide. However, research findings, regarding wind turbine related bat fatalities and mitigation strategies, do not readily transpose to the Irish situation. Due to Ireland's unique landscape characteristics, bats have developed different habitat associations and behaviours compared to their European counterparts. Even within Ireland, little is known of how bats use open, upland habitats where wind turbines traditionally tend to be sited. Car based monitoring techniques are used to gather bat presence data in representative habitats within areas of high wind resource in Ireland. Twenty-five 50km transects were completed in June and July, 2013. With this data, we apply analysis of habitat and landscape associations to predict patterns in bat distribution in these areas. This research may have several implications for the wind energy industry including planning future wind energy developments and informing turbine bat fatality research.
- 131 Common voles in agriculture – population-genetic analysis of dispersal dynamics** A. Leukers, 33
(angela.leukers@jki.bund.de), Westphalian Wilhelms-Uni., Münster, Germany, J. Jacob, (jens.jacob@jki.bund.de), Inst. for Plant Protection in Hort. & Forests, Münster, Germany, G. Heckel, (gerald.heckel@iee.unibe.ch), Uni. Bern, Switzerland Common voles can disperse from refuges to arable fields and, at high abundances, cause significant crop losses. To apply timely and spatially targeted management methods, sound knowledge about distribution patterns of voles at field-refuge-boundaries is required. In this study, capture-mark-release and microsatellite genotyping was used to investigate population dynamics and dispersal patterns of common voles. Field sites were located in East Germany. Ten grassland areas below wind energy plants were used as experimental refuges dispersed in a matrix of arable fields. To measure population parameters and to infer kinship and migration movements between refuges and arable fields, >1,000 individuals were trapped in two years and 15 genetic markers were analyzed. Voles showed highly dynamic movements with local extinctions and rapid re-colonisation of refuges but low reproductive success of immigrants. Molecular analysis revealed high population differentiation rates between refuges and seasons. Recent results on spatio-temporal movements of voles will be presented.
- 132 Long term monitoring of small mammals in managed and unmanaged mountain forest ecosystems in Austria** 33
U. Nopp-Mayr, (ursula.nopp-mayr@boku.ac.at), Uni. Nat. Res. & Life Sci., Vienna, Austria, K. Heissenberger, (k.heissenberger@students.boku.ac.at), H. Carstensen, (hannah.carstensen@web.de), I. Kempter, (iris.kempter@boku.ac.at) Small mammals were monitored in two nature reserves in Austria from 2002 (Wilderness Area Dürrenstein) and 2004 (National Park Oberösterreichische Kalkalpen) using live traps. In both study areas, sample sites were in different, typical forest habitats: managed and unmanaged forests, primeval forests and uncleared windthrow. During the survey period, there were three peak years of small mammal population density (2004, 2008, 2012), all triggered by heavy masting of *Fagus sylvatica* in the year before and followed by a collapse of small mammal population densities. We demonstrate distinct differences between peak, crash and moderate years within the two main species *Myodes glareolus* and *Apodemus flavicollis*, regarding sex ratio, body weight and sexual activity. Differences in trapping success between managed and primeval forests disappear in small mammal peak years, whilst years with low or moderate population densities show higher spatial differentiation.
- 133 Migration patterns and habitat use of Sika deer in suburbs of Sapporo, Japan** H. Igota, (igotoh@rakuno.ac.jp), 33
Hokkaido, Japan, Y. Honma, (jhonnydeppa0811@yahoo.co.jp), Rakuno Gakuen Uni., Japan, Ayane Koga, (ak52396neko@gmail.com), T. Yoshida, (yoshi-ty@rakuno.ac.jp) Urban deer issues are increasing worldwide. Between 2012 and 2013 we studied the seasonal movements and habitat use of Sika deer (*Cervus nippon yezoensis*) in suburbs of Sapporo area, with a human population of two million. Four deer were captured and fitted GPS and/or radio collars in a wintering area of a national forest. They all migrated between individually separate summer and winter ranges (49-837 ha), located in deciduous and coniferous mixed forests, mainly in a prefectural forest park, and agricultural lands adjacent to downtown areas, including three municipalities. One female with a GPS collar used agricultural land located further from roads and nearer from forests in daytime than at night. The migration distances ranged between 879 and 5126 m. They crossed railroads and/or national roads and might use rivers as corridors. These results suggest that various stakeholders must collaborate to manage suburban deer to prevent traffic accidents and agricultural damage.
- 134 Modeling occupancy of large mammals in the Iguazu National Park, southern Brazil: evidence of large-scale negative edge effects** M. Xavier da Silva, (xavier.marina@usp.br), Dept. de Ecol. IBUSP, São Paulo, Brazil, A. Paviolo, (paviolo4@gmail.com), L. Wedekin, (leonardo.wedekin@baleiajubarte.org.br), R. Pardini, (reantapardini@uol.com.br) 33
Conservation areas are the most important strategy for conserving biodiversity, especially large mammals. The efficiency of such conservation areas, however, has been the focus of much debate, especially in the tropics. We draw on a large dataset from 37 camera-trap stations covering a grid of 900-km² in one of the largest conservation areas in the Atlantic forest hotspot - the Iguazu National Park - to test the existence of large-scale edge effects on the distribution of large mammals in conservation areas. We use occupancy models for 13 native species and one exotic species, the domestic dog. We found a strong negative effect of the distance from the park border on the occupancy of domestic dogs. In contrast, for most native species (12) the effect of the distance from the park border was positive. Our work highlights that domestic dogs can act as a large-scale edge effect in conservation units.

- 135 Responses of small mammals to clearcutting in temperate and boreal forests of Europe: a meta-analysis and review** R.Zwolak, (rafal.zwolak@gmail.com), A. Mickiewicz Uni., Poland, M. Bogdziewicz, (michalbogdziewicz@gmail.com) We conducted a meta-analysis of published research on 9 small mammal species (*Apodemus agrarius*, *A. flavicollis*, *A. sylvaticus*, *Micromys minutus*, *Microtus agrestis*, *M. arvalis*, *Myodes glareolus*, *S. araneus*, and *S. minutus*), comparing their abundance on clear-cuts and in unharvested stands. For 4 other species (*Muscardinus avellanarius*, *Myodes rufucanus*, *Pteromys volans*, and *Sciurus vulgaris*) we provided a qualitative review of their responses to forest harvest. The meta-analysis suggested that common species of small mammals usually increase in abundance after clear-cutting or are unaffected by this disturbance. As an exception, *A. flavicollis* declines after clear-cutting in boreal but not in temperate forest. The qualitative review suggests that the responses of more specialized (e.g. arboreal) species to forest harvest are more varied than the responses of generalist species included in the meta-analysis. For some species of small mammals (e.g. *Pteromys volans*) habitat loss resulting from forest harvest is a major threat. **33**
- 136 Scat detection dog and faecal DNA helping distribution modeling of Brazilian dwarf brocket deer and its conservation** M. Oliveira, (oliveiram1@yahoo.com.br), Uni.de São Paulo, Brazil, H.T.Z. do Couto, (htzcouto@gmail.com), J.M. Barbanti Duarte, (barbanti@fcav.unesp.br), UNESP The Brazilian dwarf brocket deer (*Mazaman nana*) is a cervid species that occupies the forests of southern Brazil and has been greatly affected by the drastic reduction of forested areas. We aimed to model the species distribution and determine priority areas for conservation. Given the rarity and high elusiveness of the species we did a sampling based on faeces collection with detection dogs and genetic species typing through fecal DNA analysis. We collected 121 faecal samples in 13 protected areas spread over the south of Brazil. After species identification by PCR/RFLP and spatialization of the samples, we modeled the species distribution using Maxent. To determine priority areas for species conservation we selected the largest clusters of pixels with values of environmental suitability higher than 0.6 and out of protected areas. Thus, we obtained 11 priority areas that encompass 20407 km² and include natural and human-influenced landscapes. **33**
- 137 Small mammals in a biofuels landscape: community patterns and stress responses** R. Schooley, (schooley@illinois.edu), Uni.Illinois, Urbana, Illinois, USA, S. Fredebaugh-Siller, (sifredeb@gmail.com), C. Suski, (suski@illinois.edu), Z. Zuckerman, (zzucker2@illinois.edu) The expected growth in biofuel production could greatly alter landscapes and pose serious challenges for biodiversity conservation. We evaluated responses of small mammals to four biofuel crops (mixed prairie, switchgrass, corn, miscanthus) in Midwestern USA. We measured effects at the community level and the individual level (stress physiology) for the dominant species, deer mouse (*Peromyscus maniculatus*). Mixed prairie and switchgrass habitats supported similar communities of small mammals, whereas corn and miscanthus had similar communities that were impoverished and contained few grassland voles (*Microtus* spp.). Stress levels of deer mice measured by fecal corticosterone concentrations varied among biofuel habitats due to indirect effects on abundances of conspecifics and behaviorally dominant heterospecifics. Deer mice did not exhibit increased stress levels in response to corn harvest, an extensive habitat disturbance. Biofuels expansion has considerably implications for habitat quality for small mammals and for stress levels of the dominant species in many agroecosystems. **33**
- 138 The road less travelled: even recreational trails alter wildlife movement** L.L. Kanda, (lkanda@ithaca.edu), Ithaca Coll. Ithaca, New York, USA, B. Donnelly, B. Hayes Roads and recreation trails have been documented as barriers to movement of a wide variety of wildlife, but they may also serve as movement corridors for other species. We investigated the reaction of both small mammals (*Peromyscus* spp.) and larger wildlife species in a forest fragment in Ithaca, NY, to an unpaved gasoline access road used as a recreational, walking trail. *Peromyscus* made fewer movements between grids separated by the road than between grids separated by the same distance of forest. Remote cameras paired on and 50m off the road showed that canids (*Canis latrans*, *Urocyon cinereoargenteus*, and *Vulpes vulpes*) were more likely to be documented on the road. Increased predation risk from the combination of reduced ground cover and increased predator presence may explain how even this small break in the forest noticeably reduces movement of mice. **33**
- 139 Traffic disturbance to migration of Tibetan antelopes** Lin Xia, (xial@ioz.ac.cn), Inst. Zoology, Chinese Acad. Sci., Chaoyang, Beijing, China, Q.Yang, (yangqs@ioz.ac.cn), Q. Zhang, (zhangq@ioz.ac.cn) The Tibetan antelope, chiru, is one of the world's endangered animals. The new Qinghai-Tibet railway and an accompanying highway bisect the Tibetan antelope migration corridor in Hoh-xil Nature Reserve. To offset the barrier effect produced on local fauna, wildlife passages have been built beneath the railway. From 2004-2008 we recorded the passes of chiru through their migration corridors and monitored the impacts of transportation infrastructures on their migration. The results show that the disturbance to chiru migration included transportation infrastructure, human activities, road traffic, and construction of the railway. During the main construction period the Tibetan antelopes were much disturbed but they soon adjusted their migrating routes to avoid most human activities. The antelopes readily adapted to wildlife corridors and other underpasses along the railway: the efficiency of wildlife passages have greatly improved from 56% to 100%, more crossing structures were used, and group size and time used in crossing decreased. **34**
- 140 Better off in the wild? Evaluating a captive-breeding-release program for the endangered Key Largo woodrat** R. McCleery, (ramccleery@ufl.edu), Uni.Florida, Gainesville, Florida, USA, M.Oli, (olim@ufl.edu) Captive breeding and release programs (CBRP) are generally expensive, and the extent that they contribute to the recovery of rare species is often uncertain. We developed a population model to simulate the response of the population of Key Largo woodrat (*Netoma floridanana smalli*) (KLWR) to various captive breeding and release strategies. Our model suggests that in its current format a woodrat CBRP would not aid the recovery of the KLWR population. Under a no management scenario, with the lowest initial abundance (150 KLWR), the probability of terminal extinction (< 1 KLWR) for our model was < 10% (Figure 3). In captivity, woodrats had much lower recruitment (0.039) than those in the wild (0.216- 0.503), and most released KLWRs died before they could have reproduced. Consequently, removing KLWR from the wild population for captive breeding will reduce the size of the wild population, but will provide no benefit to the population in return. **34**

- 141 **Biodiversity benefit? – host specific parasites in reintroduced mammals** R. Campbell-Palmer, (rcampbellpalmer@rzss.org.uk), Roy. Zool. Soc. Scotland, Edinburgh, UK, S. Girling, (sgirling@rzss.org.uk), R. Pizzi, (rpizzi@rzss.org.uk), F. Rosell, Telemark Uni.Coll., (Frank.Rosell@hit.no) Biodiversity benefits of beavers through their habitat creation and modification activities are well documented and can be quite visually apparent. Reintroduction and translocations have been popular and successful methods in beaver conservation across Europe, bringing about the restoration of this species once threatened with extinction. Britain is one of the last European countries to consider the reintroduction of this former native; however, being physically disconnected from Europe, various statutory quarantine regulations have resulted in increased veterinary screening requirements for translocated wild beavers. Is there a requirement to treat reintroduced mammals for host-specific parasites, or should we accept that reintroductions will include the natural host-parasite lifecycles experienced in a source population and embrace the often unforeseen increases in biodiversity that these bring? Through the Scottish Beaver Trial a range of health screening procedures have been developed in a previously under-researched area. Host specific parasites are now present in free-living British beaver populations. 35
- 142 **Characterization of the ecological corridor of the Atlantic Forest Coast for the occurrence of the jaguar (*Panthera onca*)** E.V. Maggiorini, (ericavam@yahoo.com.br), Escola Superior de Agricultura "Luiz de Queiroz", São Paulo, Brasil, S.M.C. Cavalcanti, (cavalcanti1@yahoo.com), H. Quigley, (hquigley@panthera.org), K.M.P.M. de Barros Ferraz (katia.ferraz@usp.br) Atlantic forest, one of the most threatened hotspot for jaguaris a high priority area for its survival in the long term. Due to the lack of information, this study aimed to characterize the occurrence of the jaguar in the Atlantic coastal Forest and define priority areas for its conservation. 577 interviews were conducted in 111 grids of 90 km² (May 9th, 2010-June 2nd, 2011). Species distribution models (SDM) and occupancy models were produced. Distance from urban areas, percentage of forest and elevation were the most significant variables explaining the species occurrence in the area. The SDM (AUC=0.979, omission error=0.2039, p=0; AUC=0.9851, omission error=0.2375, p=0) and the occupancy models indicated the environmental suitability for the species occurrence allowing the identification of the high priority areas for jaguar conservation in the biome. These results will be used in the jaguar Action Plan in Brazil. 35
- 143 **Chronic exposure to trace metals is related to parasitic contamination in the lesser horseshoe bat (*Rhinolophus hipposideros*)** E. Afonso, (eve.afonso@univ-fcomte.fr), Uni. Franche-Comté UMR CNRS Besancon, France, V. Canella, (mamzel_cunella@msn.com), P. Tournant, (Pierline.Tournant@univ-fcomte.fr), R. Scheifler, (renaud.scheifler@univ-fcomte.fr) The present study aimed to assess the relationships between chronic exposure to trace metals and biological contamination in the lesser horseshoe bat. During July 2011, 26 maternity roosts located in Franche-Comté (16 202 km², Eastern France) were sampled. Bats were tested for 16 trace metals (ICP-AES and -MS) and the parasites *Anaplasma* sp., *Bartonella* sp., and *Eimeria hessei* (PCR) using non-invasive techniques (droppings collection, individual genotyping). Prevalences for the three parasites were estimated from 351 bats located in the 26 maternity roosts: 46.4% for *E. hessei*, 25.6% for *Anaplasma* sp., and 39.1% for *Bartonella* sp. Prevalence for *E. hessei* was positively related to cadmium concentrations, while parasitic specific richness per individual was positively related to an exposure gradient including several trace metal elements. The underlying functional mechanisms remain to be explored: however, our results suggest that environmental pollution may affect contamination by pathogens in bats. 35
- 144 **Concentrations of radioactive cesium and urinary 8-OHdG of the large Japanese field mouse *Apodemus speciosus* after the Fukushima nuclear accident** M. Tomozawa, (mt@a3.keio.jp), Keio Uni., Yokohama, Japan, S. Sakamoto, (aposhin1@med.miyazaki-u.ac.jp), Miyazaki Uni., Japan, Jun Sato, (jsato@bt.fubt.fukuyama-u.ac.jp), Fukuyama Uni., Japan, F. Yamada, (fumio@ffpri.affrc.go.jp), Forestry & Forest Prod. Res. Inst., Sapporo, Japan The impact of the Fukushima nuclear accident on wild mammals is a major concern for the local residents and the global community. However, the genetic effect of low-dose irradiation and the monitoring methods are not fully understood. One pathway for genetic effects is oxidation of DNA bases by radioisotopes of oxygen produced by irradiation. To detect the effect of environmental radioactive contamination on wild mammals, we examined the concentrations of radioactive cesium in muscle and 8-hydroxydeoxyguanosine (8-OHdG) in urine of *Apodemus speciosus*. We obtained samples from four localities with different contamination levels. The cesium concentration corresponded to the background (air) contamination levels. The 8-OHdG concentrations did not show significant differences among the localities except one pair of localities. The concentrations of radioactive cesium and urinary 8-OHdG varied among individuals within a locality, and did not show a significant correlation with each other, suggesting a small effect of irradiation. 35
- 145 **Diet of wild boar (*Sus scrofa*) in agricultural land, Korea** Seong Min Lee, (zoologist@snu.ac.kr), Seoul Nat.Uni., Coll. Agricult. & Life Sci., Gwanak-gu, Seoul, Rep. Korea, Jong U. Kim, (wildlife@snu.ac.kr), Woo Shin Lee, (krane@snu.ac.kr) Wild boar have increased in recent years in Korea where damage to agricultural crops is considered as a social issue. We collected and analyzed wild boar stomach contents (n=79) during the hunting season from May to December 2012. There was seasonal variation in the diet. Plant foods represented up to 93.5% of the diet and were consumed more frequently than animal foods. Invertebrates occurred with high frequency but were underestimated in dry weight because they are rapidly digested. Agricultural crops consumed comprised mainly chestnuts (33%), rice (33%), and apples (24%). The frequency of occurrence of earthworms was 50% of diet. Earthworm consumption generally increased in summer, and then decreased in winter. Our results show that wild boar can be considered an omnivore whose diet consists of plant and animal foods. Agricultural crops are also a potentially important food resources for wild boar. 35

- 146 Dietary interactions of damage-causing caracal in a highly impacted rangeland ecosystem, South Africa** 35
 N. Avenant, (navenant@nasmus.co.za), Nat. Mus., Bloemfontein, South Africa and Uni. of the Free State, Bloemfontein, South Africa, C. Pohl, (pohlcf@ufs.ac.za), A. Sliwa, (sliwa@koelnerzoo.de), Zool. Garten, Köln, Germany Caracal *Caracal caracal* are blamed for excessive small stock losses on South African rangelands. Inadequate knowledge of their ecology limits our understanding of their role in these ecosystems, but also inhibits the development of effective and sustainable management interventions. This contribution reports on caracal feeding behaviour in the southern Free State, where stock losses are reported to be most severe. Results showed the main prey items to be hares (average monthly occurrence in scats 28%), rodents (20%), hyrax (18%) and small stock (13%). Smaller amounts of antelopes (8%), birds (7%), small carnivores (4%) and arthropods (4%) were also present. The caracal's opportunistic feeding behaviour was indicated by strong correlations, for most prey groups, between usage and relative availability (\approx actual densities and or the presence of newborn). The impact of these findings on farm and damage-causing predator management are discussed.
- 147 Discovery of a new population of the critically endangered Darwin's fox (*Lycalopex fulvipes*): range expansion and conservation implications** 35
 A.A. Farias, (afarias@bio.puc.cl), Pontificia Uni.Católica de Chile, & CIICC-Uni. Santo Tomás, Santiago, Chile, E.A. Silva-Rodríguez, (eduardosilvar@gmail.com), Uni. Andrés Bello, Santiago, Chile, M.A. Sepúlveda, (maximiliano.sepulveda@gmail.com), Uni. Minnesota, St. Paul, Minnesota, USA, G.L. Svensson, (gabi.linnea@gmail.com) Darwin's fox is a small canid endemic to coastal forests of southern Chile. Only two populations have been documented: one in Chiloé Island, presumed to comprise 90% of the population, and the other 450 km north at Nahuelbuta National Park. Such a restricted distribution, small population size, and ubiquitous threats such as forest degradation and presence of domestic dogs, led IUCN to classify this species as critically endangered, being one of the most threatened carnivores worldwide. Here, we report the discovery by camera-trapping, of a new population of Darwin's fox in three protected areas half way between previously recorded populations. Our findings provide evidence for a broader distribution of this critically endangered species. We discuss the relevance of our findings for the conservation of this canid and the role that this species may play as a flagship for the conservation of fragile, Coastal Range ecosystems.
- 148 Efficacy of rodenticides for roof rat and deer mouse control in orchards** 35
 N. Quinn, (n.quinn@irri.org), Uni. California, Parlier, California, USA, D.H. Davis, R.M. Engeman, USDA Wildl. Services, Nat. Wildl. Res. Cent., R.A. Baldwin, (rabaldwin@ucanr.edu) Roof rats (*Rattus rattus*) and deer mice (*Peromyscus maniculatus*) are occasional pests of orchard crops throughout the world. Rodenticides are a practical and effective way of controlling rodent pests and reducing damage. However, a paucity of information exists on the efficacy of rodenticides in orchards. An index was developed to measure rodent activity in order to monitor efficacy of rodenticides, and to subsequently test the efficacy of three rodenticide baits to determine their utility for controlling roof rats and deer mice in agricultural orchards. The 0.005% diphacinone grain bait was shown to be the most effective option for controlling both roof rats and deer mice (x efficacy = 90% and 99%, respectively). The use of elevated bait stations proved effective at providing bait to target species and should substantially limit access to rodenticides by many non-target species.
- 149 Home ranges and habitat use of wild boar (*Sus scrofa*) in Korea** 35
 Jong U. Kim, (wildlife@snu.ac.kr), Seoul Nat.Uni., Coll. Agricult. & Life Sci., Gwanak-gu, Seoul, Rep. Korea, Woo Shin Lee, (krane@snu.ac.kr), Seong Min Lee (zoologist@snu.ac.kr) Home ranges and habitat use of radio-collared wild boar were monitored during April to December 2012 in Korea. Five individuals were captured, of which 1 male and 2 females were radio-tracked. Home range size averaged $5.56 \pm 1.54 \text{ km}^2$ (MCP) and $1.55 \pm 0.76 \text{ km}^2$ (Kernel 95%). Home range of male (7.16 km^2 MCP) was larger than those of females ($4.77 \pm 0.97 \text{ km}^2$; MCP). Core habitat area averaged $1.48 \pm 0.75 \text{ km}^2$ (MCP) and $0.45 \pm 0.19 \text{ km}^2$ (Kernel 50%). We distinguished five habitat types in order of land use and forest type to analyze habitat use and habitat preference. This preference derives from core habitat area and radio-tracked points. Using Jacobs D preference index, we found that wild boar preferred chestnut orchard. Wild boar mainly inhabited forest edge and damaged nearby agricultural land and rice paddies.
- 150 Ocelot density in the semi-arid Caatinga, Brazil** 35
 G. Penido, (g.penido@yahoo.com.br), Uni. Brasilia, Darcy Ribeiro, Brasília, Brazil, R. Sollmann, (rahel.sollmann@jaguar.org.br), North Carolina State Uni., Raleigh, North Carolina, USA, L. Silveira, (l.silveira@jaguar.org.br), Jaguar Conserv.Fund, Inst.Onça Pintada, Mineiros, Brazil, J. Marinho Filho, (jmarinho@unb.br) We estimated the density of ocelot (*Leopardus pardalis*) in a National Park in the Caatinga, a semi-arid biome in northeast Brazil. We used spatially explicit capture-recapture models to estimate density from camera-trapping data. Analysis was conducted in software R and package "secr". We developed several models for variation in detection parameters and selected the best models by AIC. The best model included heterogeneity and time effect on detection parameters. Under this model, ocelot density was estimated at 4.7 individuals/100km², a very low density in relation to other areas. Low annual rainfall and high temperatures of this region might be responsible for the low density, since ocelots densities are positively related with a higher rainfall. There is a suggestion of population growth since a previous study 10 years ago. Increasing park security and interaction with other carnivore species might be stronger factors for ocelot densities at Brazilian semi-arid.

- 151 **Reticulated giraffe: you don't know what you've got till it's gone** J. Doherty, (johndoherty@sapiensnetwork.org), Queen's Uni. Belfast, Belfast, UK, R.W. Elwood, (r.elwood@qub.ac.uk), D.M. Scantlebury, (m.scantlebury@qub.ac.uk) 35
The conservation of terrestrial megafauna is uniquely challenging: whether because they are perceived to be dangerous, prized as commodities, require extensive areas of suitable habitat or because their capacity for regeneration is limited, large-bodied animals are often in the vanguard of anthropogenic extinction events. Reticulated giraffes are endemic to the north-east of Kenya. Their numbers are thought to have decreased by more than 80% over the past 15 years, reflecting but exceeding similar declines in giraffe populations elsewhere. Human activities responsible for the disappearance of reticulated giraffes are several and increasing, and further potentially damaging developments are imminent. Compared to the crises facing the conservation of other megafauna, that of giraffes is largely unreported and unrecognised. Here, we seek to sound the alarm by drawing attention to current and future threats to the existence of a unique megaherbivore.
- 152 **The impact of mesopredator release on rangeland in South Africa** J. Du Plessis, (jurie.duplessis@nasmus.co.za), Nat.Mus., Bloemfontein, South Africa, and Uni. of the Free State Bloemfontein, South Africa, H.O. de Waal, (dewaaho@ufs.ac.za), N. Avenant, (navenant@nasmus.co.za) 35
Black-backed jackal *Canis mesomelas* and caracal *Caracal caracal* are abundant on rangelands where virtually all their larger competitors have been exterminated. Their impact on livestock and wildlife is reported to be excessive and on the increase. In response, a variety of human-wildlife conflict management (HWCM) methods are employed by stock owners. Most of these approaches disregard the ecological, social or economical ramifications, as well as management impacts on the long term. Furthermore, it is possible that many of the HWCM methods may even contribute to the escalation in stock losses. This contribution evaluates current knowledge on a wide range of associated aspects, and put the conundrum caused by these two predators into perspective. It also proposes a model with which to address the shortcomings in existing information. This could lead to a sustainable management plan for these two damage-causing predators on rangeland in southern Africa.
- 153 **Viability analysis of aquatic mammal populations: a review** I.Guion de Almeida, (inae_guion@yahoo.com.br), Uni.São Paulo, Piracicaba, São Paulo, Brazil, M. Manoel Rollo Jr., (mario.rollo@gmail.com), State Uni.São Paulo, Brasil, A. Reis Percequillo, (percequillo@usp.br) 35
Aquatic mammals have faced substantial decline in the last century from local, regional and global extinction events. The main factors influencing population dynamics are difficult to identify. Models can be used to make quantitative predictions about population size over time and estimate the viability of small populations under different scenarios. This survey aimed to verify the implementation of the population viability analysis (PVA) in populations of aquatic mammals around the world. 11 species of aquatic mammals had their populations accessed, from baleen and toothed whales to pinnipeds and sirenians. The data revealed important results addressing conservation issues and the development of models for endangered species is essential for efficient planning. We discuss the advantages and limitations of the method. Despite its limitations, PVA is the best tool available for conservation actions in a wide range of contexts. Conservation efforts should be taken even before the population shows significantly decline.
- 154 **What do kids from Lacandona rainforest think about jaguars? New perspectives for future conservation** 35
L. Vaca, (lucrovaca@hotmail.com), Uni. Autón. Metro. Calzada del Hueso, Distrito Federal México, Mexico
Jaguars in México are under risk due to habitat loss and poaching. The latter is critical and deserves special attention because it has been linked to a human-wildlife conflict, predation resulting in an economic loss. For this reason, a sensitization activity aimed to promote jaguar conservation was carried out in a community in a conservation priority region which comprises both connecting areas of the Mayan Forest, and a refuge for two other species at risk, as well as a habitat for many potential prey of jaguars. The objective of this research was to identify social attitudes that kids have about jaguars and to examine the hypothesis that kids from a ranching community, have a negative view of this felid. Further, the research will provide useful information to investigate future alternatives in jaguar conservation.
- 155 **What we know about our Xenarthras? An Uruguayan study case** F. Montenegro, (bonesarte@gmail.com), Museo Nacional de Hist.Natural, Montevideo, Uruguay, H. Coitiño, (hcoitino@gmail.com), Ecol.y Conserv.de la Biodivers. Uruguay, D. Hernandez, Uni. de la República., Uruguay 35
At present, in Uruguay, there are five living species of Xenarthra, and one locally extinct. The objective of this research was to evaluate the knowledge about this group in our country, in order to make a baseline for future research and conservation plans. For this work scientific articles were surveyed as well as books, divulgation notes, thesis and congress abstracts. We analyzed all the published work from 1808 to 2012. The information on the species was classified in twelve different categories such as behavior, genetics, parasitology, etc. Most of the articles reviewed were about zoonosis, species presence and parasitology with only a few on behavior, genetics and ecology detected. The results show that it is critical to develop long-term research on this group to determine aspects of their biology, ecology and population dynamics. This will make important contributions to future conservation plans for these species in Uruguay.

- 156 **Using environmental features to predict the distribution of sympatric large carnivores, and their attacks upon livestock, in Tanzania's Ruaha Landscape** L. Abade, (leandro.adabe@oc.ac.uk), Wildl. Conserv. Res. Unit, Uni. Oxford, Abingdon, UK. A. Dickman, D. Macdonald The Ruaha landscape is considered a top priority area for carnivore conservation in Africa, harbouring an intact guild of large carnivores such as lions, leopards and spotted hyaenas. This diversity of large carnivores has also been an issue of major concern regarding intense levels of human-carnivore conflict (HCC) reported in this area, particularly motivated by large carnivore predation upon livestock. The conflict is resulting in alarming rates of retaliatory killing of large carnivores, threaten their local persistence. Better understanding of the key factors influencing the dynamics of HCC in the area is therefore an urgent issue to promote local conservation of these large carnivores. The present study aimed to (i) predict the distribution of the main sympatric carnivores associated to livestock predation across the landscape, and, (ii) to identify the ecogeographical variables related to livestock vulnerability to predation and map likely depredation hotspots on village lands around Ruaha National Park. 36
- 157 **Assessing the impact of fox baiting on the Tasmanian devil** C. Hughes, (nhug7059@uni.sydney.edu.au), Uni.Sydney, Sydney, New South Wales, Australia, N. Mooney, (nickjmooney@gmail.com), C. Dickman, (chris.dickman@sydney.edu.au) The recent incursion of the red fox (*Vulpes vulpes*) in Australia's island state of Tasmania poses a significant ecological and economic threat. In response, the Tasmanian Government is conducting an ongoing poison-baiting campaign across much of the state. The mortality risk to native carnivores, including the endangered Tasmanian devil (*Sarcophilus harrisii*), has not yet been adequately assessed. We report the progress of a two-year before-after-control-impact (BACI) study currently under way in northwestern Tasmania. 36
- 158 **Control of invasive grey squirrels in Scotland: assessing capture probability using programme MARK** A. Brereton, (a.brereton@abdn.ac.uk), Uni. Aberdeen, Aberdeen, UK, S. Burthe, (sburthe@ceh.ac.uk), Cent. Ecol. Hydrology, P. Lurz (lurzpww@gmail.com), S. Telfer, (s.telfer@abdn.ac.uk) Invasive species can negatively impact native ecosystems. Lethal control is commonly used to manage these negative impacts by attempting to reduce the density or range of invasive species. Understanding factors that influence capture probability is important for the design of effective control programmes. The grey squirrel (*Sciurus carolinensis*) has successfully established and spread in the UK. Transmission of squirrel pox virus from grey squirrels has caused declines of the native red squirrel. Intensive control work in Scotland aims to limit the spread of grey squirrels and squirrel pox and attempt eradication of grey squirrels from one isolated area. This project is investigating the effectiveness of this control using detailed records of trapping effort and captures. MARK has been used to investigate factors influencing capture probability, removal efficiency and compensatory movements during trapping. Results will provide information for future squirrel management and for other invasive species control programmes. 36
- 159 **Demise of the previously invasive grey squirrel (*Sciurus carolinensis*) in the Shannon Region, Ireland** M. Flaherty, (margaret.flaherty@nuigalway.ie), National Uni.Ireland, Galway, Ireland, C. Lawton, (colin.lawton@nuigalway.ie) American grey squirrels were introduced in 1911 and in just over 100 years they have spread throughout the eastern part of Ireland. The Shannon River has delineated the western boundary of its distribution, which was evident from an all-Ireland squirrel survey conducted in 2007. An up-to-date squirrel distribution map has been generated for the Shannon Region based on a visual sightings survey. In addition, a hair tube study was undertaken in several woodlands and live-trapping programmes were initiated in two woodlands in the area. No grey squirrel activity was recorded during the hair tube or trapping programmes. Following the sightings survey, grey squirrels are considered absent or possibly in very low numbers in much of the region. The hair tube and trapping studies confirm this finding. There has been a shift eastwards in the western frontier of grey squirrel distribution. 36
- 160 **Development of techniques to eradicate mongoose for conservation of biodiversity in the Ryukyu Islands, Japan** T. Jogahara, (jogahara@zool.ous.ac.jp), Okayama Uni.Science, Okayama, Japan, M. Asano, (asanojr@gifu-u.ac.jp), Gifu Uni., Japan, F.Yamada, (fumio@ffpri.affrc.go.jp) The small Indian mongoose (*Herpestes auropunctatus*) is one of the worst invasive alien species because of its negative impacts on ecosystems where it has been introduced worldwide. In Japan, it has also caused damage to native species in the Ryukyu Islands. Eradication campaigns against the mongoose are enforced by the Japanese and local governments. Hence, the number of mongoose is decreasing in Amami and Okinawa Island and a more efficient techniques for capture or killing mongooses in low-density areas is required. Moreover, bycatch of endemic and endangered species were problems for in the eradication of mongooses. We are developing new techniques: 1) establishment contraceptive vaccine; 2) simplicity and low-cost fencing to prevent range expanding and re-invasion of eradicated areas; 3) DNA techniques to identify species and sex of mongoose using hair traps; and, 4) prevention of bycatch of native species. 36
- 161 **Diet of wild boar (*Sus scrofa*) in a protected area of Argentina: composition and impacts** S.A. Ballari, (sebastianballari@gmail.com), Uni.Nacional de Córdoba, Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina Wild boar is one of the most abundant invasive alien species and widely distributed in Argentina. The breadth of its diet includes a wide variety of animal and plant species causing damage to the soil, destroying seeds, and preying on nests and endangered species. Although the wild boar diet has been described by many authors within the native and exotic range, information on this species in South America is scarce. We analyzed the stomach contents of 107 wild boars in El Palmar National Park (EPNP) in order to determine the composition of diet and its implications for native species conservation. Wild boars in EPNP are omnivorous, but show a marked vegetarian tendency (79%). Diet consists mainly of maize (bait), leaves, fruits and birds. We found evidence that boar might affect recruitment and dispersal of *Syagrus yatay* a protected species. However, the impacts are generally minor, probably because the boar population is controlled by hunting. 36

- 162 **Domestic dogs as invasive species in protected areas of the Brazilian Atlantic forest** A. Chiarello, (bradypus@ffclrp.usp.br), Uni.São Paulo, Ribeirão Preto, São Paulo, Brazil, A.M.O Paschoal (anamuzenza@gmail.com), R.L Massara, (rmassara@gmail.com), N.H.A. Curi, (nelsoncuri@hotmail.com) We evaluated the status of domestic dogs in six protected areas (PA) of the Brazilian Atlantic Forest (957-36,000 ha). We also interviewed dog owners (n=205) living nearby the PAs to assess dog management and health. We recorded dogs with camera traps inside the PAs and estimated their densities. The dog was among the four most frequently recorded species in five out of the six study areas (0.14 - 2.22 dogs/km²). We also found a clear link between dog abundance and the area covered with agriculture or urban settlements in the surroundings. Each household had, on average, 2.7 dogs, and most owned dogs (87.7%) were not restrained on a daily basis, nor received frequent veterinary care (93.2%). The prevalence of Leishmaniasis was quite high (9% of all sampled dogs). We concluded that the dog invasion is far advanced, justifying a change in attitude towards this conservation/public health problem. 36
- 163 **Estimating hare numbers using camera trapping and the Random Encounter Model** A. Caravaggi, (ahallam01@qub.ac.uk), Queen's, Queen's Uni. Belfast, Belfast, UK, P. Prodöhl, (p.prodohl@qub.ac.uk), W.I. Montgomery, (i.montgomery@qub.ac.uk), N. Reid, (neil.reid@qub.ac.uk) Camera traps are now commonly used in estimating density and abundance of animal populations. Most methods rely on the identification of individuals to facilitate the application of capture-recapture type models. The Random Encounter Model (REM) permits the estimation of density and abundance where individuals are not readily discernible. In Ireland, the European hare (*Lepus europaeus*) is an invasive species introduced during the 19th century and the endemic Irish hare (*L.timidus hibernicus*) is of high conservation concern. Neither species is individually recognisable from pelage characteristics. We applied the REM to camera-trap data collected using an array of 13, 1km squares and compare the resultant density estimates to those derived from Distance analysis of nocturnal line transect spotlight surveys. This is the first study of the REM in a lagomorph. It demonstrates the utility of REM and potential to replace more intensive survey techniques. 36
- 164 **Invading and expanding: ecological consequences and genomic characteristics of the invasive greater white-toothed shrew (*Crocidura russula*) in Ireland** A. McDevitt, (amcdev@gmail.com), Uni.Coll.Dublin, Ireland, W.I. Montgomery, (i.montgomery@qub.ac.uk), Queen's Uni.Belfast, UK, J. Searle, (jeremy.searle@cornell.edu), Cornell University, USA, J. Yearsley, (jon.yearsley@ucd.ie) The greater white-toothed shrew (*Crocidura russula*) was discovered in Co. Tipperary in Ireland in 2007. Subsequent trapping in 2012 has revealed that the species is widespread in the southern half of the island and occupies an area of ~5,800 km². Data collected in 2013, points to the species expanding its range by several km per year and it is likely that the species has been present in Ireland for a significant period of time (pre-2000). *C. russula* is having a detrimental impact on the indigenous pygmy shrew (*Sorex minutus*) in Ireland, with the pygmy shrew completely absent within the core range of the greater white-toothed shrew. Ongoing work is focusing on neutral and adaptive changes occurring in the genome of the greater white-toothed shrew at the expanding edge of its range in comparison to its point of introduction using RAD-sequencing. In addition, we are investigating if phenotypic change associated with dispersal (size-specific foot length) is evolving at its range edge. 36
- 165 **Invasion patterns and potential distribution of the Chinese muntjac deer (*Muntiacus reevesi*)** M. Freeman, (mfreeman02@qub.ac.uk), Queen's Uni. Belfast, Belfast, UK., N. Reid, (neil.reid@qub.ac.uk), J. Dick, (j.dick@qub.ac.uk) Muntjac invasion is difficult to predict; their small size easily allows for human facilitated dispersion. As a consequence of their elusive nature, they often remain undetected until the establishment phase of invasion is reached. Despite efforts to prevent muntjac arrival in Ireland, they have been detected in several areas across the country, though the extent of their distribution is unknown. Modelled predictions of their distribution could inform strategic spacial planning of a detection and eradication programme. We compiled occurrence records with precisions of at least 100m from the UK's NBN gateway database. MaxEnt models were run with 20 environmental variables and using 50% and 95% kernel density to represent the current distribution. Initial results suggest arable and urban areas had the most explanatory power. Counties Down, Armagh and Wicklow were predicted to have relatively high probabilities of occurrence. We suggest that these areas are target sites for future monitoring. 36
- 166 **Multi species monitoring: molecular detection of small mammals from a predator diet** D. O'Meara, (domeara@wit.ie), Waterford Inst.Tech., Waterford, Ireland, E. Sheehy, (emmasheehy@gmail.com), P. Turner, (pturner@wit.ie), C. O'Reilly, (coreilly@wit.ie) DNA identification of mammal species occurring in the diet of a predator is potentially a useful approach to monitor the distribution of multiple species. This is important in Ireland, where the combined presence of the introduced (*Myodes glareolus*) and (*Crocidura russula*) have been shown to impact the distribution of the indigenous small mammals, the (*Apodemus sylvaticus*) and (*Sorex minutus*). Direct monitoring of these species and their interactions requires trapping, a labour intensive and costly approach. In this study, we tested for the presence of small mammals in (*Martes martes*) scats collected during the National Pine Marten Survey (2005-2007) of Ireland to map their distribution. We also included additional scats to investigate if rarer prey items, (*Sciurus vulgaris*) and (*S. carolinensis*) could also be detected. This study demonstrates that all target species were genetically detected from pine marten scats. This strategy could be used as a monitoring tool for conservation management. 36

- 167 **Parasites from faeces and intestines of the raccoon dog (*Nyctereutes procyonoides*), including species dangerous for people** N. Osten-Sacken, (nataliost.osten@gmail.com), Adam Mickiewicz Uni., Poznan, Poland, L. Rychlik, (l.rychlik@gmail.com), A. Słodkiewicz-Kowalska, (aslodk@ump.edu.pl), P. Solarczyk, (solar@ump.edu.pl), P. Nowosad, (p.nowosad@ump.edu.pl) Parasites were sampled from 39 dead raccoon dogs and 124 faeces collected in western Poland during 2007-2012. Stomachs of 8 animals contained 34 specimens of *Toxocara canis* - a highly invasive parasite that can also be dangerous for people. The duodenum of 5 dogs contained 119 larvae of the insect family, Gastrophylidae. Larval *Trichinella spiralis* in midgut of 2 animals. In the faeces, there were numerous oocysts of *Cryptosporidium* sp. in 37 samples, numerous specimens of *Entamoeba* sp. in 23 samples and many eggs of *Toxocara canis* in 21 samples. Moreover, faeces contained also 3 specimens of *Demodex* sp. and many eggs of Ancylostomatidae. Most of these parasites are very invasive and considered to be pathogenic for human. *Isospora* sp. were found in 43 samples and eggs of *Trichocephalus vulpis*, which do not infect people, were found in some samples. Thus, raccoon dogs should be re-considered as a significant vector of dangerous parasites infective to people. 36
- 168 **Patterns of occurrence and abundance of small non-flying mammals of Mt. Sto Tomas, Luzon Island, Philippines** A.A. Reginaldo, (arisreginaldo@yahoo.com), Uni. The Philippines, Baguio, A. Pauline O. de Guia, Uni. The Philippines, Los Baños Recent sampling of mammals along habitats with varying levels of disturbance in many areas of the Philippines elucidate the effect of habitat disturbance on the small, non-flying mammal assemblage in a given habitat, and the relative tolerance of some native species. A standard mammal survey was conducted across a disturbance gradient, with an elevational range of 1980-2200 m asl in Mt. Sto Tomas, Luzon Island, Philippines. Native species are generally restricted and more common in intact forest habitats and the non-native species commonly occur in disturbed to highly disturbed habitats. Initial finding also show that, a known specialist, *Apomys datae*, also tolerates some disturbance, extending the knowledge about the specific responses of endemic species. There is also a strong indication that each, non-native species responds differently to varying types of disturbance. 38
- 169 **A new method for estimating the size of beaver populations in Poland** P. Janiszewski, (janisz@uwm.edu.pl), Uni. Warmia & Mazury, Olsztyn, Poland, W. Misiukiewicz, (castor_f@poczta.wp.pl), Wigry Nat. Park, A. Weigle, (a.weigle@nfos.org.pl), Nat. Found. Environ. Protection, Poland A new method was applied in 2005-2006 to estimate the size of beaver populations in Central Poland (Mazovia Province). Sites inhabited by beavers were surveyed during an inventory, based on the following: 1) winter food piles in the vicinity of lodges and burrows; 2) freshly cut trees and shrubs and beaver tracks along the shores of water bodies; 3) freshly solidified lodges; and, 4) newly built and kept in good repair dams. Information on 4889 signs of beaver activity was gathered, including 267 winter food piles, 606 lodges, 2550 burrows, 559 dams, 729 signs of beaver foraging and 178 other signs. The data were used to develop maps (1:50000), and the spatial distribution of beaver habitats was analyzed. An attempt was also made to identify the signs of beaver activity as belonging to different family groups. A visual buffer zone of 1000 m was created around each of the recorded traces to determine the ranges of beaver families. It was estimated that the surveyed area is inhabited by at least 1019 beaver families. Since the average size of a beaver family is 3.7 individuals, the beaver population in the area was estimated to be approximately 3800 animals. 39
- 170 **Different threats by male and female intruders to a territorial obligate monogamous mammal** H. Cross, (hannah.cross@hit.no), Telemark Uni. Coll., Telemark, Norway, F. Rosell, (frank.rosell@hit.no), A. Zedrosser, (andreas.zedrosser@hit.no), O. Nevin, (o.nevin@cqu.edu.au), CQ Uni., Australia Monogamy in mammals is relatively unusual, only occurring in 3-5% and to an even lesser degree in rodents. Intra-sexual competition occurs in many species to maintain pair bonds and also to signal presence within a territory. We tested the hypothesis that resident obligate monogamous Eurasian beaver can discriminate between the sexes when investigating anal gland secretions (AGS) from unknown (stranger) mated pairs. We predicted that dominant territorial male and female beavers will display a stronger response to AGS of same-sex conspecifics. Territorial intrusion by mated pair strangers was simulated by the formation of experimental scent mounds (ESM) with AGS. Our results showed that both sexes: (i) displayed a stronger response to the male AGS in sniffing duration; (ii) physically responded for longer durations towards male AGS; and, (iii) overmarked male AGS more frequently. We infer that obligate monogamous mammals can determine the sexual identity of intruding conspecifics of a mated pair via AGS and that intruding males pose more of a threat to resident males via intra-sexual competition and resident females due to the long-term costs of a new dominant male. 39
- 171 **Inhibitive effects of quinestrol on male reproductive system in Mongolian gerbils (*Meriones unguiculatus*)** S. Dazhao, (shidazhao@cau.edu.cn), China Agricult. Uni., Beijing, China, S. Wei, (shidazhao@cau.edu.cn), H. Shuzhen, (shidazhao@cau.edu.cn) The current study evaluated effects of quinestrol on oxidative stress and abnormal spermatogenesis for male Mongolian gerbils. Gerbils were randomly divided into multi-dose treated, single-dose treated group and control group. At 15 days after treatment antioxidant enzymes (SOD, GSH-Px) activities and T-AOC decreased whereas the MDA concentration significantly increased, testicular weight and seminiferous tubulars area decreased, germ cells were rarefied and showed irregular distribution in seminiferous tubules, apoptosis was pronounced among spermatocytes and spermatids, the number of dead and abnormal acrosome of spermatozoa increased significantly in quinestrol treated groups. At 30 days following treatment the testicular histopathological changes were more severe, sperm quality and antioxidant capacity continued to decline, and multi-dose treatment was more damaging to gerbil testes compared with single-dose treatment. The physiological indicators were recovered by 60 days of treatment withdrawal. The results showed oxidative stress induced by quinestrol in relation to abnormal spermatogenesis. 39

- 172 **Snow tracking of Yellow-throated marten in Korean temperate forest to study its winter ecology** T.Y. Choi, (gumiran@gmail.com), Nat.Inst.Enviro.n.Res., Kyunseo-Dong, Seo-Gu, Incheon, South Korea, D. Woo, (birdwatcher@naver.com) Individual yellow-throated martens (*Martes flavigula*) were snow-tracked to determine the winter ecology of the marten in a temperate region of Korea. The study was performed across 2 winter seasons, January–March of 2011 and December 2011 to February 2012. The total distance covered during snow tracking was 43.9 km (comprising 12 snow-tracking routes) and was used to determine winter foraging habits, general behavior and movement paths of solitary and small groups (1–6 individuals; mean = 2.6 ± 1.3) of yellow-throated martens. The martens in the current study were omnivorous, with their winter diet including 7 animal and 5 plant species. Yellow-throated martens searched for food near and under the fallen logs and branches, root plates of fallen trees, around the roots of growing trees, and in small holes in the ground. Foraging activity was estimated to occur at a frequency of 1.25 times/km, while territory marking occurred 1.34 times/km on average. Of the 55 foraging activities documented where this current study was performed, 17 were successful (31.5%). 39
- 173 **Suckling behaviours of Japanese wild boars, *Sus scrofa leucomystax*, in their early developmental stages** K. Kusumoto, (sk1191@edu.cc.saga-u.ac.jp), Saga Uni., Saga, Japan, N.Suzuki, J. Nakatani, (sanglier@affrc.go.jp), Agricultural Res.Cent., Nat. Agriculture & Food Res.Organization, Tsukuba, Japan In this study, we observed social behaviours of the Japanese wild boars (*Sus scrofa leucomystax*), a mother and her 4 infants (littermates), under semi-natural condition in a riverbed of Ashiya River, Hyogo, Japan (34°45'N, 135°15'E), and analyzed their suckling behaviours. The different vertical-striped pattern on each infant body was used for the individual identification from 3 days to 4 months old. Among the infants, most suckling occurred at the same time. Each infant used only a particular teat, and teat order had already established at 3 days old. Suckling frequency decreased with the advance of aging. Suckling lasted as long as ca. 400 seconds until the 10th day after birth, and then, its duration stabilized at ca. 180 seconds until weaning. The mother weaned her infants at the 100th day after birth. 39
- 174 **Test of scent lures for ocelots (*Leopardus pardalis*, Felidae) in a neotropical wetland region and implications for field use** F. Franchini, (flaviafranchini3@yahoo.com.br), Uni.Federal de Minas Gerais, Pampulha Belo Horizonte, Brazil, G.M. Mourão, (guilherme.mourao@embrapa.br), Embrapa, Pantanal, Brazil, A.P. Paglia, (apaglia@icb.ufmg.br) Field studies using camera-traps often use scent lures, but data about differences in the attractiveness of them is scarce. To address this deficiency, we evaluate the attractiveness of 6 commercial lures – Calvin Klein's Obsession, Cronk's Bobcat No.1 lure, Bobcat urine, Whitetail Deer urine, Catnip Oil and Catnip dried herb – and discuss implications for field use. Each scent was tested against a control using 12 camera-traps which were set along tracks. The data were collected from September to December/2012. There were 38 registers of ocelots. The GLM analysis shows significant difference among treatments ($P=0.004$). Contrast analyses indicate two different groups; that containing bobcat lure and urine and catnip oil had the highest number of captures/day. Lures to attract bobcats and catnip oil seem to be more likely to attract ocelots. These lures may increase the detectability of this species by camera-traps in the Brazilian Pantanal. 39
- 175 **Ultrasound social calls and activity in a *Rhinolophus ferrumequinum* nursery roost and hibernaculum. What are the bats communicating?** M. Andrews, (m.m.andrews@livjm.ac.uk), Liverpool John Moores Uni., Liverpool, UK Infant *Rhinolophus ferrumequinum* make polyharmonic ultrasound calls with the fundamental in the range 11-39 kHz and 12-50 ms duration. Constant frequency (CF) isolation calls made by newborn bats enable mothers to locate them. Frequency modulated (FM) calls, initially isolation calls, develop into modified echolocation calls and infant echolocation FM-CF-FM calls made during internal flight at 15-21 days old. Of the 28 categories of adult *R.ferrumequinum* ultrasound social calls recorded, with the fundamental range 11-39 kHz and 3-300 ms duration, six were similar to infant ultrasound calls and a further seven FM social calls developed from infant calls. Simultaneous timed ultrasound and infrared video recordings and automatic IR beam array counts enabled analysis of activity in adult *R. ferrumequinum* in the nursery roost from April to October. Six categories of FM ultrasound trill calls were made in a hibernaculum occupied by male *R. ferrumequinum* and activity was analysed from timed ultrasound recordings. 40
- 176 **Biogeographical and ecological diversification of caviomorph rodents** R. Ojeda, (rojeda@mendoza-conicet.gov.ar), IADIZA-CONICET, Mendoza, Argentina, A.A. Ojeda, (agustinao@mendoza-conicet.gov.ar), A. Novillo, (anovillo@mendoza-conicet.gov.ar) The New World hystricognath rodents (Caviomorpha) probably came from Africa and diversified into major clades during the Eocene-Oligocene. We address the biogeographical and ecological diversification of caviomorphs within a recent phylogenetic framework. Our main results show that: a) The Amazonia and the Atlantic forest are the macrohabitats with the highest species density; b) species richness is associated with area and productivity; and, c) the extraordinary diversity of biogeographical and ecological attributes of extant superfamilies result from the diversification of ancestral character states. The most likely ancestral macrohabitat in the history of their diversification appears to be the Amazonia; whereas for the reconstruction of ecological characters (macroniches), our analysis hypothesized a saxicolous proto-caviomorph that fed on grasses, leaves and seeds. Our contribution highlights that caviomorph rodents serve as a good model for integrating and disentangling the roles of phylogeny, biogeography and ecology. 40

- 177 **Chromosome painting elucidates complex rearrangements among Oryzomyini species formerly reported with conserved karyotypes (Rodentia, Sigmodontinae)** C.N. Moreira, (cmoreirabio@gmail.com), Uni. de São Paulo, São Paulo, Brazil, Y. Yonenaga-Yassuda, (yyassuda@ib.usp.br), K. Ventura, (kabiousp@yahoo.com.br) Oryzomyini display an exceptional range of chromosomal polymorphisms. However, conserved karyotypes with minor structural rearrangements, an exceptional condition in Neotropical rodents, are suggested to occur in *Holochilus brasiliensis* (HBR), *Nectomys squamipes* (NSQ) and *Pseudoryzomys simplex* (PSI), with $2n=56$, and *Nectomys rattus* (NRA), with $2n = 52$. Herein, chromosome painting allowed consistent elucidation of multiple rearrangements in these species being successful in highlighting microchromosomal rearrangements. Pericentric inversion or centromeric shift was detected between HBR and PSI and three tandem rearrangements and one paracentric inversion were evidenced between the two *Nectomys* species. Considering more distantly related HBR and NSQ, 34 homologous segments were observed, suggesting a notorious occurrence of 11 tandem events or five translocations plus one tandem rearrangement. Chromosome painting proved to be essential in establishing a new scenario for Oryzomyini chromosome evolution, revealing species with highly rearranged genomes even if they present the same $2n$, FN, chromosome morphologies and similar banding patterns. 40
- 178 **Evolutionary genetic consequences of a catastrophic event: impacts of Volcan Puyehue on the colonial tuco-tuco** J. Hsu, (jlhsu@stanford.edu), Stanford Uni. Stanford, California, USA, E. Lacey, (elacey@berkeley.edu), Uni. California, Berkeley, California, USA, E. Hadly, (hadly@stanford.edu) The genetic consequences of extreme environmental perturbations are not well understood. Studies of the colonial tuco-tuco (*Ctenomys sociabilis*) provide a rare opportunity to explore this theme. This herbivorous, subterranean rodent is endemic to Neuquen Province, Argentina, where it has experienced ashfall from repeated eruptions of Volcan Puyehue, the most recent of which occurred in June 2011. A robust time series of bone and tissue samples dating from 10,000 years before present to AD 2012, combined with demographic data from the past 21 years, allows insight into the evolutionary history of the species. Here, we use a new, high-throughput sequencing strategy to examine genetic structure and polymorphisms over time, the first use in this non-model organism. We demonstrate the feasibility of this double digest restriction-site associated DNA sequencing with ancient DNA, and have identified and assessed genetic variation throughout this 10,000 year period. We used molecular markers to complement the genomic sequencing, allowing for the direct comparison of population genetic variability and structure before and after the volcanic eruptions. 40
- 179 **Spatial range of southern tamandua (*Tamandua tetradactyla*) in a Neotropical wetland area** T. Guimarães de Araújo, (tallit_a@hotmail.com), Uni.Fed.do Mato Grosso do Sul, Brazil, F. Franchini, (flaviafranchini3@yahoo.com.br), Uni. Fed. de Minas Gerais, Matp Grosso, Brazil, G. Mourão, Embrapa Pantanal, Corumbá, MS, Brazil. Body size is the most important factor in determination of the home range of an animal. Tamanduas have an intriguing bioenergetics related to a low metabolism for its body size. We proposed to analyze daily distance traveled of southern tamandua (*Tamandua tetradactyla*) in function of air temperature and to estimate its home range in the central Pantanal wetland. Ten southern tamanduas were radio-tracked for one year and eight of them were equipped with micro-GPS units. We found tamanduas resting in forest patches, inside burrows in palm tree canopies and occasionally in bromeliads clusters or grass tussocks. The median home range for southern tamanduas in the Pantanal was 0.59 Km^2 , which is similar to the ranges reported in literature for the species in savanna sites. The average daily distance traveled by tamanduas was 1.3 km. However, the mean air temperature did not affect the daily traveled distance by the animals. 41
- 180 **A possibly effective lure to attract tayras (*Eira barbara*, Mustelidae)** F. Franchini, (flaviafranchini3@yahoo.com.br), Uni. Fed. de Minas Gerais, Pampulha Belo Horizonte, MG, Brazil, Adriano P. Paglia, (apaglia@icb.ufmg.br), G.M. Mourão (guilherme.mourao@embrapa.br), Embrapa, Pantanal, Brazil Eira barbara is known to be a difficult species to capture in Tomahawk type traps. During a study to attract wild felids to camera-traps, three individual tayras were fortuitously captured in video, and the results may have an important methodological impact. A mix of sardines and eggs in a bottle hung at 1.15m in the front of a camera was used as a lure. Four videos were made of the group in which one animal makes at least ten attempts to get the lure in the air, including six high jumps that displaced the lure. The interaction time was at least 85 seconds, indicating a high attraction of the animals by this lure suggesting this lure as a good option to attract tayras to cameras and other kinds of traps, and increasing the success rate of such studies thus improving population management. 41
- 181 **Morphometric variation in *Oecomys catherinae* Thomas, 1909 (Rodentia, Cricetidae, Sigmodontinae)** R. Fonseca, (raulfonseca.bio@gmail.com), State Uni.Rio de Janeiro, Brazil, D. Astúa, (d.a.moraes@gmail.com), UFPE, L. Geise, (lenageise@gmail.com), UERJ *Oecomys catherinae* is distributed in the Brazilian Atlantic Forest with a disjunct population in southeastern Pará state. Skull measurements were taken from 137 adult specimens from 38 localities, grouped as: Northern (14), Central (7), Northeastern (15) and Southeastern (101). No sexual dimorphism was observed. MANOVA showed significant differences between groups: Northern and Southern, 11 measurements (55%); Northern and Northeastern, six (30%) and Northern and Central, five (25%). Geometric morphometrics analyzed size/shape variation in cranium and mandible of 101 individuals, divided in Northern (Carajás) (18), Northeastern (15), Central (7) and Southeastern (61). No sexual dimorphism was observed. Univariate analyses on centroid size showed significant difference among Northern and the remaining populations. Shape analyses showed a morphometric divergence between Northern and Northeastern in all views. No differences were found among samples from Atlantic Forest and Cerrado, unlike molecular analysis have shown divergent populations. 41

- 182 A biological and geographical explanation about the karyotypic diversity in mammals** P.A. Martinez, (pablo_sc82@hotmail.com), Uni.Fed.do Rio Grande do Norte, Natal, Brazil, C. Brito, (cristinabrito92@gmail.com), R.V. Fernandes, (ranevanderley@hotmail.com), U.P. Jacobina, (uedsonbio@gmail.com) Mammals show a large karyotypic diversity, that ranges from families that are completely homogeneous to those that have a highly diverse karyotypic structure. However, the role of chromosomal changes in speciation, as well as the biological and/or geographical characteristics that lead to greater discrepancy in karyotypes diversity between different families remains unknown. We analyzed the correlation between the karyotype diversity with the number of species, different biological characteristics and latitudinal range of 106 families of mammals through analyzes of independent contrasts. We observed significant correlations with the number of species, age at first reproduction and latitudinal range. Our results agree with the idea that variation in karyotype diversity can be important in speciation and biological factors like the age at first reproduction. In contrast, the relationship between karyotypic diversity and the latitudinal range may reflect the role of chromosomal rearrangements in exploring new habitats. 41
- 183 Carnivore survey in the St. Katherine Protectorate, South Sinai** L. Gecchele, (plxlvg@exmail.nottingham.ac.uk), Nottingham Uni., Nottingham UK, F. Gilbert, (francis.gilbert@nottingham.ac.uk), K. Durrant, (kate.durrant@nottingham.ac.uk), S. Bremner-Harrison, (samantha.bremnerharrison@ntu.ac.uk), Nottingham Trent Uni., Nottingham, UK We estimated the detection probabilities and site occupancies of meso- and large carnivores occurring in the territory of St. Katherine Protectorate, Egypt, as a precursor to establishing a long-term multi-species monitoring programme. Using camera traps and scat collection (including DNA sequences), we explored whether survey method influenced the detection of the target species. Finally, we estimated the sampling effort needed to determine occupancy (presence-absence). Three species of carnivores live in the study area: Red fox (*Vulpes vulpes*), Arabian wolf (*Canis lupus arabs*) and Striped hyena (*Hyaena hyaena*). Scat collection proved to be the most reliable method of detecting the presence of foxes and hyenas, but failed to detect the presence of wolves. We estimated that a survey period of 8-10 weeks or longer would be enough to detect with 95% reliability foxes and hyenas at any one site, but it would take at least 26 weeks to detect the presence of wolves. 41
- 184 Comparing methods of estimating Sika deer population in Hokkaido, Japan** T. Ikeda, (wild_wolf_traveler@yahoo.co.jp), Fuchu-city, Tokyo, Japan, H.Takahashil, (tkhshrs@affrc.go.jp), Kansai Res. Cent., Forestry & Forest Products Res.Inst., H.Igota, (igoth@raktauno.ac.jp), Rakuno Gakuen Uni.,K. Kaji, (kkaji@cc.tuat.ac.jp), Tokyo Uni. Agriculture & Technology We evaluated mark-resight methods for measuring the accuracy and precision of techniques used to estimate sika deer populations based on road surveys and camera traps (CT), and camera traps without marking (Rowcliffe method). Road surveys had the highest accuracy and precisions among three methods when a sufficient number of marked animals were used. Although CT and use of the Rowcliffe method provided nearly the same estimates as road surveys in most months, both methods showed seasonal variation. Monthly CTs were relatively stable but they had the broadest 95% confidence intervals whilst the Rowcliffe method tended to underestimate in November. We identified a higher proportion of resights from road surveys (82.7%) than from CT (42.7%), so road surveys provided estimates with high precision. We suggest CT and Rowcliffe method may provide an alternative to road surveys for estimating population size, if observers consider collecting data in a suitable season. 41
- 185 GPS fix acquisition rate in alpine areas** P.A. Maria Angeles, (m.angeles.parraga@hotmail.com), Uni.Padova, Italy, S. Enrico, (enrico.sturaro@unipd.it), R. Maurizio, (maurizio.ramanzin@unipd.it) We used data from 15 GPS-tracked female ibex *Capra ibex*, monitored (1 scheduled fix/hour) from September 2010 to April 2013, to investigate the factors affecting fix acquisition rate (FAR). Average individual FAR, expressed as successful/scheduled locations, was 0.876 (SD=0.145). We analyzed daily FAR with a logistic regression to test the effects of daily average T, daily total precipitation, morphology and land use variables calculated for daily individual minimum convex polygons (MCPs): weighted indexes of slope, sky view, and proportion of rocks, open forest, dense forest. FAR increased significantly with increasing temperature and decreasing precipitation, which explained the lower values in winter than in the other seasons, while FAR decreased with decreasing sky view and increasing proportions of rocks and dense forest. Differences between individuals were explained by differences in morphology and land use of the daily MCPs. These results suggest that successful locations may underestimate use of areas providing shelter. 41
- 186 How many wild boars do we see? Sources of errors in data obtained with camera traps** N.Markov, (nimarkov@mail.ru), Ekaterinburg, Russia, E. Goosen, (el22el@yandex.ru), Ural Fed. Uni., Russia We used camera traps to study the wild boars (*Sus scrofa*) on the sites where supplementary feeding was provided. Here, we analyze the accuracy of assessing the number of animals on the videos, obtained with the trap cameras. Lighting ("day" or "night") and number of animals in the scene were treated as factors, possibly affecting the accuracy of assessment. We used "double-observer" and "triple-observer" methods to assess the proportion of disagreements in determination of the number of individuals, "caught" by cameras. Analysis of night videos with constant number of wild boars in picture resulted in 9% of disagreements. Where number of animals varied in a picture, the proportion of disagreements increased with the group size independently of lighting. We conclude that number of animals is more important factor than lighting, and the estimations obtained with trail cameras could be reliable, where the group size does not exceed 7 individuals. 41

- 187 Interlaboratory comparison of organic materials for carbon, nitrogen, and oxygen isotope ratios using EA-IRMS system** Y. Suzuki, (yaekos@affrc.go.jp), Nat. Food Res. Inst., Nat. Agriculture & Food Res. Org., Tsukuba, Ibaraki, Japan, R. Nakashita, Forestry & Forest Prod. Res. Inst. Stable isotope analysis has widely been used to trace the origin of organic materials in various fields, such as ecology, biochemistry, and food authenticity. Generally, the isotopic compositions of plant and animal reflect growth environments such as source materials (e.g., CO₂, H₂O, NH₄, and NO₂) and food sources. The recent spread of elemental analyzer/isotope ratio mass spectrometry (EA/IRMS) facilitates a rapid and routine analysis of the isotopic composition of organic materials. However, lack of reliable technique in the isotope ratio measurement and limited availability of adequate international references, are significant, regrettable deficiencies that should be addressed immediately. Here we present results of an inter-laboratory test on the EA-IRMS determination of stable carbon, nitrogen and oxygen isotopic compositions in organic materials. **41**
- 188 Responses of a small-mammal community to habitat management through controlled burning in a protected Mediterranean area** L.J. Palomo, (javier.palomo@uma.es), Uni. Málaga, Málaga, Spain, S. Moreno, (smoreno@ebd.csic.es), Estac. Biol. de Doñana, CSIC, Seville, Spain, C. Rouco, (roucoc@landcareresearch.co.nz), Landcare Res., Alexandra, New Zealand Fire is widely used as a management tool to achieve conservation goals. This study examines the effects of traditional management for scrubland clearance by controlled burning to enhance abundance of endangered carnivores and non-target species, namely, rodents and insectivores in Doñana National Park (SW Spain). We used capture–recapture methods to examine changes in abundance in areas that were burnt one and three years ago, compared with unburnt areas. Results showed that burnt areas had higher species abundances with dramatic seasonal differences with high abundances in autumn and winter, but almost absent during summer. Our study revealed that scrubland management by controlled fires increases the abundance of small mammal species but mainly on the ecotonal boundaries. However, some species that were formerly abundant in Doñana, such as *Elyomys quercinus*, were found only in burnt areas. Therefore, controlled burning is not contributing to the current loss of biotic diversity in this community. **41**
- 189 Sexual differences on winter diet of the stone marten (*Martes foina*) in central Bulgaria** M. Hisano, (masumi.6172@gmail.com), Tokyo, Japan, E.G. Raichev, (eraichev@uni-sz.bg), H. Tsunoda, (tsunoda@gifu-u.ac.jp), Y. Kaneko, (ykaneko7946@gmail.com) In mustelids, sexual size dimorphism seems to affect dietary differences between males and females, but little is known for the stone marten. We examined winter stomach contents of this species in central Bulgaria (31 samples of males and 19 of females, November–March, 1997–2009), obtained through the corporation of local hunters. Both sexes primarily preyed on rodents. Next to rodents, males frequently fed on birds and hares, followed by fruits and carcasses of ungulates and carnivores. On the other hand, females frequently exploited insects while did not eat any fruits and carcasses. No significant correlation was seen in the prey occurrence rank between males and females, even though dietary overlap was pronounced. This indicates that food preference of each sex was not entirely the same but somewhat different. This is possibly due to differences of foraging behaviour and dietary requirement in home range, which implies trophic resource partitioning between sexes. **41**
- 190 Temporal structure of the community of rodents and marsupials in remnants of Atlantic Forest in southern Brazil** D. Behs, (danybehs@yahoo.com.br), Uni. de Brasília, Asa Norte, Brasília, Brasil, J.J. Zocche, (jjz@unesco.net), UNESCO, M.E. Graipel, (graipel@ccb.ufsc.br), UFSC The variation of community structure of small mammals is one of the major factors in the division of resources and species coexistence. The aim of this study was to evaluate the influence of the seasons and arthropod availability in the community of rodents and marsupials in a remnant of Atlantic forest, in southern Brazil. Sampling occurred at seasonal intervals between 2011 and 2012, resulting in 4,080 trap-nights and 320 pitfall-nights. We recorded 14 species of small mammals, with *Euryoryzomys russatus*, i spp. and *Philander frenatus* the most abundant. The analyses of nMDS (Stress: 0.14), based on the abundance of species by site and season, showed grouping of small mammals in winter and summer. Arthropod biomass varied among seasons, being higher in spring and summer. There was a larger capture of juveniles in winter, showing an increase in the reproduction of small mammals in the months following the seasons with higher arthropod availability. **42**
- 191 The influence of dietary protein on life history patterns in mice** E. Derrickson, (ederrickson@loyola.edu), Loyola Uni. Maryland, Baltimore, Maryland, USA, L. Brazier, (lbrazier@loyola.edu) Mice of the genus *Peromyscus*, despite their many similarities, differ in body size, geographic range and reproductive characters. Larger members of the genus have smaller litters and slower growth, but the reasons behind these changes in life history are not well understood. One possible correlate with a slower life history may be an inability to respond flexibly to changes in diet quality. The objective of this study is to determine whether species of *Peromyscus* that naturally have lower reproductive rates are less responsive to changes in dietary protein levels compared to species with higher reproductive rates. Female *P. californicus* were placed on one of five isocaloric diets containing 6.9–23% protein. Juveniles were tested for endurance when they reached 50% of adult mass. Female reproductive patterns were constant except at the lowest protein level at which litter size was reduced. Pup response, however, was plastic with both growth rate and pup endurance positively associated with maternal dietary protein. **42**
- 192 A meta-analysis of home range and body size in lemurs** R. Carlisle, (rcarlisle02@qub.ac.uk), Queen's Uni. Belfast, Belfast UK, R. Kelly, (ruth.kelly@qub.ac.uk), E.J. Louis, (edlo@omahazoo.com), Henry Doorly Zoo, Omaha, USA, A. Cameron, (a.cameron@qub.ac.uk) Kleiber Law hypothesises that the metabolic rate of a species is related to its body size. It has been further hypothesised that home range should scale with basal metabolic rate and body weight. For this study home range data (radio, GPS, and satellite tracking) for 34 of 101 species of lemurs, from 136 studies, was extracted from publications. Generalized Linear Mixed Modelling found body weight, taxonomy (family), and social organization (solitary, pair living, group living) to be significant predictors of home range size. Activity pattern (nocturnal, diurnal, cathemeral) was not found to be significant. In conclusion, body size is a significant predictor of lemur home range, particularly when additional interacting factors are incorporated into the model. **42**

- 193 Is the desert marsupial *Thylamys pallidior* another semelparous species?** M.S. Albanese, (salbanese@mendoza-conicet.gov.ar), IADIZA - CONICET, Mendoza, Argentina, A. Astié, (aastié@mendoza-conicet.gov.ar), R.A. Ojeda, (rojeda@mendoza-conicet.gov.ar) Studies on marsupials show that species inhabiting seasonal environments synchronize their breeding season with the most favorable time of the year. An extreme expression of this strategy is semelparity. Although rare among mammals, it has been described in some dasyurid and didelphid marsupials. The aim of this study was to characterize the reproductive strategy of the desert mouse opossum by analyzing its population structure and response to environmental seasonality. We analyzed data from live-trapping during 3 periods in Nacuñán Reserve (Mendoza, Argentina): 1984-88, 2005-07 and 2011-13. In all cases, captures showed seasonality in population structure. We found evidence of generation replacement with young animals occurring in summer (high resource availability). Reproductive females were trapped in spring and early summer. Almost no recapture exceeded 1 year. If we consider iteroparity - semelparity as a gradient, we suggest that this species is much nearer to a semelparous strategy. 42
- 194 Molar shape in bank vole reflects a complex history of isolation between populations** A. Seiller, (alisonseiller@hotmail.com), CNRS Uni. Lyon, Lyon, France, P. Chevret, (pascale.chevret@univ-lyon1.fr), J.R. Michaux, (michaux@supagro.inra.fr), Uni. Liege, Belgium, S. Renaud, (sabrina.renaud@univ-lyon1.fr) Evolution of morphological structures such as dentition can evolve due to adaptation to environmental factors (e.g. food availability) but also neutrally due to divergence among isolated populations. Their study thus may bring insights into the evolutionary history of species complementing genetic markers. Molar shape was quantified using geometric morphometrics in 23 populations of bank voles (*Myodes glareolus*) covering most of western Europe. Results showed a limited role of the climatic context, undermining an adaptive interpretation of the morphological variation. The primary driver of differentiation appeared to be isolation. Divergence among genetic lineages was related to ancient isolations in refuge zones. Further divergence occurred in the topographically complex Alpine area. Local isolation promoted by pronounced geographic barrier and complex admixture of phylogeographic lineages may be involved. Several temporal and geographic scales influence the pattern of morphological divergence, indicating the complexity of the processes involved. 42
- 195 Primate brains, the 'island rule' and the evolution of *Homo floresiensis*** S. Montgomery, (stephen.montgomery@cantab.net), Uni.Coll.London, London, UK The taxonomic status of the small bodied hominin, *Homo floresiensis*, remains controversial. One contentious aspect of the debate concerns the small brain size estimated for specimen LB1 (Liang Bua 1). Based on intraspecific mammalian allometric relationships between brain and body size it has been argued that the brain of LB1 is too small for its body mass and is therefore likely to be pathological. An analysis of brain and body evolution in seven extant insular primates reveals that although insular primates follow the 'island rule', having consistently reduced body masses compared to their mainland relatives, neither brain mass nor relative brain size follow similar patterns. Brain:body scaling relationships previously applied to *H. floresiensis* tend to underestimate body masses of insular primates. In contrast, under a number of phylogenetic scenarios, the evolution of brain and body mass in *H. floresiensis* is consistent with patterns observed in other insular primates. 42
- 196 Sexual differences and the sequence of epiphyseal closures in the nutria** M. Moriya, (mo55n@hotmail.co.jp), Tsukuba, Ibaraki, Japan, S. Kawada, (kawada@kahaku.go.jp), Nat. Mus. Nature & Science To obtain basic knowledge about the growth of the nutria, 102 skeletons (56 female, 46 male) were examined for epiphyseal closures (ECs) at 13 sites on the limb bones. The condylobasal length of the skull was used to indicate relative growth stages. EC first occurred at the distal humerus. In the forelimb, epiphyses fused at a relatively early stage, although the wrist did not completely unite. The ankle and proximal femur started to fuse at almost the same time. The sequence of EC was almost the same in both sexes. However, complete closures were observed at three and six sites in females and males, respectively. The results suggest that EC progresses slightly faster in males than in females, which may be due to the nutrition requirements of females for reproduction as nutria become sexually mature at less than 1 year old. 43
- 197 The role of age and kinship on association patterns of male elephants in all-male groups** K. Gough, (ktgough@yahoo.ie), Nelson Mandela Metro. Uni., Port Elizabeth, South Africa, G. Kerley, (graham.kerley@nmmu.ac.za), A. Shrader, (shrader@ukzn.ac.za), Uni. KwaZulu Natal, South Africa Strong association bonds within mammalian male societies are relatively rare. Male elephants *Loxodonta africana* disperse from a matriarchal society during puberty, thereafter associating predominately with other males, when not searching for mating opportunities. We examined the association patterns of all-male groups in a closed population of elephants (Addo Elephant National Park, South Africa), specifically, the influence of maternal relatedness and age. Males were found to have high association rates with relatively few individuals and weak association rates with most individuals. This was supported by time lagged association rate models. Strength of association between individuals was positively correlated with maternal relatedness. Long term preferred associations were also found between individuals within age-classes. However, maternal relatedness and age were not significantly correlated, highlighting the complexity of male elephant social relationships. 43

- 198 **Age and spatial variation in craniometrics in *Nectomys* (Cricetidae, Sigmodontinae)** E. Chiquito, (elisandrachiquito@gmail.com), Uni.de São Paulo, Piracicaba, Sao Paulo, Brazil, A. Reis Percequillo, (percequillo@usp.br) A central issue in understanding taxonomic diversity is to evaluate and discriminate intra- and interpopulational variation. Therefore, we investigate the intrapopulational variation of the genus *Nectomys* in relation to age. This study has been conducted using five age classes based on molar toothwear of four populations of *Nectomys* from distinct river basins in South America: Trinidad and Tobago; Tapajós River basin, Brazil; western and eastern São Paulo State, Brazil. We employed multivariate methods: Principal Component and Discriminant Analyzes using 19 cranial and teeth log-transformed measurements. Our results showed that the cranial size exhibit different growth rates in the four different populations, with most variation associated with younger classes. Consequently, age is an important component of variation both within and between populations which is possibly correlated with geographic and/or taxonomic aspects. 43
- 199 **Contribution towards the development of a DNA barcode reference library for some West African mammals** C. Echi, (paul_echi@yahoo.com), Uni. Nigeria, Nsukka, Enugu State, Nigeria, S. George, (sgeorge@rgcb.res.in), Ragiv Ghandih Cent.for Biotech., Kerela, India, S. Kumar, (sureshkumar@rgcb.res.in), E. Vincent C (ejerevc@yahoo.com) DNA barcoding is a widely used molecular approach for species cataloging for unambiguous identification and conservation. In the present study, DNA barcoding of some West African mammals was performed with six new mitochondrial CO1 sequences for *Civettictis civetta* (Schreber, 1776), *Tadarida nigeriae* (Thomas, 1913), *Oryzteropus afer* (Pallas, 1766), *Heliosciurus gambianus* (Ogilby, 1835), *Equus africanus asinus* (Linnaeus, 1758) and *Funisciurus anerythrus* (Thomas, 1890) which are absent in public databases such as BLAST/NCBI and BOLD. Sequence identifications were made by comparing unknown sequences against the DNA barcodes of known species through distance-based tree construction and alignment probing. The sequences have been deposited to GenBank/NCBI. 43
- 200 **Domestication of the American Mink** A. Gugolek, (gugolek@uwm.edu.pl), Uni.Warmia & Mazury, Olsztyn, Poland, C. Zwolinski, (khzfil@uwm.edu.pl), M. Konstantynowicz, (makos@uwm.edu.pl) The American mink is the most commonly farmed fur-bearing animal. Breeding American mink for fur began at the end of the 19th century. The species is native to North America, but human intervention has expanded the range of feral mink to Eurasia and South America. Farmed mink populations differ from their wild ancestors and feral animals. Breeding programs aim to produce different color shades of mink, whose number has exceeded 100. Females and males with body weight of over 2 kg and 3 kg, respectively, are selected for breeding, with some individuals weighing over 7 kg. Due to high demand for short-haired furs, most farmed mink have soft, delicate furs that resemble velvet. Attempts have also been made to breed tame and docile mink populations. Mink are known for their plasticity and genetic diversity, which enabled to develop many breeds with different characteristics within a short time. 43
- 201 **eMammal – using citizen scientists with camera traps for a broad-scale, long-term monitoring of wildlife populations** W. McShea, (mcsheaw@si.edu), Smithsonian Conserv.Biol.Inst., Front Royal, Virginia, USA, R. Costello, (costellor@si.edu), R. Kays, (roland.kays@naturalsciences.org), North Carolina Mus.Nat.Sci., North Carolina, USA, T. Forrester (forrestert@si.edu) eMammal is a new initiative that integrates camera trap data from a volunteer corps to increase the spatial scale of survey data in Mid-Atlantic USA. Initial research questions evaluated the effects of consumptive and non-consumptive recreation on wildlife communities and assessed volunteer learning and experience. In 2012, 85 volunteers deployed cameras to 687 sites in 12 parks and collected over 25,000 animal detections which were managed through a web-based venue. Preliminary results indicate human recreational activity may influence wildlife communities, with some species being more (white-tailed deer, black bear, bobcats, red fox and eastern gray squirrel) or less (coyotes, wild turkeys, eastern chipmunks and eastern cottontails) abundant in areas primarily hunted for deer. Volunteers were attracted to the project by the desire to contribute to science, but found capturing photos of wildlife most rewarding. Attitudes toward wildlife and protected areas did not change significantly, but knowledge of wildlife significantly increased. 43
- 202 **Foundation of ecology: Was there a bias towards ideas of English speaking authors? An invitation to participate in an online survey** N. Schroeder, (natalias@mendoza-conicet.gov.ar), Inst. Argentino de Invest. de las Zonas Áridas, Mendoza, Argentina, M.D. Rodriguez, (mdrodrig@mendoza-conicet.gov.ar), J.L. Cortegoso, (jcortego@mendoza-conicet.gov.ar) Current science is written in English, but since when? In the pre-Christian era science was written in Latin, a legacy still reflected in the meaning of many scientific names assigned to different species or in the names of the different scientific disciplines. English is the third most spoken language in the world, after Mandarin and Spanish. Then, why has publishing "science" in English become commonplace and massive? Since when? Is it possible that science written in other languages has been relegated into oblivion? Or do good ideas come to light beyond language? To answer these questions we are conducting an inquiry into the true contribution to Ecology of "classic" authors whose mother language is not English. Our intention is to encourage attendees to IMC11 to participate of this project through answering an online survey (<http://www.cricyt.edu.ar/lahv/encuesta-ns/encusta.html>). We trust the contributions will serve to begin to elucidate some of these questions. 43

- 203 **Functional anatomy of the hind limb of *Rhinolophus ferrumequinum nippon* during the hibernation posture** M. Kobayashi, (s12zm04km@std.ous.ac.jp), Kita-ku Okayama-shi, Okayama, Japan, M. Natori, (natori@zool.ous.ac.jp) 43
 Many kinds of hibernation postures are known in hibernating bats. *Rhinolophus ferrumequinum nippon* adopts a hibernation posture where its hindlimbs are fully extended, which is called free-resting. Free-resting is an interesting behavior, but few studies have considered the relationship between the forms of the hindlimb muscles and free-resting. This study describes hindlimb muscles related to free-resting in *R. ferrumequinum nippon*. The leg flexor muscles of *R. ferrumequinum nippon* are different from those of other species in this genus. *M. flexor hallucis logus* and *M. flexor digitorum fibularis* are completely fused together. This fused muscle and *M. flexor digitorum longus*, which flexes the distal phalanges of foot, are well developed. Furthermore, for flexion of the middle phalanges *M. flexor digitorum brevis* is fused with insertion tendon of *M. flexor digitorum longus* toward the fourth toe. Therefore, *R. ferrumequinum nippon* mainly flexes the distal interphalangeal joint to inverted hanging.
- 204 **Functional anatomy of the knee joint of the masked palm civets (*Paguma larvata*)** Y. Fujii, 43
 (s13zm05fy@std.ous.ac.jp), Kita-ku Okayama-shi, Okayama, Japan, M. Natori., (natori@zool.ous.ac.jp), Okayama Uni. Sci., Okayama, Japan The masked palm civet is distributed mainly in Southeast Asia and also found in Japan. The palm civets inhabit forest areas and principally inhabit the trees. It has been observed that the palm civets turn their feet caudally to hold the trunk of trees when descending. This behavior is peculiar to the palm civet and suggests that their hind limb joints are more movable than those of typical carnivores. The present study reports the knee joint structure of the palm civets, focusing particularly on the ligaments. The medial collateral ligament of the palm civets is approximately one and a half times as long as that of typical carnivores, and attaches to the upper third portion of the tibia. The anterior and posterior cruciate ligaments attach the femur more centrally than the position typically seen in carnivores. These structures allow the knee to rotate widely.
- 205 **Modeling the cost of information for data deficient mammal species in Brazil** A. Paglia, (apaglia@icb.ufmg.br), Uni. Fed. de Minas Gerais, Belo Horizonte, Brasil, D.Teixeira Rezende, (daniellatr.bio@gmail.com) 43
 Gaps in knowledge about biodiversity and limited funding for baseline research are common in tropical countries and lead to a large number of species listed as Data Deficient (DD). In Brazil, 15% of mammal species are DD. The difficulty in accessing isolated areas raises the cost of studying these species. Using occurrence data for 54 DD Brazilian mammal species we designed an economic model to estimate the cost of carrying out field studies needed to produce data on population ecology or geographic range. The model considers the distance to research centers, number of field days and size of the research team. We estimated a cost of \$6million dollars to produce the information needed for IUCN categorization. The total cost is evenly distributed due to the concentration of DD species in southeastern Brazil and scattered occurrences in northern region. The cost of studying 54 mammals is the same as building a bionic man. Funding: Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG) and Brazilian Science Council (CNPq).
- 206 **Morphological integration in the postcanine dentition of the European polecat (*Mustela putorius*)** K. Topolska, 43
 (ktopolska@miiz.waw.pl), Mus.Inst.Zool., Polish Acad.Sci., Warszawa, Poland, M. Wolsan, (wolsan@miiz.waw.pl) Morphological integration is the cohesion amongst phenotypic traits that results from interactions of developmental and/or functional factors. We evaluated the morphological integration of the postcanine dentition in the European polecat, *Mustela putorius*, using Pearson product-moment correlation matrices for the lengths and widths of permanent premolar and molar crowns. These size variables were measured with a monocular microscope to the nearest 0.01 mm in 15 females and 15 males from Poland. Results reveal that mandibular postcanines are more integrated than maxillary postcanines, premolars are more integrated than molars, corresponding postcanines in the maxilla and mandible are more integrated than noncorresponding postcanines, contiguous postcanines in a row are more integrated than noncontiguous postcanines, and the non-occluding second mandibular molar is least integrated.
- 207 **Natural history collections in undergraduate education** E. Lacey, (ealacey@berkeley.edu), Uni. California, Berkeley, California, USA, J. A. Cook, (cookjose@unm.edu), Uni. New Mexico, Albuquerque, New Mexico, USA, E.P. Lessa, (lessa@fcien.edu.uy), Uni. de la Republica, Montevideo, Uruguay, M. Paz Echeverriarza, (mpaz@unesco.org.uy), UNESCO, Montevideo, Uruguay Natural history collections provide invaluable resources for undergraduate education in mammalian biology. In particular, ongoing efforts to digitize and to make freely available online the data associated with mammal specimens enable exciting new opportunities to engage students in studies of mammals. AIM-UP! is an NSF-funded Research Coordinating Network dedicated to increasing the use of specimens and specimen-based data in undergraduate courses. The Network is developing online modules consisting of inquiry-based activities that use natural history collections data to promote project-based learning, resulting in a rich array of educational outcomes. Activities can be tailored to specific geographic regions or species to encourage place-based or taxon-focused learning experiences. We provide an example of the successful incorporation of such projects into an undergraduate mammalogy course, including evidence of the positive impact of this experience on student understanding of mammalian biology. 43
- 208 **Potential for the CSID model animal of *Suncus murinus*** Chizue Oda, (s12zm02oc@std.ous.ac.jp), Kita-ku Okayama-shi, Okayama, Japan, T. Jogahara, (jogahara@zool.ous.ac.jp), Okayama Uni.Science, Sen-ichi Oda, (oda@zool.ous.ac.jp) 43
 Sucrase is a disaccharidase whose deficiency is known as a congenital sucrase-isomaltase deficiency (CSID) type 5 which has symptoms of sucrose intolerance and malabsorption in humans. Soricidae (Insectivora) are divided into Crocidurinae and Soricinae that have sucrase activity and inactivity, respectively. However, the crocidurin, *S.murinus* (laboratory name : SUNCUS) is known to show variation in sucrase activity dependent on origin. Therefore, our aims are establishment CSID type 5 model using SUNCUS. We first verified that KAT line have sucrase activity, but NAG line have completely lost sucrase activity. F1, BC1(KAT) and BC1(NAG) animals were produced by crossbreeding KATxNAG, F1xKAT and F1xNAG, respectively. Sucrose tests for these 3 groups, showed weight gain corresponding to genetic background.

- 209 Stable carbon and nitrogen isotopic fractionation between diet and tissues of captive Japanese monkeys** 43
 R. Nakashita, (nakashita@affrc.go.jp), Japan Forestry & Forest Products Res.Inst., Japan, Y. Hamada, Primate Res. Inst., Kyoto Uni., E. Hirasaki We determined the magnitude of isotopic fractionation of carbon and nitrogen stable isotope ratios between the tissues and diets of captive Japanese monkeys (*Macaca fuscata*) using a controlled feeding experiment, to provide the basic data for reconstructing their feeding habits. We then investigated the effects of diet on $\delta^{13}\text{C}$ in hair growing during alternating diets of the monkeys each month where each diet differed markedly in $\delta^{13}\text{C}$. Hair re-grown after shaving reflected $\delta^{13}\text{C}$ in the diet consumed during the time of hair growth. In contrast hair naturally grown during the diet-change experiment did not show a clear pattern. To reconstruct a long-term feeding history of Japanese monkey, we need to further clarify the relationships between the stable isotope signature in diet and various body tissues.
- 210 The atlas of Moroccan Mammals: a new synthesis** S. Aulagnier, (stephane.aulagnier@toulouse.inra.fr) C.E.F.S. - I.N.R.A., Castanet Tolosan, France, F. Cuzin (fabcuzin@yahoo.fr), M.Thévenot, (michelthevenot@wanadoo.fr) 43
 The first maps of all terrestrial mammal species living in Morocco was published in 1986. Twenty five years later, taxonomic changes, population and/or range regression, and increased knowledge require an update in this atlas. We collected the largest set of available data (including museum collections). The main sections of the book will deal with identification, distribution, habitat and conservation status of the 105 "historical" species on the basis of texts facing maps prepared from a large database on a 15' x 15' grid (> 5,200 filled grids, ranging from 1 for *Gerbillus simoni* to 239 for *Lepus capensis*). These will be complemented by invited contributions on marine mammals and history of the mammal fauna, including syntheses of palaeontology and illustration. A comprehensive list of references will be added to each chapter. This publication is scheduled for the end of 2013. Additional data are urgently welcome.
- 211 You've been framed: trail camera success within a community project** A. Wilson, (info@wildlifeinspired.co.uk), Wildlife Inspired, The Wildlife Inspired project funded by O2 Think Bigger, has recorded several hundred hours of trail camera footage, in an attempt to encourage enthusiasm for wildlife, particularly mammals. Here we report on the success of this aspect of the project and the different ways in which we have made use of trail cameras. We have recorded common and unique behaviours, created species inventories and gained new records for our local area, for example, recording a pine marten close to Dundee, 48km outside its known range. All the footage collected has been made available to the general public via a YouTube channel for the purpose of community engagement and education. 43
- 212 The suitable size of wildlife-crossing structures of South Korea** T. Young Choi, (gumiran@gmail.com), NIER, Seogu, Incheon, South Korea, Donggurl Woo, (birdwatcher@nate.com) 7
 The objectives of this study were to recommend designs and measurements for wildlife crossing devices by monitoring existing structures. Results are: 1. design and measurements of the structure should be determined according to the scale of the ecological corridor and site topography. Overpasses 7m in width were confirmed by field surveys as the narrowest used by most mammal species in Korea. Hence, overpasses should be no narrower than 7m wide. 2. Openness Index (OI) of underpasses should be larger than 0.7. Regarding the insufficient crossing structures and safety of drivers, water deer (*Hydropotes inermis*) should be a target species. 3. Converting the existing passageways to OI, 0.7 structures could cause budgetary burdens. Therefore, converting existing, non-wildlife crossing structures to suitable wildlife crossing structures should be included in existing and future road expansion and improvement projects.