



**97th Annual Meeting of the German Society of Mammalian Biology
2nd to 5th September 2024**

General Information and Abstracts



Funded by
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Organisation Committee

Gert Wörheide, Gertrud Rößner, Anneke van Heteren, Nadja Pöllath

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Gertrud Rößner, Anneke van Heteren, Nadja Pöllath

Meeting Host

Geobio-Center, Ludwig-Maximilians-Universität, München

Sponsors

Deutsche Forschungsgemeinschaft e. V.

Deutsche Gesellschaft für Säugetierkunde e. V.

GeoBio-Center^{LMU}

Venue

Paläontologisches Museum München, Ludwig-Maximilians-Universität München und Bayerische Staatssammlung für Paläontologie und Geologie, Richard-Wagner-Str. 10, 80333 München



Map of venue surroundings with station and stops of public transport

Entrances: • Richard-Wagner-Str. 10
• Luisenstr. 37

MEETING INFORMATION

Rooms

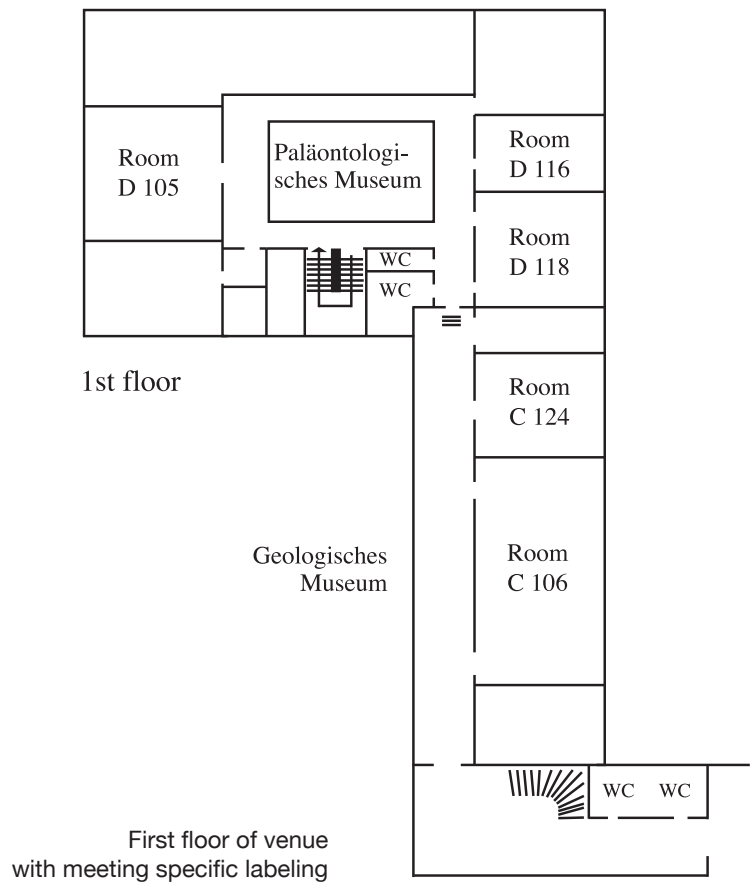
D 105: Welcoming reception, Coffee Breaks,
Conference Dinner

D 116: Conference Office

D 118: Posters

C 106: Lecture Hall

C 124: WS Dragonfly



Conference Office

Opening hours

Monday, 2nd September 2024, 7:30 am to 4:00 pm

Tuesday, 3rd September 2024, 8:30 am to 4:00 pm

Wednesday, 4th September 2024, 8:30 am to 4:00 pm

Internet access

Access is provided through the secured eduroam service and the unsecured BayernWLAN service.

Lunch breaks and dinner on Monday and Tuesday

The western and northern surroundings of the conference venue offer many locations for lunch and dinner.

Contact

dgs2024@palmuc.org

[Webpage](#)

Programme

Sunday, 1st September 2024

Pre-workshop: Shrews and Bornavirus (in German)

Monday, 2nd September 2024

Talks: Mammals and Grasslands

DGS board meeting, Curators meeting, Young DGS meeting

Welcoming reception

Tuesday, 3rd September 2024

Talks: Wild animal of the year 2024: European hedgehog

Postersession

Curator guided tour [Paläontologisches Museum München](#)

Wednesday, 4th September 2024

Talks: Free topics

General meeting

DGS Pubquiz

Conference dinner

Thursday, 5th September 2024

Workshop: Introduction to Dragonfly

10am curator guided tour [Archäologische Staatssammlung München](#)

12am curator guided tour [Paläontologisches Museum München](#)

3pm curator guided tour [Botanischer Garten München](#)

5pm head of museum-head of exhibition design-curator guided tour Museum Mensch und Natur,
special exhibition [SKELETTE - Choreografen der Bewegung](#)

[>>> Detailed programme](#)

Logo

The logo for the 97th Annual Meeting of the German Society for Mammalian Biology (DGS) depicts a Gomphotherium, ancient proboscidean and center piece at the Paläontologisches Museum München, representing the past Bavarian mosaic landscapes, greeting an okapi, representing the DGS, against the backdrop of Munich. Made by Anneke van Heteren based on the silhouette images of a Gomphotherium by Scott Hartman (CC BY 3.0 / colour changed to grey), an okapi by Kai Caspar (CCO 1.0) and Munich by Stefan Meister (CC BY-SA 4.0).

This year's [DGS](#) meeting explicitly invites **neontologists, zooarchaeologists, and palaeontologists** to get together in order to exchange data, hypotheses, and methodologies across the disciplines. It is aiming at stimulating **future transdisciplinary research** to open up possibilities for more comprehensive understanding of the world's modern mammal fauna with a view into deep time and transition to Anthropocene.

The meeting is dedicated to two major topics:

A) Mammals and Grasslands

Mammals and grasslands are tightly linked. A considerable number of mammal species, large and small, are adapted, deeply rooted, in manifold ways to conditions related to grasslands and contribute to the unique biodiversity of those ecosystems. Nevertheless, the narrative of the anthropogenic origination of most grasslands and their harm on global biodiversity is persistent, especially with regard to worldwide deforestation and climate change. Yet, evidence from the past is ambiguous. Hence, the importance of mammals to grasslands and their mutual evolutionary impact is not only a well debated topic, but also an experimental field with yet unsatisfying outcome (e.g. Oostvaardersplassen, Netherlands; Pleistocene Park, Siberia). Expertise from various disciplines is needed to comprehensively assess the nature of grassland mammal biology in space and time.

Invited speakers:

Elizabeth le Roux, Prof. Dr., Aarhus University, Denmark

Ludovic Orlando, Prof. Dr., Centre for Anthropobiology and Genomics of Toulouse, Purpan Medical School, Toulouse, France

Abigail Parker, Dr., University of Helsinki, Finland

Frans Vera, Dr., Wijk bij Duurstede, The Netherlands

B) Wild animal of the year 2024: European hedgehog

Since 2017 the Deutsche Wildtier Stiftung organizes polls for the animal of the year to raise public attention for wild animals and their threats, habitat-loss or human-wildlife-conflict. For 2024, the foundation's donors voted for the European hedgehog, *Erinaceus europaeus*, which, on the one hand, suffers from agricultural restructuring of its rural habitats and, on the other hand, faces danger from technical achievements in urban gardens and parks. Consequently, it is listed as near-threatened on the red list of Germany. DGS 2024 provides a scientific platform for this species promoting a multidisciplinary view in order to emphasize the becoming and importance of its ecological role. Accordingly, any contribution on *Erinaceus europaeus* and relatives including related zooarchaeological or palaeontological topics is strongly encouraged.

Invited speakers:

Sophie Lund Rasmussen, Dr., University of Oxford, United Kingdom

Anne Berger, Dr., Leibniz Institut für Zoo- und Wildtierforschung, Berlin, Germany

Marc Furió, Prof. Dr., Institut Català de Paleontologia M. Crusafont, Sabadell, Spain

C) Free topics

In addition, contributions on any zoological, zooarchaeological, or palaeontological topic dealing with mammalian biology are welcome. Multi- or transdisciplinary topics are especially appreciated and will be prioritised in case of more registrations for oral presentation than the available number of slots.

INVITED SPEAKER

Wild animal of the year 2024: European hedgehog



Anne Berger

Leibniz Institute for Zoo and Wildlife Research, Germany

berger@izw-berlin.de.

After school, Ms Anne Berger first worked as an animal keeper at Tierpark Berlin-Friedrichsfelde and then studied biology at Humboldt University in Berlin. After graduating, she completed a doctorate in behavioural ecology and has now been working as a research assistant at the Leibniz Institute for Zoo and Wildlife Research in Berlin for more than 25 years. Her focus here is on the development of biotelemetry methods and the analysis of acceleration data for the automatic behavioural and stress detection of tagged wild animals such as deer, lynx or hedgehogs. Since 2013, she has also been leading the long-term project 'Applied Hedgehog Conservation Research'; this project aims to investigate how hedgehogs adapt to changed living conditions in order to develop improved protection measures for hedgehogs in close dialogue with all interest groups and establish them in society.

**Marc Furió**

Departament de Geologia, Universitat Autònoma de Barcelona, Cerdanyola del Vallès, Barcelona, Spain; Institut Català de Paleontologia Miquel Crusafont (Campus de la UAB), Cerdanyola del Vallès, Barcelona, Spain

Marc.Furio@uab.cat

Dr. Marc Furió is a paleontologist at the Institut Català de Paleontologia M. Crusafont (ICP) and professor at the Geology Department of the Autonomous University of Barcelona (UAB), Spain. His research for more than two decades has been focused on fossil eulipotyphlans, a group currently represented by shrews, moles, hedgehogs and solenodons. His research was initially developed in some Neogene and Pleistocene sites of the eastern coast of the Iberian Peninsula, but it rapidly expanded to some other European, African and Asian countries of the peri-Mediterranean area. About ten years ago he started collecting data on fossil material of hedgehogs, trying to provide a new synthetic view on the taxonomy and evolutionary history of the Erinaceinae. In his route around several countries, he had the chance to check all the type-material of *Erinaceus* stored in Europe and some other fossils of hedgehogs. His preliminary results reveal some taxonomic surprises and a more conservative evolutionary nature of the genus than previously expected.

INVITED SPEAKER

Mammals and Grasslands



Elizabeth Le Roux

Aarhus University, Denmark

eleroux@bio.au.dk

Dr. Elizabeth le Roux is a South African ecologist and Assistant Professor at Aarhus University in Denmark. She is an expert on the impact of large mammals on the structure and function of natural grassland and savannah systems and is the first author or co-author of several leading scientific articles on this topic in recent years. Her contribution will introduce the conference participants to the status quo of interactions between grazing pressure and the composition of mammal communities, consisting of primary and secondary consumers, and the growth strategies of grasses.

INVITED SPEAKER

Wild animal of the year 2024: European hedgehog



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Sophie Lund Rasmussen

WildCRU, University of Oxford, UK; Aalborg University, Denmark;
Linacre College, Oxford, UK

sophielundrasmussen@gmail.com

Dr. Sophie Lund Rasmussen is a biologist and Research Fellow at Linacre College and WildCRU at the University of Oxford, United Kingdom. She is the leading expert in the field of European hedgehog ecology and conservation. Her scientific work has not only contributed significantly to the knowledge about the species' urban habitats and its threats from e.g. robotic mowers, pesticide accumulation, inbreeding and diseases, but she also has an enormous portfolio in brown-breasted hedgehog conservation, which has led her to work with manufacturers of robotic mowers. She also manages the national hedgehog conservation campaign in Denmark called "Danmarks Pindsvin" in collaboration with WWF Denmark, arranging annual hedgehog counts and inspiring the public to help preserve the hedgehogs in the wild. Recently, she expanded her research work to include ancient DNA in archaeozoological contexts.

INVITED SPEAKER

Mammals and Grasslands



Ludovic Orlando

Centre for Anthropobiology and Genomics of Toulouse, Purpan Medical School, Toulouse, France

Orlando.ludovic@gmail.com; ludovic.orlando@univ-else3.fr

Dr. Ludovic Orlando is a paleogenomicist and professor at the Center for Anthropobiology and Genomics at the University of Toulouse, France. He is a leader in ancient DNA research, with domestication research, evolutionary biology and species conservation among his main areas of work. His current research focuses on the interaction between horses as grassland dwellers, vegetation development and climate change at the end of the Pleistocene. This topic will form the content of his lecture and establish the link between research in anthropogenically and non-anthropogenically influenced grasslands.

INVITED SPEAKER

Mammals and Grasslands



Abigail K. Parker

University of Helsinki, Finland

abigail.parker@helsinki.fi

Dr. Abigail Parker is a paleontologist and postdoctoral researcher at the University of Helsinki, Finland. As a member of the Data Science and Evolution group, she is researching changes in community structure of large herbivorous mammals and their dietary and habitat adaptations. To this end, she analyzes data from the NOW database (<https://nowdatabase.org>) using state-of-the-art methods including machine learning models. One of her research focuses is the habitat context of the evolution of derived traits in North American horses in the Miocene and Pliocene. She represents the leading group in Europe in data mining on fossil mammals and is therefore an ideal speaker for the paleontological aspect of the topic of mammals and grasslands.

INVITED SPEAKER

Mammals and Grasslands



Frans Vera

Bureau Natuur Ontwikkeling, The Netherlands

frans.w.m.vera@gmail.com

Dr. Frans Vera is a Dutch freelance biologist and conservationist and visiting scientist at the Rijksuniversiteit Groningen. In the 1980s, he was involved in a new approach to nature conservation in the Netherlands, in which more space was to be given to natural processes. To this end, large grazing animals such as Heck cattle, wild horses, Koniks and red deer were introduced to the Oostvaardersplassen nature development area and left to fend for themselves. In his lecture, Dr. Vera will explain the course of this 30-year experiment at first hand and the conclusions to be drawn for the biology of grassland mammals.

Shrews and Bornavirus

(in German)

Organisers: Merle M. Böhmer and Rainer G. Ulrich

In recent years, there has been increased attention for shrews and the Bornavirus 1 (BoDV-1) that they transmit to humans. The virus has been known to cause Bornavirus in horses for a long time, whereas evidence of its transmission to humans was only succeeded for the first time in 2018. The inflammation of the brain caused by BoDV-1 in humans leads to death in the majority of cases. Fortunately, the number of infections and disease cases in Germany appears to be low so far. Bavaria is one of the main areas of distribution of the virus and the shrew *Crocidura leucodon* has been identified as the main reservoir. The aim of the workshop is to strengthen networking between research on shrews and the studies on BoDV-1.

Time: 1st September 4 - 6 pm 2024

Place:

Bayerisches Landesamt für Gesundheit und Lebensmittelsicherheit | Lazarettstr. 67 | 80636 München | Room 0.101



Map of workshop venue surroundings

Introduction to Dragonfly

Instructors: Anneke van Heteren and Stefanie Luft

Dragonfly is a software platform for scientific image processing developed and distributed by Comet Technologies Canada Inc. Dragonfly can process CT images, including segmentation, to extract quantitative information about different objects and materials. Dragonfly is free for non-profit institutions.

In this workshop we will guide you through the main functions for CT-scan segmentation and bone analyses. The workshop will include both theory and practice. We will provide CT-scans to the participants to practice on, but participants are also welcome to bring their own (preferably small) CT-scans to work with.

Time: 5th September 9 am - 5 pm with regular breaks

Place: Luisenstraße 37 | 1st Floor | Room C 124

Maximum number of participants: 30

Topics: Free Topic

Mya Alic, Heike Kessels, Theresa Bäumer, Kai Caspar
Heinrich Heine Universität Düsseldorf, Germany; alicmya@gmail.com

Are gorillas (and other non-human primates) innovative problem-solvers? A replication study

Poster Presentation

Habit formation during problem-solving in African apes has received notable attention both in the wild and in captive settings. A majority of studies from captivity suggests that once a working strategy has been established, apes tend to follow it conservatively even if more efficient but novel ways to solve a problem become available. This view was challenged by work on gorillas and chimpanzees housed at Lincoln Park Zoo in Chicago: Here, researchers presented apes with a causally clear two-phase straw pulling task and showed that their task-solving efficiency remained unchanged when the set-up was reconfigured between the first and second test phase. It was argued that conservatism shown in other studies resulted from a limited understanding of experimental set ups, which could be ameliorated by presenting tasks that apes can solve intuitively. However, these findings have not been replicated so far. Here, we attempt to reproduce results of the aforementioned study by presenting the same task to Western lowland gorillas housed at the zoos of Krefeld and Duisburg. While the German apes performed on par with the ones from Chicago in the first testing phase, their efficiency dropped significantly in the second one, suggesting that habit formation occurred. Nevertheless, individual differences in performance were pronounced, calling for an extension of the sample. Furthermore, we show that the test set-up is suitable to be applied to a wide array of primate species, such as colobus monkeys and gibbons, opening up new avenues for interspecific comparative research.

Topics: Free Topic

Patrick Arnold¹, Laura Mascialino¹, Prince K. Kaleme², Julian Kerbis Peterhans³, Terrence Demos³

¹Evolutionary Adaptive Genomics, Institute of Biochemistry and Biology, University Potsdam, Germany; ²Laboratory of Mammalogy, Department of Biology, Centre de Recherche en Sciences Naturelles, Lwiro, Bukavu, DR Congo; ³Negaunee Integrative Research Center, Field Museum of Natural History, Chicago, IL, USA; patrickarnold@uni-potsdam.de

First glimpse into the diversity and phylogeography of the Ruwenzori otter shrew (*Afrosoricida*, *Potamogalidae*, *Micropotamogale ruwenzorii*) from modern and historical specimens

Oral Presentation

The Ruwenzori otter shrew (*Micropotamogale ruwenzorii*) is one of the three otter shrew species left and the relic of an ancient pan-African distribution of insectivoran-grade afrotherians that survived on continental Africa. Like the other two otter shrews, this species exhibits a semi-aquatic ecology and morphology similar to otters, water shrews or desmans. It inhabits a small area in eastern DR Congo and western Rwanda. In this already limited range, it is tightly bound to clear freshwater streams in Afromontane forests, indicating that only few suitable habitat localities are available – and many of them are threatened by increasing pollution and deforestation. The species is known from only few voucher specimens resulting in the near lack of knowledge on its population and conservation status. For this reason, we here for the first time assess the genetic diversity of this rare species using modern and historical samples. Phylogenetic reconstructions and haplotype networks from (near) complete mitochondrial genomes reveal that overall genetic diversity is low, but that at least three major lineages exist. Although samples from different mountain ranges are, in general, also more genetically distant, there is surprising differentiation in the best-sampled mountain range (Kahuzi-Biega Mountains), too. This could be related to small scale geographic patterning in which individual mountain peaks act as watersheds and thus disconnect (sub)populations of the stream-bound species. Overall, more genetic data are needed to fully understand the population structure in otter shrews.

Topics: Free Topic

Robert Asher¹, Ephriam Dickson², Patrick Arnold³, Quentin Martinez⁴, Robert Haobo Yuan^{1,5}

¹University of Cambridge, United Kingdom; ²Carlsbad Caverns National Park, USA; ³University of Potsdam, Germany;

⁴State Museum of Natural History Stuttgart, Germany; ⁵ETH Zürich, Switzerland; r.asher@zoo.cam.ac.uk

The evolution of crown Soricidae and a novel element of the mammalian skeleton.

Oral Presentation

Soricids are among the most speciose of mammalian clades, but many questions surround their evolutionary history. Even the anatomy of living clades is poorly understood. Here, we describe the results of the first phylogenetic analysis that combines DNA and morphology across living and fossil groups. Our results support the interpretation that myosoricins comprise the sister-taxon of crocidurins, which collectively form the sister taxon to Soricinae. Blarinins form the sister taxon to all other soricines, with *Sorex* and *Anourosorex* as successively more proximate sister taxa to a *Notiosorex*-*Neomys*-nectogalin clade. Given this phylogenetic structure, we detail the patterns by which several unique features of the soricid skeleton evolved mosaically. For example, we discovered a large sesamoid extending cranially from the second thoracic neural arch in myosoricins. Small sesamoids dorsal to thoracic vertebrae are not unique to shrews, but to our knowledge, only myosoricins exhibit this element in such a robust condition. In addition, soricines exhibit a longer cranial base than non-soricine shrews, which overlap with talpids. Shrews are not "primitive insectivores" but have evolved many unique adaptations throughout their skull and skeleton.

Topics: Free Topic

Valentin Adrian Bălteanu¹, Alexandra Silvia Ardelean Costin¹, Attila Zsolnai², Marian Mihaiu¹

¹University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania; ²Hungarian University of Agriculture and Life Sciences Kaposvár Campus, Kaposvár, Hungary; avbalteanu@yahoo.com

The assessment of genetic diversity of Romanian wild boar, hybridization events with domestic pigs in Danube Delta Biosphere Reserve and relationships with other Eurasian populations

Oral Presentation

Romanian wild boar (WbRo) population size is estimated to over 40.000. WbRo are spread from Transylvanian hilly areas to southern plains close to Danube River and Black Sea. The overpopulation in Danube Delta Biosphere Reserve could represent a real threat for the survival of small mammals, birds or reptiles hunted by wild boars. Moreover, the hybridization events between wild boars and pigs are very likely to occur in Danube Delta, because pigs are raised freely on natural pastures. The expansion of hybrids could have serious environmental consequences. To assess the genetic diversity of WbRo and possible hybridization events we genotyped with the GGP Porcine HD Chip: 117 WbRo from Danube Delta, 48 Mangalitza and 10 Large White pigs. To assess the genetic relationships between WbRo versus other wild boar populations, we included data from 270 European and 57 Asian wild boars. The results evidenced a surprisingly reduced diversity of WbRo populations, in contrast with the current population size. In Danube Delta, African swine fever outbreak caused a drastic reduction of the population size since 2017, which can explain the reduced genetic diversity. The gene flow from pigs to WbRo populations was not significant, few samples being catalogued as hybrids. The WbRo populations have a closer genetic background to populations from Russia Western, Bulgaria and Croatia and are most obviously differentiated from those in the Iberian Peninsula (Spain and Portugal). The results provide a valuable scientific information for a better management of WbRo populations in this fragile ecosystem from Danube Delta.

ID: 137

Topics: Wild animal of the year 2024: European hedgehogAnne Berger

Leibniz Institute for Zoo and Wildlife Research, Germany; berger@izw-berlin.de

Germany-wide hedgehog monitoring using citizen science**Invited Talk**

Since 2020, the European hedgehog (*Erinaceus europeus*) has been on the "early warning list" of the Mammals' Red List of Germany due to declining populations. When monitoring hedgehog populations, a study design that is as simple, long-term, and comparable as possible is crucial so that long-term trends can be proven. However, reliable data on the population development of hedgehogs throughout Germany is difficult to obtain, as standard monitoring methods are very complex and can only be implemented to a limited extent in terms of time and space. Continuous and long-term measured figures are currently only available in Bavaria and Hesse, where a decline to around a fifth of road killed hedgehog finds has been documented within 30-40 years. It is not known whether this trend applies to the whole of Germany, because comparable counts are not available. Examples from Great Britain show that monitoring using citizen reports can be successful, especially since there is hardly any risk of hedgehogs being confused with other wildlife species. In 2023, the citizen science project "Germany is looking for hedgehogs and moles" was initiated, which will be repeated twice a year (in May and September) for a campaign period of ten days. The aim is to document and evaluate population trends and distribution areas of both species in whole Germany. The project also offers opportunities for environmental education and encouraging the society to protect hedgehogs and moles. The talk will present this monitoring project and its initial results.

ID: 119

Topics: Wild animal of the year 2024: European hedgehogKate Davies¹, Dawn Scott¹, Antonio Uzal¹, Dmitry Kishkinev², Sophie Lund Rasmussen³¹Nottingham Trent University, United Kingdom; ²Keele University, United Kingdom; ³University of Oxford, United Kingdom;
katie.davies2021@my.ntu.ac.uk

Rehabilitation practices of hedgehogs (*Erinaceus europaeus*) across Europe

Oral Presentation

Wildlife rehabilitation is the practice of caring for sick, injured, or orphaned wild animals, with the goal of releasing them back to the wild. This practice is carried out across Europe, with European hedgehogs frequently being the most commonly admitted mammal species. Both a lack of standardized guidance and differing levels of regulation can result in variations in rehabilitation practice. This study aims to identify the current hedgehog rehabilitation practices across Europe through the use of an anonymous questionnaire survey, as well as investigating variations in practice across different regulatory frameworks. The findings will identify areas of practice that would benefit from further scientific evidence, as well as demonstrating how different regulatory frameworks can shape practice.

Topics: Free Topic

Moritz Dirnberger¹, Pablo Peláez-Campomanes², Raquel López-Antoñanzas¹

¹ISEM, Univ Montpellier, CNRS, IRD, Montpellier, France; ²Departamento de Paleobiología, Museo Nacional de Ciencias Naturales-CSIC, Madrid, Spain; dirnberger.moritz@umontpellier.fr

Phylogenetic Relationships of Neogene Cricetinae revealed under Bayesian inference and maximum parsimony

Oral Presentation

There is an ongoing debate about the internal systematics of today's group of hamsters (Cricetinae). Regarding the closely related fossil cricetids, however, most studies deal with only a limited number of genera and statements about their possible relationships are rarely made. In this study, 41 fossil species belonging to seven extinct cricetine genera from the Neogene are analysed in a phylogenetic framework. Phylogenetic trees are reconstructed using traditional maximum parsimony and Bayesian inference approaches. Additionally, following thorough model testing, a relaxed-clock Bayesian inference analysis is performed under tip-dating. The resulting trees are used to test their fit to the stratigraphy and to reconstruct the ancestral states of the characters. The overall topologies reconstructed by the different methods are largely congruent. The monophyly of four of the seven genera, *Collimys*, *Rotundomys*, *Pseudocricetus* and *Hattomys*, is confirmed. Regarding two of the remaining three genera, *Apocricetus* and *Neocricetodon*, a few taxa are shown to be placed outside of their previously assigned genus, while the last genus, *Cricetulodon*, splits up into three independent groups. Lastly, this work contributes to a debate that went on for decades, as the genus *Kowalskia* can be confirmed as junior synonym of *Neocricetodon*. The study helps to gain a better understanding of the evolutionary history of the Cricetidae. Based on the expanded morphological matrix, additional extinct and extant members of the group can be rapidly added to the phylogeny in future studies. Therefore, this work provides the first basis for the still relatively poorly understood origin of today's hamsters.

Topics: Wild animal of the year 2024: European hedgehog

Marc Furió^{1,2}

¹Departament de Geologia, Universitat Autònoma de Barcelona, Cerdanyola del Vallès, Barcelona, Spain; ²Institut Català de Paleontologia Miquel Crusafont (Campus de la UAB), Cerdanyola del Vallès, Barcelona, Spain; Marc.Furio@uab.cat

Fossil hedgehogs from Europe: diversity, paleobiology and other ‘spiny issues’**Invited Talk**

The European hedgehog, *Erinaceus europaeus*, is one of the most iconic mammals from Western Europe. The wide distribution of *Erinaceus* at moderate latitudes suggests that the genus has experienced a long evolutionary history in this region. However, the oldest fossils confidently ascribed to *Erinaceus* in Europe are from the Pliocene, although some authors suggest that the genus could have been present as early as the Miocene.

The Miocene was likely a time of radiation for the subfamily Erinaceinae, with many different forms of hedgehogs present in Europe. Unfortunately, the taxonomy of most of these species is weakly or insufficiently supported. Some fossil genera and species of erinaceines found in European countries were erected using characters of little diagnostic value. This situation has resulted in a chaotic classification and significant difficulty in adequately quantifying the real diversity of the subfamily Erinaceinae in Europe during the Miocene.

Fortunately, these methodological difficulties have not precluded some new insights into the palaeobiology of extinct hedgehogs. The recent introduction of MicroCT scans, for instance, have provided access to hidden parts of some well-preserved Miocene fossils. The morphologies of the inner ear and the brain endocast of *Postpalerinaceus vireti* have been recently rendered, opening new questions and promising lines of research. However, there is still a long way to go to find out when and why the first true hedgehogs started running around.

Topics: Mammals and Grasslands

Lea Marie Gerstenberger¹, Nicola Heckeberg^{1,2,3}, Albrecht Manegold¹

¹Staatliches Museum für Naturkunde Karlsruhe, SMNK, Germany; ²Department of Earth and Environmental Sciences, Palaeontology & Geobiology, Ludwig-Maximilians-Universität, Richard-Wagner-Straße 10, 80333 München, Germany;

³GeoBioCenterLMU, Richard-Wagner-Straße 10, 80333 München, Germany; lea.gerst@kabelmail.de

Identification of tiger subspecies based on craniometrics, morphological characters and geometric morphometrics**Oral Presentation**

Due to habitat destruction, deforestation, and poaching, all six currently recognized subspecies of *Panthera tigris* are critically endangered. The Bali tiger (*P. t. balica*), Caspian tiger (*P. t. virgata*), and Javan tiger (*P. t. sondaica*) became extinct in the 20th century.

Over the past decades, the count of subspecies has been a topic of intense debate due to the minimal variation, significant overlap of phenotypic traits, and low genotypic diversity. However, the delineation of subspecies and correct systematic assessment are vital for conservation efforts, especially for endangered species.

Incomplete or missing information on museum specimens and sexual dimorphism pose significant challenges in subspecies delimitation based on morphological characteristics.

In this study, we test the discrimination of tiger subspecies using 39 craniodental and mandibular distances, 10 craniodental characters and 3 sets of 2D geometric morphometric landmarks on the skulls and mandibles of 100 specimens from various collections. Statistical, clustering, and phylogenetic methods indicate that subspecies delimitation is challenging. However, larger mainland subspecies could be distinguished from smaller island subspecies. Further, we were able to confirm the identification of five skulls of *P. t. sondaica* in the collections of the Staatliche Museum für Naturkunde Karlsruhe, which is an important contribution to the accessibility to specimens of rare (sub)species.

Topics: Free Topic

Federica Grandi^{1,2}, Michael Wuttke³, Bruno Gómez de Soler^{1,2}, Gerard Campeny^{1,2}, Isabel Cáceres^{2,1}

¹Institut Català de Paleocologia Humana i Evolució Social (IPHES-CERCA), Edifici W3 Campus Sescelades URV, 43007 Tarragona, Spain; ²Universitat Rovira i Virgili, Av. Catalunya, 35, 43002 Tarragona, Spain; ³Senckenberg Forschungsinstitut und Naturmuseum Frankfurt, Senckenberganlage 25, 60325 Frankfurt am Main, Germany; fgrandi@iphes.cat

Taphonomic investigations on large Mammals from the Camp dels Ninots maar site (Pliocene, Spain)

Oral Presentation

The Pliocene Konservat-Lagerstätte of Camp dels Ninots, located in NE Iberia, has been described as a crater lake of a phreatomagmatic origin. The taphocoenosis of this deposit describes the passage from a subtropical environment to a Mediterranean climate, indicated by the abundant floral and faunal remains recovered. Plant remains include casts of leaves, seeds, fruits, and wood. Macromammals are represented by *Alephis tigneris*, *Tapirus arvernensis*, and *Stephanorhinus* cf. *jeanvireti*, and microvertebrates by fishes, frogs, newts, and turtles.

The macromammals are mostly complete and in anatomical connection, displaying no signs of predation or bioturbation. They are enclosed in thin laminated clays, typical for anoxic environment. Vertebrates have a complex anatomical structure that leads to intricate processes of decomposition, which are interconnected in various ways. Therefore, the purpose of taphonomic studies is to identify fundamental mechanisms of decomposition and understand their sequence and how they interact with the environment and its abiotic and biotic factors. To understand the cause of death of these individuals, it is first necessary to know how they reached the depositional environment.

To solve the taphonomic problems, e.g. the timeline of decomposition of the soft parts of the carcasses like tendons, muscles, and ligaments, we especially use the experience of forensic taphonomy. This investigation aims to define if the carcasses sank immediately after entering the water or if they first bloated due to putrefaction gasses, floated, and sank afterwards, after leakage of these.

Topics: Free Topic

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Gait kinematics during forward and backward locomotion in Ansell's mole-rat (*Fukomys anselli*)

Poster Presentation

Subterranean mammals walk backwards habitually and swiftly. However, quantitative data on this highly unusual type of locomotion is scarce. For the present work, we recorded spontaneous and induced forward and backward locomotion in Zambian Ansell's mole-rats (*Fukomys anselli*). Based on video footage, quantitative analyses of spatio-temporal gait parameters, including speed, stride length and duration, footfall pattern, and foot posture were performed. To study the latter, we relied on the deep learning-based pose estimation software DeepLabCut. Data was subsequently compared between forward and backward locomotion. Mole-rats reached an average maximum speed of 0.58 ± 0.13 m/s while walking backwards which was approximately 1.5 times faster than while walking forwards. Whereas a similar or even higher speed was maintained during backward locomotion, stride length and stride duration decreased significantly. This was compensated for by a higher stride frequency. The angle between the hind foot and the ground was significantly lower while locomoting backwards compared to forward locomotion. Furthermore, the footfall pattern of Ansell's mole-rats is lateral while locomoting forwards and diagonal while locomoting backwards. A possible explanation for the fast backward locomotion of mole-rats is the evolutionary adaptation to their subterranean environment: Fast backward locomotion could allow the mole-rats to swiftly navigate, move food items, and escape predators in narrow tunnels that prevent a quick turning of the body. The decreased angle of the hind feet and the decreased stride length and stride duration while locomoting backwards might provide the mole-rats with more gait stability and control.

Topics: Free TopicKurt Heissig

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Function of horns and incisors in recent and fossil rhinoceroses.**Oral Presentation**

The first members of the family Rhinocerotidae show no sign of any special structure on the tip of the nasal bones. Beginning with the Upper Oligocene a swelling on the nasal tip with intense vascularisation arises independently in different not closely related species. But the long and slender nasal bones of these fossil rhinoceroses could not have supported a real horn. Most probably this predecessor of later horns was a display organ like a tuft of hair comparable to that of the Bornean bearded pig. The structure of the rhinoceros horn, made of fused hair like fibers is an argument for this assumption.

Only some members of the fossil subfamily Aceratheriinae show those nasal swellings but never evolved stronger nasals. Stronger and shorter nasals occurred first in two Oligocene American genera with paired bosses for the support of horns. They have been probably basal members of the still existing subfamily Rhinocerotinae with mostly strong horns.

The whole family Rhinocerotidae has originally enlarged lower second incisors. Asian rhinoceroses are using these teeth as weapons, whereas the African rhinos, which have lost the incisors fight with their horns. The extinct subfamily Aceratheriinae, however, without real horns strengthened the incisors as their only arms.

Topics: Free Topic

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Seasonal fluctuations in the bone microstructure of *Sciurus vulgaris fuscoater* humeri: a case study using phenomics on μ CT-scan

Poster Presentation

Sciurus vulgaris Linnaeus, 1758, the red squirrel, is a small, mostly arboreally living rodent, spread across the Palearctic. It is mostly vegetarian, feeding on plants, fungi and seeds, and is less active in the winter months, but does not hibernate. In this lateral study, the humeri of the subspecies *Sciurus vulgaris fuscoater*, the Central European red squirrel, were analysed to uncover potential intraspecific variation between individuals found in different seasons.

The μ CT-scans were obtained with a resolution of 26 microns. Five bone parameters were calculated and statistically evaluated with regards to seasonal variations: total volume, bone volume, endocortical surface, cortical thickness, and average trabecular thickness.

Bone volume, trabecular thickness and endocortical thickness correlated with bone size, whereas cortical thickness did not. Seasonal differences were observed between the warmer summer and autumn months versus the colder winter and spring months for all parameters. We, speculatively, relate the observed seasonal variation to nutrient intake, notably calcium. These results offer a deeper understanding of intraindividual variation in red squirrels, that may be useful in further ecological, taxonomic, and paleontological research.

Topics: Free Topic

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**Cementochronology using synchrotron radiation tomography
to determine age at death and developmental rate in the holotype
of *Homo luzonensis***

Oral Presentation

Homo luzonensis, a fossil hominin from the Philippines, is smaller than modern humans. At present, very little is known about the life history of this species. Cementochronology can answer life history questions, but usually involves destructive sampling. Here, we use synchrotron radiation to count the yearly cement lines of teeth belonging to a single individual. This approach allows us to determine that this individual was likely 31 years old at time of death and apparently had a developmental pattern comparable to chimpanzees. To our knowledge, this is the first time that cementochronology using synchrotron radiation tomography is applied to multiple teeth of the same fossil individual to assess growth rate and life history, as well as estimate age-at-death.

Topics: Mammals and Grasslands

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Histological age estimation of elephant bone thin sections of *Loxodonta africana* and *Loxodonta cyclotis*

Poster Presentation

The histological evaluation of elephant bone age at death offers significant insights into cellular composition via microscopic analysis. This analysis is crucial for a detailed understanding of age-related transformations, disparities, abnormalities, preservation status, and the life cycle of these majestic animals. This study focuses on histological age determination of elephant long bones, utilizing microscopic analysis to assess an individual's age at death and overall health. Samples were collected postmortal from four specimens each of the species *Loxodonta africana* and *Loxodonta cyclotis* that were once inhabiting the wild in the Democratic Republic of Congo, classified into age classes based on their state of dentition at death. Thin sections from femur, humerus and ulna were examined for age-specific characteristics, including cellular composition, osteon density, size, and bone remodeling processes. This study's goal is to identify cellular and structural variations during bone growth in African elephants, enhancing accuracy in age determination through histological examination, specifically highlighting the ages at which these changes occur. This approach contributes to a nuanced understanding of age-related changes in bone structure in African elephant species, with potential applications in species identification, environmental reconstruction, and evolutionary studies. Such insights could improve age distribution data in wild populations, crucial for the conservation and management of these endangered species, especially in combating illegal activities like poaching and the illegal trade of ivory.

Topics: Mammals and Grasslands

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New insights into the paleobiology of European *Coelodonta antiquitatis* close to its regional extinction

Oral Presentation

The woolly rhinoceros (*Coelodonta antiquitatis*) was an emblematic mammal of the Pleistocene communities in Eurasia (*Mammuthus-Coelodonta* Faunal Complex), associated with a thriving and productive grassland biome: the tundra-steppe or mammoth steppe. The loss of this habitat, due to the Late Pleistocene climatic changes (deglaciation), was critical to *C. antiquitatis* that went extinct around 14-12.5 kya as part of the Late Quaternary extinctions. The fine understanding of the paleoecological niche and its spatio-temporal evolution is thus necessary to comprehend the extinction of this species. In this context, we explored diet, physiology, and habitat of *C. antiquitatis* across Northern (UK, Belgium, Netherlands, Northern Germany) and Central-Western Europe (France, Southern Germany) during the Würmian / Weichselian glacial. To do so, we studied body mass (dental measurements), age structure and mortality curves (dentition statuses), paleoecological preferences (diet: dental wear and carbon isotopes, habitat: oxygen isotopes), and stress susceptibility (enamel hypoplasia). Our results confirmed a predominantly grazing diet in a pure C3 environment and highlighted a certain variability in the diet and physiology. The prevalence of hypoplasia was high (> 20 %) at the studied sites, suggesting important stress levels consistent with the challenging environmental conditions of the time period. Eventually, isotopic values pointed toward a relatively constrained habitat, that could have resulted in high vulnerability during the climatic and vegetational changes of the latest Pleistocene.

Topic: Wild animal of the year 2024: European hedgehogDaniel Issel

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**Wildlife in cities: effects of land use and habitat features
on citizen science reports of hedgehogs and badgers****ORAL PRESENTATION**

With an ongoing trend of urbanization, several wildlife species adapt successfully to city habitats. To prevent human-wildlife conflicts, a deeper knowledge of urban wildlife is needed. Traditional monitoring methods are difficult to implement in cities due to inaccessible properties, hence, citizen science has emerged as an alternative in recent years. This study investigated if different land use classes and slope influence citizen science report frequencies of badgers (*Meles meles*) and hedgehogs (*Erinaceus sp.*) within the city of Vienna, Austria. Although the city has over 2 million citizens, its area consists of 50 % greenspace in form of forests, parks, and gardens. Overall, 356 hedgehog and 918 badger encounters were reported at two citizen science platforms between 2012 and 2023. Both species were mainly reported during evening and night hours in spring, summer, and fall. Spatial analysis of the reports suggested segregation, supporting the hypothesis of predator avoidance of hedgehogs towards badgers. In terms of land use classes, a mix between sealed, built-up areas and greenspaces like meadow areas and shrub layers were positively associated with a report of both species. Arable land was negatively associated with both species, most likely due to ecological and methodological reasons. Slope had a negative effect on the reporting probability of hedgehogs, while a positive trend was associated with badgers. This project demonstrated that a citizen science wildlife monitoring, as established in Vienna, is a good data source for urban wildlife research and could be a model for other urban areas.

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Topics: Mammals and GrasslandsElizabeth Le Roux

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Mammalian consumers and the maintenance of open grassy ecosystems**Invited Talk**

The traditional notion that climate predominantly determines vegetation distributions has been increasingly challenged by the observations that different vegetation types can coexist within the same climatic zones. Historically, open ecosystems that occur in areas where the climate potential can support forest, have been viewed as degraded ecosystems that formed as a product of anthropogenic mismanagement. However, this perspective overlooks the substantial biodiversity to be found in open grassy systems – a biodiversity that could not have developed during the relatively short period of human ecosystem exploitation. Instead, emerging evidence depicts these ecosystems as ancient and suggests a much more complex reality, shaped by disturbance.

In this presentation I will delve into the pivotal role played by mammalian herbivores in maintaining the biodiversity and functionality of open grassy ecosystems. These herbivores serve as agents of disturbance, influencing vegetation patterns through consumption, trampling and interactions with fire. The variability in the impacts of herbivores is substantial and linked to the diversity of mammalian herbivore communities, variability in feeding strategies and the variability in plant response traits. Environmental factors such as rainfall, soil quality and forage nutrition interact with animal traits like diet, migration patterns and metabolism to drive these effects.

I will attempt to outline the significant challenges and research priorities needed to disentangle these interactions between mammal communities and open grassy system, particularly in the context of increasing human influence and environmental change in the Anthropocene.

Topics: Free Topic

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Investigating differences in the bone morphology of the limbs of *Clamyphorus truncatus* and *Calyptophractus retusus* using micro-CT scans

Poster Presentation

Fairy armadillos are fascinating animals. As endemic species, they live exclusively in the dry forests of the Gran Chaco region, which includes parts of Bolivia, Argentina, and Paraguay. They are nocturnal, subterranean armadillos that only leave their underground tunnels to search for food, making observations and captures an exceedingly rare occurrence. Due to the lack of data, the conservation status is currently listed as unknown. *Calyptophractus retusus*, the greater fairy armadillo, and *Chlamyphorus truncatus*, the pink fairy armadillo, form the subfamily Chlamyphorinae, but are assigned to separate genera and differ in terms of their external morphology, the most prominent difference being the size. Both species are very well adapted to the subterranean lifestyle, which is likely also reflected in the skeleton, but a thorough interspecific skeletal analysis has not yet been made.

One individual of each species was scanned using a micro-CT (*Calyptophractus retusus* subadult, *Chlamyphorus truncatus* adult). The resulting image stacks were reconstructed into 3D models using the software Dragonfly and analyzed for any differences between the skeletons. Emphasis was put on the front- and hindlimbs, as they show various adaptations to the subterranean lifestyle, noting differences in the bone morphology.

Through this study we hope to bring more attention to these otherwise elusive animals and provide more insight into differences of the skeletal structures between both species of fairy armadillos using already available material.

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Topics: Wild animal of the year 2024: European hedgehogSophie Lund Rasmussen^{1, 2, 3}¹WildCRU, University of Oxford, UK; ²Aalborg University, Denmark; ³Linacre College, Oxford, UK;
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Solving the mystery of the disappearing European hedgehog: using research to understand and mitigate the decline

Invited Talk

The European hedgehog, *Erinaceus europaeus*, is a peculiar, fascinating and adaptable species which is widespread across Europe, with records dating back at least 11000 years. Nevertheless, the population has seen a worrying documented decline in many European countries, especially since the turn of the millennium.

This presentation will provide a general introduction to the ecology of the European hedgehog, and will describe the conservation status of the species, alongside the factors currently known to contribute to the decline of this beloved species.

Moving on, I will present a palette of approaches from my own research, which serves to understand why the hedgehogs are declining, and to provide potential solutions to the threats.

Lastly, I will introduce and discuss current initiatives to mitigate the decline through research-based and targeted conservation practices.

Topics: Free Topic

Albrecht Manegold

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An improbable gorilla odyssey**Oral Presentation**

By chance, remains of a formerly mounted gorilla skeleton obtained from a secondary school collection in Karlsruhe were identified as part of the type material of *Gorilla gorilla schwarzi* Auerbach, 1912, – meanwhile recognized as junior synonym of *Gorilla gorilla gorilla* (Savage & Wyman, 1847). The type material, which also comprises a mounted skin, was supposed to have been destroyed during Second World War, but could be recovered in the collections of the State Museum of Natural History Karlsruhe and the Natural History Museum Brunswick, respectively. The present study describes the improbable odyssey of both skeleton and mounted skin, and provides new information on type locality as well as taxonomy of *G. g. schwarzi*.

Topics: Free Topic

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Comparative Analysis of the Occlusal Surface Shape of the p4 Tooth in *Glis glis* and *Glis sackdillingensis*

Poster Presentation

The occlusal morphology of mammalian teeth serves as a valuable indicator of dietary adaptations and thus of ecological shifts over evolutionary time. This study investigates the outline variation in the occlusal surface of the lower premolar (p4) between two dormouse species: *Glis glis*, the extant edible dormouse, and *Glis sackdillingensis*, an extinct dormouse species present from the upper Pliocene to the upper Pleistocene (5.3 mya to 11.7 kya). The analysis aims to explore whether there are significant interspecific variations in the outline of the p4's occlusal surface, suggesting evolutionary adaptations that distinguish these closely related species. This would contribute to the understanding on morphological changes in the dentition of *Glis* in the context of environmental changes since the Pleistocene.

A preceding analysis focusing solely on *Glis glis* revealed that the p4 exhibits the highest intraspecific variation among examined tooth positions. The current examination further expands upon this finding. In conducting the study, an elliptical Fourier analysis and a principal component analysis are utilized. While the analysis is still in progress, the anticipated results will provide insights into the evolution of dormouse dentition, revealing functional adaptation over time.

ID: 136

Topics: Wild animal of the year 2024: European hedgehog

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Animal of the year 2024: Our activities for the European hedgehog**Poster Presentation**

The European hedgehog (*Erinaceus europaeus*) is the animal of the year 2024 in Germany. Since 2017 donors of the German Wildlife Foundation have been voting for the animal of the year. Although the hedgehog is widespread throughout Germany, it is listed as “near threatened” in the Red List of Mammals in Germany. As our cultivated landscape is poorly structured, suitable habitats can be found particularly in residential areas with gardens and green spaces.

However, reliable data on the population development in Germany is currently only available through individual observations in Bavaria and Hesse. There is no comparable data available for the remaining parts of Germany. In order to fill this data gap, we initiated the citizen science project “The search for hedgehogs and moles in Germany” in 2023 with several project partners. In fall 2023, 4.617 people reported 10.586 hedgehog observations and in spring 2024, at least 2.378 people reported 6.103 hedgehog observations. The project will be permanently established as a nationwide survey system for the two species. In this way, long-term population trends and distribution areas will be documented and evaluated.

We are also focusing on the public and want to raise public awareness of hedgehogs and their problems with our project “Hedgehog garden campaign”. Together with committed citizens we are networking many individual gardens with small holes in fences and thus stopping the fragmentation of hedgehog habitats. Various information materials for children and adults introduce the hedgehog and provide tips for a hedgehog-friendly garden.

Topics: Wild animal of the year 2024: European hedgehog

Victoria Nistoreanu

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Data on ecology and road mortality of the northern white-breasted hedgehog (*Erinaceus roumanicus*) in Moldova**Poster Presentation**

The northern white-breasted hedgehog (*Erinaceus roumanicus*) is a common and widespread species in the Republic of Moldova. It is most abundant in forests, where it has been recorded with a frequency of 72% and a characteristic or constant ecological significance. It is well adapted to human environment and have synanthropization tendency with the value of anthropogenic adaptation index of 10.53. In urban ecosystems the density of the species varies between 0.3 ind./ha residential flat buildings and 5.3 ind./ha in the suburban area. In the last 20 years no large fluctuations in population number, nor drastic decrease in the density of the species was recorded.

The negative factors that affect population number are most often related to human activity, especially loss of forest habitats, landscape fragmentation and road traffic. In Moldova, of all mammals, *Erinaceus roumanicus* have the highest mortality due to road traffic. In the period 2013-2023 more than 120 cases of road mortality were registered. The highest number of hedgehogs killed by road traffic was recorded in May-July period with the highest density in June – 1 ind./8-10 km on the roads passing through forest habitats. More than 70% of the animals were juveniles and subadults, aged 0-3 years.

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Topics: Wild animal of the year 2024: European hedgehog

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The use of Citizen Science to establish a baseline distribution of hedgehogs in Ireland

Oral Presentation

While the hedgehog is one of Ireland's most distinctive mammals, it is one of the least studied. Introduced to Ireland around the 12th Century, it is neither an invasive species nor a pest but is regarded as part of the naturalised Irish fauna. There is a perception that hedgehogs are widespread and common in Ireland, but no census of the population has been carried out to date.

The Irish Hedgehog Survey is a citizen science initiative to gather data on the distribution of hedgehogs on the island of Ireland. The hedgehog survey has three elements: a casual recording scheme, a volunteer survey and a garden survey.

The Hedgehog Survey has attracted positive media and public interest. Between 2020 and 2023, just over 8,000 hedgehog sightings were submitted via a designated portal on the National Biodiversity Data Centre's website. These figures are approximately 10 times the average number of records received in the years 2000 to 2019.

Over the summers of 2021 and 2022, 149 sites throughout Ireland were surveyed for hedgehogs by volunteers using footprint tunnels. Hedgehogs were found at 47% of the sites surveyed. There was a significant difference in hedgehog detection between urban and rural environments; Just over one third of rural surveys found hedgehogs compared to 70% of urban surveys.

Over 500 people have contributed to the Garden Hedgehog Survey over the three years. Most of these are householders who have hedgehogs regularly visiting their garden. Again, urban gardens had a significantly higher detection rate than rural gardens.

ID: 141

Topics: Mammals and Grasslands

Ludovic Orlando

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**The horse, the steppes and the southwestern American plains:
a cross-continental genomic history of mobility****Invited Talk**

The history of the horse, as both a family and a species, began on the American continent, long before the animal was domesticated in the Pontic-Caspian steppes around 4,200 years ago. Throughout this extensive period, horses have endured numerous global climate changes, and adapted to a wide range of environments across the planet. Over the last decade, the sequencing of extensive ancient genome time-series has enabled us to rewrite the evolutionary history of the species before and after our companionship. These time-series have uncovered complex patterns of migration across the Beringian mammoth steppes as sea levels fluctuated during Ice Ages. They revealed that, among the many horse lineages that spread throughout Eurasia, only one lineage ended up providing us with fast mobility and became the ancestor of all modern domestic horses. Another lineage, known as the Przewalski's horse, survived until the present-day while most others have gone extinct. This presentation will summarize how 10 years of ancient DNA discoveries have revisited the evolutionary and domestication history of the horse, until the animal finally returned to its ancestral homeland as part of the Columbian exchange. It will also showcase the intimate interplay between climate change, anthropogenic pressure and grasslands that shaped the expansion and demise of various horse lineages in the last 50,000 years.

Topics: Mammals and Grasslands

Abigail K. Parker

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40 million years of spreading grasslands and restructuring of mammal communities**Invited Talk**

Both mammals and grasses evolved relatively recently in earth history. While both were present prior to the Cretaceous-Paleogene boundary, when the mass extinction of the dinosaurs occurred, mammals became major components of terrestrial vertebrate communities during the recovery from that extinction event. During the earlier part of the Cenozoic, from ~66-38 million years ago, grasses remained minor components of floras, with closed forests dominating global landscapes in climates significantly warmer than today. This talk will focus on the consequences of the expansion of open grassy landscapes thereafter. In particular, herbivorous mammals responded in their body size and diets. Information about mammals' diets is preserved in the rich fossil record of fossil teeth. I will review the timing of grassland expansion, which varied across continents, and highlight extinct mammalian taxa that inhabited those novel environments. Over the last 10 million years, grasslands dominated by plants using the C4 photosynthetic pathway have covered large areas of the continents, where open habitat mammal faunas evolved. The dental traits of these faunas are closely linked to the climate and vegetation conditions where they lived; I will review the paleontological subfield of ecometrics, which uses those links between traits and climate to estimate paleoenvironmental conditions based on fossil morphologies. Between ecometrics and advances in plant fossil and geochemical proxies, paleoenvironmental reconstructions have become more quantitative and nuanced. Finally, I will address the complex vegetation and mammalian extinction dynamics that have followed the global spread of humans over the last two million years.

Topics: Free Topic

Juan Olvido Perea Garcia¹, Anna Szala², Michelle Spierings³, Elif Duran⁴, Sławomir Waciewicz¹

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Vocalizations in response to different external eye appearances in pygmy marmosets (*C. pygmaea*)

Oral Presentation

Humans utilize eye contact flexibly in communication, in contrast with most other examined primate species where the percept of eye contact leads to either gaze aversion or contests of dominance. It is unclear how humans incorporated eye contact into more complex sequences like gaze following, or affiliative eye contact. It has been proposed that eyes without peri-iridal pigments, a by-product of selection against aggression, facilitate the percept of eye contact, serving as an honest indicator of tame temperament. Marmosets have been suggested as a primate group in which peri-iridal depigmentation is notable due to this mechanism. We present the results of a study in which we showed a group of four pygmy marmosets stimuli depicting conspecifics with 1) pigmented peri-iridal tissues; 2) depigmented peri-iridal tissues, and; 3) closed eyes. We measured the amount and types of vocalizations emitted in each condition. According to the idea that peri-iridal depigmentation signals tame temperament, we expected the marmosets to vocalize the least when exposed to stimuli with depigmented peri-iridal tissues, out of the two conditions with open eyes. We discuss our results in terms of the notion that ocular melanins could signal temperament, and in the broader context of recent investigations into the adaptive significance of external eye appearance in land vertebrates.

Topics: Mammals and Grasslands

Nadja Pöllath

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How humans and sheep jointly conquered grasslands**Oral Presentation**

Wild sheep (*Ovis orientalis*) prefer ample grasslands in precipitous landscapes, which offer good pasture and at the same time safe retreat inaccessible for their predators. According to Early Neolithic archaeofaunas from Upper Mesopotamia (c. 10000-8800 BCE), they thrived in the eastern Taurus and western Zagros mountains and were the most important game species of human hunters there. When human groups became sedentary, they seemingly began experimenting with strategies for the sustainable exploitation of their preferred game species. Since most settlements in this part of Upper Mesopotamia were abandoned during the later phase of the Early Neolithic (c. 8800-6500 BCE), these strategies seemingly did not work out. Contrary to this, human groups in the western part of Upper Mesopotamia mainly hunted goitered gazelles (*Gazella subgutturosa*) and Asiatic wild ass (*Equus hemionus*), gregarious species of the Syrian steppe, while evidence for hunted wild sheep are rare suggesting that they did not thrive there. The turning point came in the later phase of the Early Neolithic, when the sedentary groups began controlling and finally rearing sheep. Domestic sheep rapidly became the most important source of animal protein in Upper Mesopotamia. Under human care, sheep were able to conquer grasslands without steep and rocky retreats formerly unfavourable for them. Climatic changes and the anthropogenic impact on the vegetation led to further expansions of arid grasslands—again favouring sheep, while humans increasingly relied on this species well-adapted to arid grasslands.

ID: 127

Topics: Mammals and GrasslandsHeiko G. Rödel¹, Katalin Ozogány^{2,3}, Benjamin Ibler⁴, Viola Kerekes^{3,5}

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Early foal survival in the Przewalski's horse depends on social group parameters, weather and mother's parity

Oral Presentation

In group-living species, social group parameters can affect offspring survival, in particular during the early period after birth. We studied such effects based on survival data of >400 foals, collected over 20 years from a Przewalski's horse population (*Equus ferus przewalskii*) living on a 3,000 ha area in the Pentezug reserve of the Hortobágy National Park in Hungary. We predicted that offspring from primiparous, and thus younger, often lower-ranking and less experienced mothers may be particularly sensitive to negative impacts by conspecifics. Generally, peri- and postnatal foal survival during the first 21 days was around 88%. Some of the social group parameters we studied indeed affected the early survival of foals, depending on mother's parity. For example, foal survival decreased significantly with an increasing number of adult females in a harem group, but only in foals born to primiparous mothers. Furthermore, in such mothers, early foal survival was significantly lower when the dominant harem stallion had changed before or after parturition, whereas no such effects were apparent in multiparous mothers. We also found negative effects of abiotic conditions on offspring survival, again in interaction with mothers' parity, as foals from primiparous mothers showed a decreased survival probability in response to strong rainfall around their date of birth. In conclusion, our study points out that the survival of foals born to primiparous Przewalski's horse mothers shows a notably higher sensitivity to challenging abiotic and social environmental conditions than offspring survival of multiparous mothers.

Topics: Free Topic

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Temperature increase and frost decrease driving upslope elevational range shifts in Alpine grouse and hares

Oral Presentation

Global climate change has led to range shifts in plants and animals, thus threatening biodiversity. Latitudinal shifts have been shown to be more pronounced than elevational shifts. Additionally, global climate change is expected to disadvantage habitat specialists. In the Alps, climatic variation along the elevation gradient allows the coexistence of habitat specialists and generalists. Alpine species are anticipated to adapt their elevational ranges to the change of various climate variables caused by global climate change. Furthermore, distinct climate variables might differently affect the shifts of habitat specialists and generalists. To study the effect of climate change on Alpine species, we analysed hunting bag, climate and biogeographic data of two grouse species (*Tetrao tetrix*, *Lagopus muta*) and two hare species (*Lepus timidus varronis*, *L. europaeus*) in Grisons, Switzerland, over a period of 30 years. Our results based on 84,630 harvested specimens were: (1) only three out of seven climate variables changed significantly within the study period. (2) The grouse species significantly shifted towards higher elevations, whereas the hare species only shifted in their minimum/maximum elevations. (3) Hunting elevation of habitat generalists increased more than in habitat specialists. (4) The elevational shifts were mostly related to the number of frost days. (5) Hunting elevation increased especially in the southern biogeographic region. To conclude, all four taxa respond to climate change but habitat generalists more rapidly than habitat specialists. Climate change is thus a serious threat to alpine biodiversity. Regions rich in alpine habitats will have an increased responsibility to conserve these species.

Topics: Free Topic

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Coexistence of European hares and Alpine mountain hares in the Alps: what drives the occurrence and frequency of their hybrids?

Poster Presentation

Mountain hares are adapted to cold and snowy conditions. Conversely, European hares originate from the grasslands of the Middle East and spread from there throughout agricultural areas of Europe. Mountain hares and European hares generally occur allopatrically, but sympatry occurs in some areas. In sympatric areas introgressive hybridisation poses a threat to the Alpine mountain hare. Introgressed individuals are found in both species but are far more frequent in European hares. The ecology of hybrids is poorly known in these species. To examine the Alpine mountain hare and European hare populations in the Alps with a particular focus on the occurrence and ecology of their hybrids, we performed molecular genetic analysis of hare faecal samples collected in the Alps in South Tyrol and compared habitat associations of the genotyped samples. We recorded 150 individuals (i.e., 14 hybrids, 25 European hares, 111 Alpine mountain hares). Four introgressed individuals were at levels consistent with F2 hybrids, whereas the others showed an older interspecific gene flow. We found that hybrid faeces tended to be at lower elevations compared to those of Alpine mountain hare but at higher elevations than those of the European hare. The frequency of Alpine mountain hares decreased as the proportion of Alpine grassland increased but was positively correlated with the proportion of dwarf shrub heaths. Our results support the widely raised concerns that the European hare, as a generalist, is a competitor with the Alpine mountain hare in the Alpine ecosystem in the time of global climate change.

Topics: Free Topic

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Conservation causing costs and conflicts – The return of the Eurasian otter (*Lutra lutra*) and the response of the Central European human (*Homo sapiens*)

Poster Presentation

After near extinction, Eurasian otter (*Lutra lutra*) populations are recovering across Central Europe, slowly closing an otter-free area from the East and the West. The return of this predator to its original range causes conflicts with people no longer used to its presence. Eurasian otters are territorial opportunistic feeders and can cause significant financial harm when they have unimpeded access to commercial fish ponds. As a response to this problem, there are at least three potential paths of action. 1. "The dead end": Idealistic conservation without debate and no reaction to the brewing conflict will only exacerbate the problem in the future. 2. "The red line": Calls for the killing of "problematic" animals as seen in Austria and Bavaria might seem like an easy fix for some but are unacceptable for the conservation of a fragile animal population reclaiming its former range. Killing otters is also a pseudo-solution as other individuals will quickly claim any vacant territory, including fish ponds. 3. "The long and winding road": Most ponds can be secured by otter-proof fences and unbureaucratic financial compensation can alleviate further damage. Independent unbiased research of otter behaviour, their population size, and effective repellents and protections against otter damage - without damaging otters - can potentially offer long-term solutions. All of these measures take time, cost money, and depend on political will. But they have two crucial advantages compared to radical populism: They do not kill a protected species. And they work.

Topics: Mammals and Grasslands

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Mammals show faster recovery from capture and tagging in human-disturbed landscapes

Poster Presentation

Wildlife tagging provides critical insights into animal movement ecology, physiology, and behavior amid global ecosystem changes. However, the stress induced by capture, handling, and tagging can impact post-release locomotion and activity and, consequently, the interpretation of study results. Here, we analyze post-tagging effects on 1585 individuals of 42 terrestrial mammal species using collar-collected GPS and accelerometer data. Species-specific displacements and overall dynamic body acceleration, as a proxy for activity, were assessed over 20 days post-release to quantify disturbance intensity, recovery duration, and speed. Differences were evaluated, considering species-specific traits and the human footprint of the study region. Over 70% of the analyzed species exhibited significant behavioral changes following collaring events. Herbivores traveled farther with variable activity reactions, while omnivores and carnivores were initially less active and mobile. Recovery duration proved brief, with alterations diminishing within 4-7 tracking days for most species. Herbivores, particularly males, showed quicker displacement recovery (4 days) but slower activity recovery (7 days). Individuals in high human footprint areas displayed faster recovery, indicating adaptation to human disturbance. Our findings emphasize the necessity of extending tracking periods beyond one week and particular caution in remote study areas or herbivore-focused research, specifically in smaller mammals.

Topics: Free Topic

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Exploring patterns of ocular coloration in carnivorans**Oral Presentation**

The external appearance of the human eye with its strong contrast between the widely exposed white sclera and the overlying transparent conjunctiva has been widely regarded as an anomaly among mammals. Numerous controversial ideas have been proposed to explain this conspicuous morphology, many of which hypothesize a link between (de)pigmentation and socio-cognitive functions such as gaze signaling. So far, comparative research on ocular appearance has almost exclusively focused on humans and our primate cousins, leaving other groups of mammals essentially unexplored. The order Carnivora displays a large variety of body and ocular sizes as well as diverse patterns of eye pigmentation, both at the inter- and intraspecific level, making them suitable models for comparative research on determinants of ocular appearance in mammals. We scored conjunctival pigmentation and iris hue for 30 species of carnivorans, relying on a large sample of publicly-accessible digital photos. We tested ocular diameter and geographical range, as potential predictors for these traits while accounting for phylogenetic relatedness. While no effects on iris hue were found, we recovered a significant inverse correlation between conjunctival brightness and eye size - the larger the eye, the darker its conjunctiva presents. This finding aligns with data on non-human primates which suggest that photoprotection rather than social cognition plays an important role in shaping ocular appearance. Although the human eye interestingly does not correspond to the aforementioned pattern, comparative research across diverse mammalian taxa could hold important clues to unravel the evolution of its distinctive phenotype.

Topics: Free Topic

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20-year network “Rodent-borne pathogens”: an interdisciplinary approach

Oral Presentation

The network "Rodent-borne pathogens" was established as a platform for an interdisciplinary collaboration of scientists in mammalogy, ecology, genetics, immunology, toxicology, epidemiology, virology, microbiology, parasitology and human and veterinary medicine.

Over the last 20 years, about 30,000 rodents and other small mammals were collected by network collaborators from forests, grasslands, zoological gardens, urban landscapes and pet rat breedings and other husbandries. Specimens were dissected and species determined following corresponding standard protocols. A variety of pathogen-specific, generic and open view molecular methods were used to detect and identify known, and yet undiscovered, pathogens.

This network was involved in the discovery of numerous rodent- and shrew-specific herpes- and polyomaviruses. Based on clinical cases in humans, domestic and zoo animals, novel zoonotic and animal pathogens were identified, e.g. squirrel bornavirus 1 and rustrela virus. The network enables the detection of several viruses of unknown zoonotic potential, e.g. novel hepeviruses in rats, common voles and shrews, and the identification of the rodent reservoirs of rustrela virus and lymphocytic choriomeningitis virus. In addition to eight hantavirus species in wildlife, the zoonotic Seoul hantavirus was recently identified in pet rats in Germany.

The network provides an important infrastructure for interdisciplinary scientific work in a One Health perspective and allows a holistic view on environment-host-pathogen interactions for viruses, bacteria and endoparasites.

Topics: Mammals and GrasslandsFrans Vera

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Large herbivores direct the vegetation succession**Invited Talk**

In the centre of the Netherlands, in 1968, the polder South Flevoland was created, there is a 5.600 ha nature reserve, the Oostvaardersplassen. In a 3.600 ha marshy part, tens of thousands non-breeding Greylag geese moulted in May, June or July, their primaries, and cannot fly then and graze the reed beds. The prevailing idea was, the marsh could not be preserved without classic management of reed mowing, because the succession theory predicted it would be a fen forest in decades. It did not happen.

To moult in the marsh, they need short, protein-rich grassland, to fatten up before and after the energy consuming moult. Without grassland, no moulting geese in the marsh, resulting in a trophic cascade there.

Wild living Heckcattle, Konikhorses and Red deer created grassland in a 2.000 ha drier part adjacent to the marsh. Their numbers were regulated by the available amount of food. When an animal's condition deteriorated in winter to an extent that it would not survive until the coming spring, it was shot. Without these large herbivores, the whole ecosystem would collapse.

The grassland developed despite the argument that the past proved that with wild herbivores such as aurochs, tarpan, red deer, not grassland but a closed canopy forest would develop. Besides geese, grasslands created by wild living large herbivores are also necessary for the establishment of light-demanding tree species like oak.

However, shifted baselines in science and the public, made this project come to an end.

Topics: Free Topic

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Craniomandibular morphology and the evolution of total-group Soricidae**Oral Presentation**

Soricids (shrews) are an exceptionally diverse mammalian clade whose evolutionary history has yet to be fully elucidated. Here, we describe the oldest and most complete heterosoricid fossil yet known and demonstrate mosaic evolution in anatomy over the course of soricid phylogenetic history. *Domnina gradata* shares with crown soricids the double-jaw articulation and an incomplete zygomatic arch. But unlike crown species, *Domnina* shows open vomeronasal canals, a tympanic process of the basisphenoid, a posteriorly positioned jaw joint relative to the nasal fossa, and a deep masseteric fossa, similar in anatomy to non-soricid lipotyphlans. Although clearly divided, the mandibular condyles of *Domnina* are mediolaterally elongated with a significant lingual shift of the lower facet. Incorporating the hard-tissue characters with molecular sequence data, we compiled a DNA-indel-morphology matrix for Bayesian inference. We included an expanded sample of fossil soricids and utilized their stratigraphic data to estimate a time-calibrated phylogeny. Our results place *Domnina* and other heterosoricids in the sister clade to crown Soricidae; “crocidosoricines” are paraphyletic and closer to crocidurins than soricines. The oldest, well-supported total-group soricid relative is North American (*Domnina gradata*), not Asian (*Soricolestes soricavus*), and the most speciose mammalian genus, *Crociodura*, likely originated 10-15Ma ago and began to diversify at least 8Ma ago.

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