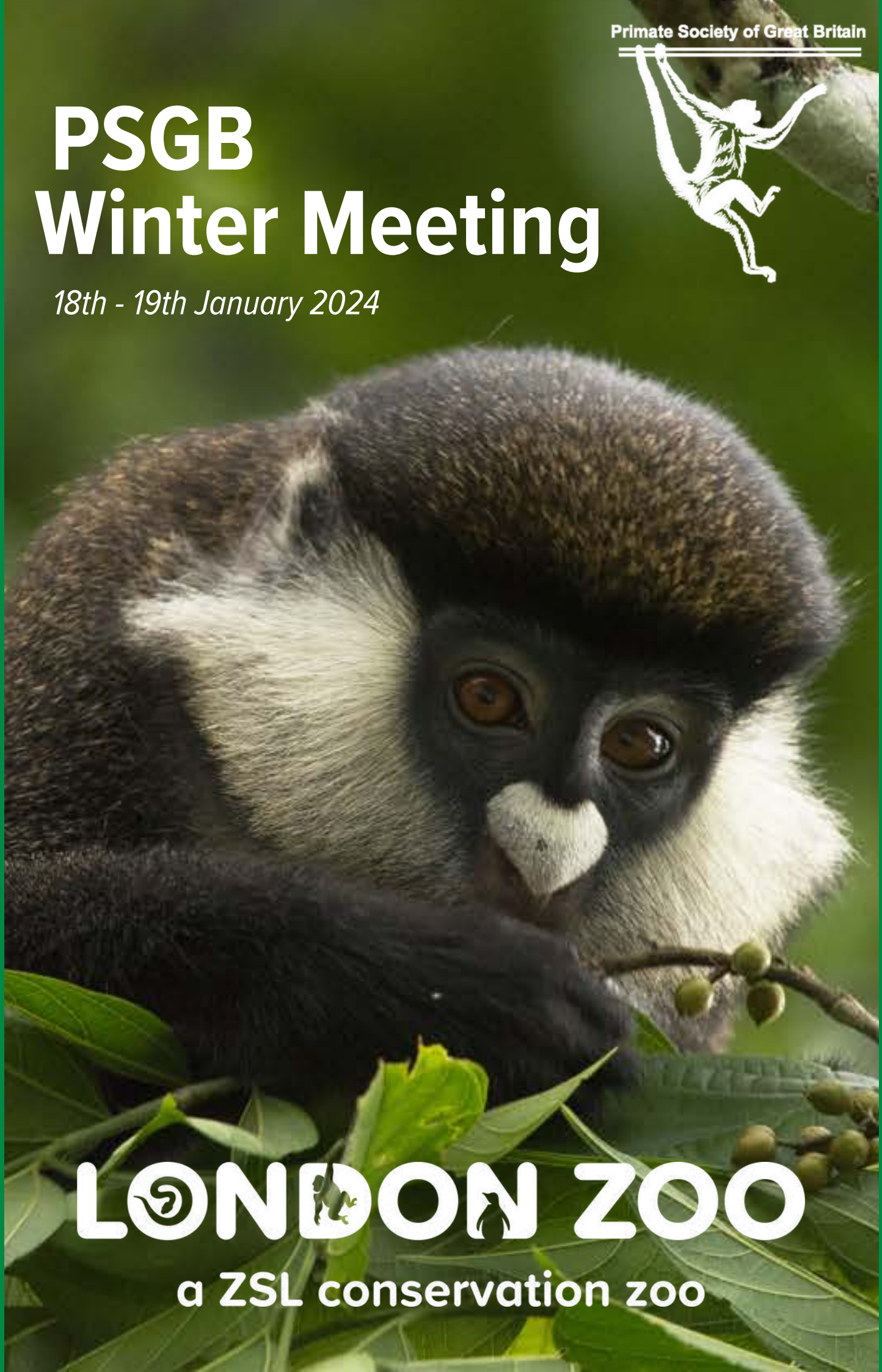
Primate Society of Great Britain

PSGB Winter Meeting

18th - 19th January 2024



LONDON ZOO

a ZSL conservation zoo

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Welcome

to the PSGB Winter Meeting 2023/2024

This year's winter meeting is held in collaboration with London Zoo, a ZSL Conservation Zoo.

The Zoological Society of London (ZSL) was established in 1826 as a Society for members interested in the natural world, and as the conservation charity that runs both London and Whipsnade Zoos, has always had science and conservation at the forefront of its mission.

As the world's oldest scientific zoo, it's very exciting to host you all and share exciting recent developments from the world of primate conservation, research, and captive animal care.

At ZSL we promote the value and role of science in the modern zoo. We collaborate with taxonomic curators, registrars, clinical vets, pathologists, our EAC team and animal keepers alongside our colleagues in the Institute of Zoology and the Conservation & Policy Directorate. We also work alongside many academic and conservation partners at an international level to ensure a world where wildlife thrives.

Through these collaborations we aim to produce impactful science that benefits the care and conservation of animals housed ex-situ, as well as to inform and drive conservation efforts out in range countries.

We are thrilled to offer an exciting variety of talks, notably from our plenary speakers as well as posters, small group meetings and general networking opportunities. We hope that you can also spend some time enjoying a wander around our historic zoo.

If you are in need of any additional information please contact the PSGB meetings officer, Shannon Farrington, using the following email.

meetings@psgb.org

Information

Equality, Diversity & Inclusivity

Both ZSL and PSGB value diversity and strive to support equal opportunities. We recognise inter-individual differences in socio-economic, geopolitical, educational, demographic, and cultural knowledge and perspectives. We aim to promote equality and diversity in science through inclusive, accessible and equitable programming ensuring the event is open to those from all backgrounds, roles, and levels of seniority. We strive for our panels of speakers to have a diverse representation and to amplify the voices and experiences of those from underrepresented backgrounds. ZSL's EDI statement can be found **here.** PSGB's EDI statement can be found **here**.

Sustainability

At ZSL, we strive to employ the most environmentally friendly and sustainable practices possible. We strive to incorporate sustainable practices into our daily activities. More information regarding ZSL's goals pertaining to sustainability may be found **here**. We have only made this booklet available in electronic format. Printed copies will not be available at the meetings, so please download this booklet onto your devices and refer to the e-copy. We will provide all registered delegates with a name badge and holder. Please return these holders to the conference staff at the end of the meeting and they can then be reused for future meetings. We thank you for your efforts and cooperation towards making PSGB 2024 a sustainable and 'green' meeting.

Food & Drink

Lunch will not be provided as guests are encouraged to utilise the array of catering options around Camden Town, providing options that cater to all dietary requirements and budgets. In addition, guests are able to bring their own food or buy food on site. We do however suggest that attendees contact meetings@psgb.org to discuss any dietary requirements during the morning and afternoon refreshments.

Photography and Videography

Presentations will be streamed live on the day to allow access for researchers in primate range countries (see EDI statement above) and others otherwise unable to make it in person owing to certain constraints. Filming of presentations is not permitted. As always, please refrain from using flash photography at any point during live conference-related events. If you wish to take photographs of presenters and their slides to post these on social media, please do so with due permission, respect and consideration. We suggest that presenters clearly highlight anything in their talk or poster that they would prefer people not to take photos of or post about.

Social Media

We encourage delegates to use the following PSGB and ZSL specific hashtags and Twitter handles when posting or tweeting about the meeting. Share your experience of the day on any of our social media channels (Instagram, Facebook, Twitter or LinkedIn).

#PSGB2024

@Primatesociety @OfficialZSL @zsllondonzoo

@psgb @ZSLScience

ZSL
Zoological
Society
of London



Travel Information



The conference will be held in the Huxley lecture theatre at ZSL London Zoo. The entrance is located on the Outer Circle, between the ZSL Main Offices (Green ZSL Signpost) and the Nuffield Building (IoZ).

TUBE:

Camden Town (0.8 miles)
The nearest Underground station to the Zoo (Northern Line). Once out of the station, the route will take you along Camden Parkway and past the canal.

Chalk Farm (0.9 miles)
(Northern Line) is an Edgeware line alternative to Camden Town station, approximately the same walking distance from the Zoo.
This station has lift access.

Baker Street (1.1 miles)
Around a 20 minute walk. Serviced by the Bakerloo, Circle, Metropolitan and Hammersmith & City Lines via Regent's Park. Also serviced via 274 bus northbound.

Regent's Park (1.2 miles)
The Zoo is an easy walk from Regent's Park station (Bakerloo Line). Once out of the station, cross Marylebone Road and follow the signposts. You can take the 88 bus northbound from nearby Albany Street to halve the walking distance.



OVERGROUND:

Camden Road station (1 mile)
London Overground makes travel to the Zoo easy from southwest, north and northeast London. A 20 min walk to the zoo from Camden Road station, or alternatively catch the 274 bus towards Camden Town.

NATIONAL RAIL:

Euston (Avanti West Coast, London Northwestern Railway or London Overground). If arriving at Euston, the fastest route is to transfer to the Northern Line for Camden Town or Chalk Farm.

Marylebone (Chiltern Trains) From the main entrance of Marylebone Station walk left to Baker Street then follow Baker Street tube walking directions, or take the 274 bus northbound.

CYCLING:

Cycling to the Zoo is easy. We have a public bike shed located at the **East Service Gate**. There are also two TfL Barclays Cycle Hire scheme docking stations, one of which is in the small car park opposite the main Zoo entrance.



BUS ROUTES:

88 Northbound: towards Kentish Town. Alight on Albany Street at Prince Albert Road.

88 Southbound: towards Great Portland Street. Disembark at Albany Street, Regent's Park Barracks.

274 Northbound/Southbound: Get off at Prince Albert Road, then cross the bridge to ZSL London Zoo.

DRIVING:

The most sustainable routes to the zoo are by public transport. If travel by car is necessary, the post code for parking is NW1 4SX. Parking will incur a daily charge. **Disabled parking is available in front of the main Zoo entrance and in the main car park.**

Accommodation

Accommodation options for a range of budgets can be found through websites such as booking.com.

Hotels near the zoo include the Best Western (Swiss Cottage) located on 4 Adamson Road, Swiss Cottage, London, London, NW3 3HP. This hotel is approximately 30 mins walking distance or public transport. Call 0207 722 2281 and quote rate code: ZSL for a discount on the booking (Fully flexible - Double room, bed and breakfast). Be sure to book early to get the best rates. A credit card is needed to secure your booking.

Alternative hotels include Travelodge (London Marylebone) and (Euston) are situated approximately 35 minutes walk or 30 minutes by public transport.



Schedule Day 1: Thursday 18th January

10:30	Registration, refreshments & networking
11:05	Welcome from PSGB and conference organisers. Raffle & conservation cause
11:30	**Plenary Speaker: Sarah Papworth.** Monkey see, monkey do: How do primates react to humans?
12:15	Break
12:35	**Felipe Ennes Silver:** Connecting landscape, genomics, and climate change to unravel the evolutionary history and the challenges for the conservation of bald-headed uakaris, genus Cacajao.
12:50	**Mishaal Akbar:** Elevated hair cortisol and decreased hair testosterone indicates chronic disruption of the HPA/HPG axis and is reflective of poor welfare in Rhesus Macaques used as performing (dancing) monkeys in Pakistan.
13:10	Lunch
14:30	**Jing-yu Chen:** Adopting an anthropological perspective to construct community-based conservation of the human-gibbon interface in south-eastern China.
14:45	**Claire Cardinal:** Are lemurs special? Considering the importance of lemurs among people living in Tsitongambarika protected area, south-east Madagascar.
15:00	**Samuel Turvey:** Conservation planning for the Hainan gibbon - understanding interdisciplinary baselines and evidence.
15:15	**Rodrigo Carvalho:** Safe haven for the endangered Buffy-tufted-ear marmoset (*Callitrhix aurita*) in Brazil.
15:35	Poster viewing and networking session
16:55	**Chloe Chesney:** Understanding primate distribution, behaviour and human-primate interactions through group interviews inside and outside protected areas in Guinea-Bissau.
17:10	**Cameron Goodhead:** Integrating drone-based thermal and visual telephoto cameras for real-time identification of primate species.
17:25	**Tim-Joshua Andres:** Precision in a click: Streamlining video data analysis with segment-anything annotator.
17:45	Day 1 closing remarks and social

Schedule Day 2: Friday 19th January

10:00	Refreshments, networking and welcome
10:50	**Dishari Dasgupta:** Urban adaptation of Hanuman Langurs residing in human-modified environments.
11:05	**Ben Walton:** Space use and crop foraging by baboons in an agricultural landscape
11:20	**Susan Cheyne:** Occupancy patterns of endangered Long-tailed Macaques (*Macaca fascicularis*) across regenerating and anthropogenic forests on Indonesian Borneo.
11:40	**Zoo Tours**
12:40	Lunch
14:15	**Lewis Rowden:** Personality assessment in zoo-housed siamang (Symphalangus syndactylus), including potential applications for management.
14:30	**Thomasin Millington:** Why do primates carry corpses?
14:45	**Amanda Bartlett:** Behaviour, furnishing and vertical space use of captive Callimico (Callimico goeldii): Implications for welfare.

5-minute talks

15:20	**Divya Dwivedi:** How disturbed are the disturbed ones? Impacts of anthropogenic stressors on the socio-ecological interactions of Terai Gray langur (Semnopithecus hector) in Shivalik Hills.
15:25	**Daniel R Lewis:** Mandrills and microbes: Characterising the mandrill scent-gland microbiome and its potential role in olfactory communication.
15:30	**Bethany Gadd:** Societal perceptions and interactions between Barbary macaques and residents in Gibraltar, and the potential for citizen science to play a role in their management within the Upper Rock Nature Reserve.
15:35	**Ella Pickering:** Are captive, Red-bellied lemurs (Eulemur rubriventer) cathemeral? An investigation into their activity patterns in European zoos.
15:40	**Lou Savigny:** Investigating the effect of personality on maternal style in zoo-housed bonobos.
15:45	**Emily Dixon:** Investigating population trends of the endangered Sanje mangabeys (Cercocebus sanjei).
16:30	**Ursula Paredes-Esquivel**: Intergenerational inheritance of early life adversity in owl monkeys.
16:45	**Ian Redmond:** Primates and the UN's Convention on Migratory species.
17:00	Closing remarks



Plenary Speaker



Plenary Speaker: Sarah Papworth



Sarah Papworth is a Reader in the School of Biology at Royal Holloway University of London, where she teaches Conservation Science. She has broad research interests but currently conducts research on human perceptions of the natural environment and Amazonian primate behaviour. She examines behaviour in complex human-animal ecosystems, thus most of her work is interdisciplinary and combines approaches and theory from ecology, anthropology and psychology. She started her career by studying a BA (Hons) in Anthropology at the University of Durham, before completing an MSc in Ecology, Evolution and Conservation and a PhD in conservation behaviour at Imperial College London. After a post-doc at the National University of Singapore, she joined the faculty at Royal Holloway.

Talk Title: **Monkey see, monkey do: How do primates react to humans?**

More information on her research can be found at www.conservationbehaviour.com.



Presentations: 15-minute talks



Connecting landscape, genomics, and climate change to unravel the evolutionary history and the challenges for the conservation of bald-headed uakaris, genus *Cacajao*

Felipe Ennes Silver [1]

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[2] *Mamirauá Institute for Sustainable Development, Research Group on Primate Biology and Conservation, Tefé, Amazonas, Brazil*

Five species of bald-headed uakaris are currently recognised. However, the biogeographic forces behind their evolutionary history were never studied, and the conservation status of these species needs to be reassessed. In this study, I investigate how landscape changes in western Amazonia influenced the geographic distribution, genetic diversity and demographic history of Cacajao. I also use predictive modelling to investigate how habitat loss will impact the future of these primates. I performed a continuous phylogeographic analysis to estimate the ancestral origin of the genus Cacajao. I used ddRADseq (9,303 loci and 58,791 SNPs) to investigate the uakaris' population structure, gene flow, and demographic history. With these analyses, I estimated the flooded forests of the Solimões River as the geographic origin of the Cacajao ancestral, with a species level diversification estimated between 0.7 and 0.4 My. Parameter estimates in the demographic analysis suggest a large ancestral population size of ~438,282 (CI 95%: 487,932 – 712,027), with divergence times between C. rubicundus and the ancestor of C. calvus and C. amuna beginning ~763,009 (CI 95%: 440,471 – 1,204,923) years ago, and a second divergence event between C. calvus and C. amuna occurring ~389,658 (CI 95%: 270,822 – 415,240) years ago. While rivers like Tarauacá, Jutaí, and Negro, were important vicariant agents, the sedimentological and tectonic activity in western Amazonia impacted the population structure, gene flow and demographic history in the middle and late Pleistocene. Deforestation represents 27% (55,510 km2) of habitat loss for bald-headed uakaris under the governance scenario and 83% (82,053 km2) under the business-as-usual. Species from the Tarauacá River (C. novaesi and C. amuna) will be more impacted by both climate change and deforestation. Areas with higher habitat suitability will be restricted to the middle Solimões River in Brazil, and a small area in the north of Peru.

Pulling my hair out? Approaching alopecia in captive nonhuman primates

Mishaal Akbar,[1] Dr Wesley M Burnside,[2] Prof Neil Price Evans [1]

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[2] *Haman Ranch, The Mannheimer Foundation, LaBelle, Florida, USA*

Rhesus macaques (*Macaca mulatta*) are one of the most widely used animal research models. Alopecia, defined as hair loss, is a common multifactorial disorder of captive nonhuman primates. High incidence rates of alopecia have been reported across multiple primate facilities and it is increasingly used as a welfare biomarker due to its association with abnormal behaviour, stress, and idiopathic pathology. Most alopecia research has been conducted on indoor, individually- or pair-housed macaques and, as such, a gap in the literature exists for outdoor, socially-housed animals. Despite environmental enrichment being one of the recommended interventions to improve welfare, its efficacy in reducing alopecia is still unknown. This study aimed to 1) characterise alopecia in outdoor, socially-housed harem breeding groups of rhesus macaques and its association with physiological stress based on hair cortisol concentrations (HCC), and 2) evaluate the efficacy of a supplemental, novel, and rotational enrichment program using multiple modalities to reduce stress and alopecia. On initial examination, the presence of sex skin was significantly associated with higher alopecia scores and HCC in sexually mature adults. Alopecic individuals also had lower HCC in social groups with increased foraging behaviour, but HCC was positively correlated self- and social-grooming behaviours. Despite additional enrichment, mean HCC significantly increased between the initial and post-programme assessments, likely due to changes in pregnancy status; however, alopecia scores were lower after increasing enrichment. Although providing alternate activities to aberrant or maladaptive behaviours does not decrease hair cortisol, it also decreases alopecia severity; thus, a novel enrichment program may be a valid means of alopecia reduction.

Adopting an anthropological perspective to construct community-based conservation of the human-gibbon interface in South-eastern China

Jing-Yu Chen [1]

[1] *Cloud Mountain Conservation*
[2] *Institute of Anthropology, National Tsing Hua University*

Gibbon conservation, as a growing umbrella species concern in China, coexists alongside ethnically diverse rural human populations within specific social-ecological contexts. Over the last three decades, ongoing and evolving human-induced pressures on these areas have resulted in the unsustainable exploitation of natural resources, habitat loss, and declines in gibbon populations. However, these pressures are often oversimplified as a 'development versus conservation dilemma,' lacking a systematic analysis of the social and cultural factors.Drawing from our extensive experience working across Southwest China, we present a case study in Yingjiang County, Dehong Dai and Jingpo Autonomous Prefecture, Yunnan Province, China, which illustrate the various interactions between Skywalker Gibbon *(Hoolock tianxing*) and the local Lisu communities. Our research highlight that the human gibbon interface in China can maintain and support the localization of community-based conservation practice. Furthermore, we advocate for adopting an anthropological perspective into interdisciplinary conservation research that engages social-ecological relationships of local communities, including empowering local female by introducing ecological public affairs fund to transform the traditional up-to-down and male-domination conservation approaches.

Are lemurs special? Considering the importance of lemurs among people living in Tsitongambarika Protected Area, Southeast Madagascar

Claire Cardinal,[1] Mosa Jean Fidele, Ratsimamao Solofo Martial, Giuseppe Donati,[1] Catherine M. Hill [1]

[1] *Department of Social Sciences, Oxford Brookes University, Oxford OX3 0BP, United Kingdom*

With 96% of lemur species classified as threatened in the IUCN Red List, they are a high priority for global conservation efforts. But how does this fit with local people's views about lemurs in rural Madagascar? We conducted qualitative research in two communes in Tsitongambarika Protected Area, using semi-structured interviews and participatory observations to investigate how forest-dependent villagers interacted with and valued two lemur species. Local people have an origin story that tells how humans descended from halo – southern bamboo lemur *(Hapalemur meridionalis*) and variky – red-collared brown lemur (*Eulemur collaris*). Despite this common ancestry, they are among the most harvested animals in the area. We found that the two species of lemur are not considered related as in western taxonomy, and local people hold contrasting views about them. Whereas brown lemurs are valued as a favoured food source, bamboo lemurs are categorised alongside 'pest' species because they enter people's fields to forage on rice shoots. People's practices towards lemurs varied between our two study sites. Where agricultural land was less fertile and conservation initiatives had disrupted traditional livelihoods, farmers trapped bamboo lemurs, despite their meat being considered poor quality. By contrast, where agricultural land was relatively productive and enforcement of conservation rules minimal, farmers were less likely to use lethal methods on bamboo lemurs. Brown lemur hunting is widespread in the areas where enforcement is nominal. Statutory protection of both species had little effect on people's views about them, and only the fear of repercussions influenced their hunting practices. The lack of intrinsic support for lemur conservation in both study sites is likely to undermine the success of the conservation programme. Our research illustrates the need for conservationists to appreciate local residents' complex viewpoints in their socio-cultural context instead of simply assuming the importance of species from a western perspective.

Conservation planning for the Hainan gibbon - understanding interdisciplinary baselines and evidence

Samuel T. Turvey,[1] Heidi Ma, Hui Liu

[1] *Zoological Society of London*

Evidence-based decision-making for highly threatened species that survive within human-occupied landscapes must draw upon information from both ecological and human perspectives, but informed conservation planning can be hindered by variable data quality and availability. The Hainan gibbon (*Nomascus hainanus*), the world's rarest primate, survives as a single remnant population within Bawangling National Nature Reserve, China. Past estimates suggest that this population has experienced a series of bottlenecks and recoveries since the late 1970s, with three successive periods of growth interspersed by population crashes. Recovery has apparently become progressively slower over time, raising concerns over demographic parameters. However, historical population counts are challenging to interpret, preventing a robust understanding of the dynamics of the species' recovery. The last Hainan gibbon population survives within a landscape that also supports low-income Indigenous Li and Miao communities, who have historically used natural resources available within gibbon forest habitat. Local peoples' ongoing interactions with gibbon habitat may be contributing to limited recovery of the Hainan gibbon population, and expansion of gibbon groups close to human communities raises concerns over increased potential conflict. Gibbons are an important component of Indigenous folklore and cosmologies in Hainan, and most respondents from these communities are not aware that species extinction is possible, highlighting the need for tailored outreach and engagement activities that incorporate local worldviews.

Safe haven for the endangered Buffy-tufted-ear marmoset (*Callitrhix aurita*) in Brazil

Vitor Guniel Cunha, Alessandro Antunes da Silva, Leonardo Cerqueira, Vinícius dias Netto, Ricardo Barros de Mello Filho, Heliza Palma Pinheiro Cruz, Bruna Maia de Oliveira, Caio Henrique de Araujo Morelli, Ian Lessa Oliveira, Carlos Eduardo de Viveiros Grelle, Jorge Luiz do nascimento, and Rodrigo Salles de Carvalho[1]

[1] *Programa de Educação Ambiental - PREA - Executive director*
Mountain Marmosets Conservation Program - Coordinator

The Buffy-tufted-ear marmoset (*Callithrix aurita)* is one of the two threatened species cared for by the Mountain Marmosets Conservation Program (MMCP). It lives in the Atlantic Rainforest of southeastern Brazil that was historically deforested to less than 20% of original. Yellow fever outbreaks and allochthonous marmosets taken over its remaining habitat, are two more dreadful hazards that made it to be included in the 25 Most Endangered Primates -2018. Our hypothesis is that without protected areas to act as safe havens for the species it will be doomed to extinction in the wild. Among the actions of the MMCP is a Pilot Project at the Teresópolis Mountains Natural Municipal Park where we are acting on three fronts: a) monitoring native family groups; b) removing invasive marmosets; and c) implementing a solid program of environmental education. Our results: Two family groups of C. aurita monitored; the first test using GPS backpack for family groups monitoring; 6 individuals of invasive marmosets removed; more than 22 local schools reached by our educational program; more than 700 students of different ages reached by our educational program; six days when we were present on public squares presenting the event named Aurita in the Square with informative fliers, banners, speeches and puppet theatre. Our project is one of seven that won funds from a public city tender and has been considered a model project by the local environmental agency. And it is an example for other parks to follow as an active and necessary action to guarantee safe havens for the native free ranging remaining C. aurita. The Buffy-tufted-ear marmoset is still under serious menace needing continuous and stronger efforts to really change its walk towards extinction.

Understanding primate distribution, behaviour and human-primate interactions through group interviews inside and outside protected areas in Guinea-Bissau

Chloe Chesney,[1,2] Elena Bersacola,[2] Kimberley Hockings, [2] Amélia Frazão-Moreira [1]

[1] *PCRIA, NOVA FCSH, Lisbon, Portugal*
[2] *CEC, University of Exeter, Penryn, UK*

With wildlife populations plummeting and continued habitat loss, research investigating local ecological knowledge and how it could be incorporated into typical approaches to wildlife conservation is increasingly vital. Research outside protected areas is important because the majority of primates inhabit areas under no formal protection including over 80% of Critically Endangered western chimpanzees (*Pan troglodytes verus*). This is the first project, to our knowledge, to investigate primate distribution through focus-group interviews and to compare data from the same locations over a 19-year period both inside and outside formally protected areas in southern Guinea-Bissau. Semi-structured, focus-group interviews with photo elicitation exercises were used to collect data in 160 villages including over 2500 participants. The data from 2006/7 and 2022/23 show reported socio-ecological changes over time that are affecting the presence, distribution, behaviour and interactions with humans of ten primate species including western chimpanzees, western red colobus, king colobus and Guinea baboons. Qualitative data were assigned codes and inferentially transformed to expose variables and their relations. Reported spatial distribution data were mapped using GIS. Results include higher reported diversity of primates inside protected areas with less adaptive primate species (such as colobines) reported as absent outside, and more 'negative' reports of human-primate interactions inside protected areas than outside. Our results highlight the need to address human-primate negative interactions within protected areas and develop culturally appropriate community-led conservation initiatives outside protected areas that are based on local ecological knowledge and needs.

Assessing the use of drones for conducting nest surveys of Bornean orangutans (*Pongo pygmaeus*)

Cameron Goodhead,[1,2] Dr Kimberley Hockings,[2] Simon Husson,[3] Dr Hendrik Segah,[4] Adit,[3] Restu Aminullah,[3] Santi,[3] Dr Helen Morrogh-Bernard[2, 3]

1 *University of Durham*
2 *University of Exeter*
3 *Borneo Nature Foundation*
4 *Universitas PalangkaRaya*

A global advancement in technology is rapidly assisting with conservation practises, facilitating new methods to survey wild populations. The potential of drones as a survey tool for threatened primate species is being increasingly investigated and has previously demonstrated considerable promise. In this research, we aimed to evaluate the use of drones for conducting nest surveys of the critically endangered Bornean orangutan (*Pongo pygmaeus*) within the Sebangau National Park, Central Kalimantan, Borneo. We hypothesised that counts of nests surveyed using drones would correlate with nests surveyed from the ground using traditional methods. Nests spotted on the ground were matched to nests spotted from the air by estimating the GPS locations of each nest recorded on both survey types. From 10.2km of nest surveys, a total of 348 orangutan nests were recorded from ground surveys, and 93 nests were recorded on the drone surveys, thus giving detection rates for the drone of 26.7%. The drone spotted an additional 3 nests per km that were missed from the ground surveys, reinforcing previous research that ground surveys may underestimate nest counts for areas. The number of nests spotted from the drone per 500m were significantly positively correlated with the number of nests spotted from ground transects. This indicates that population estimates using drones may be possible, however may be hampered by substantial variation between transects and areas. Age of the nest, nest height, and canopy cover significantly affected the likelihood of detection with the drone. The ease of the methods demonstrated potential in using drones for rapid surveys of areas of difficult areas to access. Nevertheless, further investigation is recommended to highlight any further predictors of nest detectability and to determine the extent of variation between sites and habitats.

Precision in a click: Streamlining video data analysis with segment-anything annotator

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The study of animal behaviour has relied on video data for decades, providing grounds for detailed observations and the potential of the observer being absent during recording. However, video analysis is often labour-intensive and susceptible to subjectivity. In response to these challenges, recent advances in computer vision tools enhance the efficiency and objectivity of automated video analysis including methods in primate research. We present segment-anything-annotator, a publicly available labelling tool based on labelme and segment-anything models, designed for training custom object detection and segmentation algorithms. These models distinguish objects of interest from the background and can follow each of these detections over multiple frames. The tool's utility is assessed by comparing the accuracy and speed of the automated method against manual labelling, utilizing images captured from group-housed Rhesus Macaques (*Macaca mulatta*). In addition, we train a segmentation model based on the labelled images to derive basic measures of behaviour at the group level. Thus, the model finds primates and specific enrichment items in their environment to derive potential behaviours. The results demonstrate the effectiveness of the automated method, revealing higher agreement compared to manual labelling with significantly reduced processing time. These findings underscore the potential of adapting existing tools to automate video analysis in primate studies. The presented labelling tool exemplifies the increasing accessibility and user-friendliness of recent technological advancements, emphasizing their potential to augment primate research methodologies by expediting the processing of extensive datasets in a more timely and generalizable manner. We hope this presentation encourages more researchers to embrace and integrate such tools, fostering advancements in primate research.

Urban adaptation of Hanuman langurs residing in human-modified environments

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Department of Environmental Science, University of Calcutta

Urbanization has had a significant impact on ecosystems and their biodiversity. While some species have become extinct due to habitat degradation, others have exhibited behavioral and life history adaptations to thrive in human-altered environments. Our study focuses on examining the urban adaptations of free-ranging Hanuman langurs (HL) living in an urban area of West Bengal, India. Over the course of 2019 to 2021, we followed a troop of 31 HL and conducted field-based experiments. Our observations revealed that these langurs have developed intentional gestural communication wherein they ask for food from nearby humans using a variety of gestures, which is very similar to human begging behaviour. Their persistence in requesting food continued till they received their desired item. To assess the success of this begging behavior, we categorized it as successful if the langurs obtained the food and unsuccessful if they did not. Notably, we identified eight distinct "begging" gestures, with those involving embracing human legs and pulling their clothes showing a strong correlation with successful begging. Here the adult female langurs had significant involvement in both successful and unsuccessful begging, given that the troop predominantly comprised adult females. Upon observing this highly human provisioned troop, we were intrigued to explore their feeding repertoire. We did a yearlong feeding census which revealed their interest towards processed food items. We conducted a choice-based field experiment, offering them options between "processed" and "unprocessed" food items in 83 experimental trials, of which 74 were included in final analysis. Our results reveal that these HL not only learned to approach "processed" food items but also developed preferences for it, despite their primarily folivorous nature. This shift in their dietary habits and their acquisition of a communication system with humans to access processed food items may have played a pivotal role in their urban adaptation.

Space use and crop foraging by baboons in an agricultural landscape

Ben J. Walton,[1] Andrew J. King, [2] Leah J. Findlay,[1] Russell A. Hill [1]

1 *Department of Anthropology, University of Durham, Durham, UK*
2 *Department of Biosciences, Faculty of Science and Engineering, Swansea University, Swansea, UK*

Many primates living in agricultural landscapes forage on crops. Understanding the spatial and temporal dynamics of crop-foraging is vital to effectively protect crops and to encourage co-existence between people and wildlife. We used high-resolution GPS data (1 Hz) from tracking collars on individuals in two groups of chacma baboons (Papio ursinus) to understand their spatial and temporal patterns of crop-foraging behaviour and space use on commercial farms in Limpopo Province, South Africa. Baboons mostly avoided crop fields which were positioned at the edges of their home range. Man-made water sources were highlighted as a driver of space use, adding to growing evidence that this may be an overlooked factor in human-primate interactions. Visits to crop fields were brief and infrequent and baboons tended to stay close to the field edge, suggesting that the baboons perceived crop fields as high-risk areas. Baboons may flexibly re-purpose existing anti-predator behavioural strategies to exploit food sources in risky anthropogenic landscapes. We discuss how this information can help to inform crop protection strategies such as guarding.

Occupancy patterns of endangered long-tailed macaques (*Macaca fascicularis*) across regenerating and anthropogenic forests on Indonesian Borneo

Susan M Cheyne [1]

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We examined patterns of occurrence of the long-tailed macaque (*Macaca fascicularis*, LTM's) across study areas on Indonesian Borneo characterised by different land use histories and forest changes. We expected that human activities, including logging and hunting, would have a negative effect on the distribution of these monkeys. We also predicted that these monkeys would be widespread across landscapes. We conducted systematic camera trap surveys across eight study sites and analysed data using occupancy modelling. We correlated the relative amount of diurnal activity of LTM's across sites and the impact of different habitat types and anthropogenic disturbance on LTM occupancy. We show that LTM's are limited in their distribution and present across a variety of landscapes. These monkeys are susceptible to anthropogenic habitat disturbance and able to recolonise regenerating forests and that when logging and hunting occur simultaneously, their ranging patterns are severely restricted. This study represents the first available baseline data occupancy probabilities for the LTM's and detection rates were very low across all sites. LTM presence was slightly higher in pristine habitats, but severely decreased at a site with ongoing human disturbance (logging+hunting+fire) and within regenerating forests where LTM's could be coming into contact more with humans. We showed that (1) LTM's in these landscapes are predominantly diurnal, (2) LTM's occur at low numbers and their distribution is frequently far from the forest edge, (3) LTM presence appears to be impacted by anthropogenic disturbance and (4) LTM's presence in protected areas cannot be assumed without robust data. These results support classifying the LTM as globally Endangered on the IUCN Red List and we advocate for further studies on this primate to determine in more detail the distribution, density and range of LTM's across Borneo, not only in areas where these monkeys come into contact with humans.

Personality assessment in zoo-housed siamang (*Symphalangus syndactylus*), including potential applications for management

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Assessment of animal personality is an increasingly applied methodology within the field of animal behaviour, with potential to inform various areas of animal management. Knowledge obtained from these sorts of investigations can inform practices such as the coordination of managed reproduction programmes, with zoos also providing opportunities to further investigate behaviour theories. The authors aimed to investigate whether standardised tools for quantifying primate personality produced determinable results for siamang, *Symphalangus syndactylus*, and also how this assessment of personality dimensions may inform management of an Endangered species. Evidence-based reproductive management in conservation programmes is vital to ensure that goals are met and, as a species with a monogamous breeding strategy, personality may play an important role in pair compatibility as well as associated reproductive and social management.

To obtain data on personality profiles of individual animals, the Hominoid Personality Questionnaire was distributed to all 48 institutions holding *S. syndactylus* as part of the European Association of Zoos and Aquaria EEP (Ex-situ Programmes). Questionnaires completed by familiar animal care staff were received from 24 institutions (50% response rate); providing trait rating data for a total of 77 animals. Validation of the trait rating methodology for this species was carried out through direct behaviour observations, allowing for behavioural profiling of 16 individuals at three institutions from within this sample.

Following assessment of inter-rater reliability, three personality domains were defined through Principal Component Analysis. Significant relationships between sex, age and personality domain scores were identified. The effect of personality, alongside other life history variables such as numbers of transfers between institutions, on reproductive success will be discussed and contextualised with other similar studies. Results obtained from this assessment could provide population managers with an additional tool for informing husbandry and management, and implementing breeding transfer recommendations as part of the One-Plan conservation program.

Why do primates carry?

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Infant corpse carrying is the most prevalent thanatological response in primates, with may hypotheses being proposed to explain this behaviour. Harder to explain is the presence of non-mother carrying, and the carrying of heterospecific corpses, both infant and adult. This study centred on a cross-species experimental test of the mammalian cues hypothesis, which was posited to explain these unusual behaviours. This was conducted through observation of interactions with four different objects, each with a varying number of mammalian cues. The study was conducted at ZSL London Zoo and ZSL Whipsnade Zoo. Six primate species were observed: chimpanzees, western lowland gorillas, white-naped mangabeys, black-capped squirrel monkeys, golden-headed lion tamarins, and ring-tailed lemurs. We found that there is a significant difference between species in the amount of interaction with the objects, with object type having a significant effect on levels of aggressive and grooming behaviours. We also found no differences in behaviours between object types within species, except within the white-naped mangabey and the black-capped squirrel monkey. It was concluded that the range in time spent interacting with the objects could be attributed to neophobic and neophiliac reactions to the novel objects. Age ranges within the different primate groups also likely had a part: the white-naped mangabeys interacted with the objects at a much higher frequency than all other species and contained two adolescent males and a juvenile female.

Behaviour, furnishing and vertical space use of captive *Callimico* (*Callimico goeldii*): Implications for welfare

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Provision of optimal captive care should be supported by species-specific evidence. This industry endorsed study sought to address gaps in knowledge and captive management research for callimico (*Callimico goeldii*), a small South American callitrichid. Observations were conducted across five zoological collections to examine differences in behaviour, investigate vertical enclosure use and to consider possible association between specific behaviours and vertical zones. Significant differences were observed in foraging between collections which were much lower than Best Practice recommendations, although near-wild levels were recorded in one enclosure. At an average height of 2 m, callimico utilized a similar vertical space regardless of overall available height, reflective of their natural ecology. The association between whole food items and increased foraging time, furnishings and locomotion, and deep substrate and diversity of behaviours, offers further species-specific evidence of how the callimico use their captive environment. Our findings complement current EAZA guidelines to support species appropriate care for callimico and has prompted further, ongoing, research which is examining wider callitrichid response to the environment using behavioural, physiological and vocal indicators.

Intergenerational inheritance of early life adversity in owl monkeys

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Early parental deprivation can have long term effects on physical and behavioural health on human and non-human primates, if survived it can lead to a lifetime of reduced immunity, behavioural disorders and increased mortality. Laboratory experiments show some parental deprivation effects and behaviours can be inherited by next generations. In captive owl monkeys (*Aotus nancymaae)*, premature maternal rejection can occur spontaneously. Without veterinary rescue, this form of early life adversity is lethal and with veterinary rescue owl monkeys can survive, but suffered from increased infections. In this study we analyse behavioural and physiological and epigenetic consequences of of this exposure across two generations on a captive breeding colony of owl monkeys in Peru. We demonstrate that individuals rejected by their mothers prematurely display different stress responses, display alterations in epigenetic profiles (DNA methylation and microRNA), reduced lifespan. Furthermore, their offspring shows behavioural and molecular alterations suggesting inheritance of effects across generations.

Primates and the UN's Convention on Migratory Species

Ian Redmond [1]

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The UN's Convention on Migratory Species (CMS) provides a legal framework for countries along the routes taken by migratory species to collaborate in their conservation. The 133 countries that are parties agree to coordinate actions to protect species listed on the Appendices of the convention. To be listed on CMS Appendix I, species must be classed as threatened or endangered and "a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries".

With the exception of some nomadic human communities, primates are not normally considered to be migratory; and yet some species do meet the legal definition under the terms of the convention. The first to be listed was the Mountain Gorilla in 1979 because of some groups' movements in search of seasonal food (especially bamboo) across the borders of Rwanda, Uganda and DRCongo. Western gorillas were listed in 2005 and chimpanzees in 2017.

Appendix II of the CMS is for species that would benefit from a treaty or MoU to improve their survival chances. Gorillas and chimpanzees are on both Appendices. Gorillas benefit from the CMS Gorilla Agreement, negotiated by all ten gorilla range states, which came into force in 2008 and so far eight of the countries have ratified it.

The CMS has pioneered the importance of conservation of animal culture and in 2020, agreed to a Concerted Action on the conservation of nut-cracking culture in West African chimpanzees, on the grounds that this could confer a survival advantage in the face of climate change. A proposal has been tabled to expand this Concerted Action to encompass cultural diversity of chimpanzees across the 21 range states. This will be discussed at CMS CoP14 in February 2024.

Primatologists studying other primate species whose range spans international boundaries might usefully consider whether their study animals meet the legal definition of migratory, and whether a proposal to list them on the CMS Appendices might enhance their survival chances.



Presentations:
5-minute speed talks

How disturbed are the disturbed ones? Impacts of anthropogenic stressors on the socio-ecological interactions of Terai Gray langur (*Semnopithecus hector*) in Shivalik Hills, Outer Himalayas, India

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This study investigates the socio-ecological impacts of anthropogenic factors on Terai Gray langurs in the Outer Himalayas' Shivalik landscape. Comparing langur troops in Rajaji National Park (protected) and Shivalik Forest Division (disturbed), the study analyses feeding, movement, and behavioural ecology of these old-world monkeys.

Four comparable-sized langur troops, two in each habitat, were examined. In undisturbed habitats, langur troops allocated more time to resting (43%), feeding (19%), socializing (17%), and moving (14%). Conversely, disturbed habitats saw reduced resting (30%) and socializing (11%) time, with increased feeding (29%) and moving (26%) activities. Affiliative and agonistic interactions were analysed using social networks, showing distinct patterns among age-sex classes in both habitats. Undisturbed troops exhibited higher affiliative interactions and fewer agonistic interactions than disturbed troops.

Dietary analysis revealed differences in plant part consumption. Troops in disturbed habitats consumed 83% of plant parts, while undisturbed troops consumed 68%. Holoptelea integrifolia was prominent in undisturbed habitats, while Ehretia laevis dominated disturbed ones. Lopping in disturbed areas impacted major langur diet plants, including Acacia catechu, Anogeissus latifolia, Terminalia bellerica, and Terminalia tomentosa. Behavioural differences were noted in canopy usage, with disturbed troops using lower canopies (38%) and ground (32%), while undisturbed troops used middle (34%) and lower canopies (32%). Disturbed troops exhibited more ground movement (57%) compared to undisturbed troops (65%). Daily travel distances varied, with disturbed troops covering more ground (winter: 1.45±0.07 km, spring: 2.48±0.14 km) than undisturbed troops (winter: 0.9±0.1 km, spring: 1.35±0.12 km). Home range sizes mirrored these trends, with disturbed troops having larger ranges (winter: 2.98 km2, spring: 3.42 km2) than undisturbed troops (winter: 2.25 km2, spring: 1.37 km2). In conclusion, anthropogenic disturbances significantly impact the socio-ecology of Terai Gray langurs. The observed adaptations underscore the primates' resilience to human-induced environmental changes, emphasizing the importance of understanding these dynamics for effective conservation strategies.

Mandrills and microbes: characterising the mandrill scent-gland microbiome and its potential role in olfactory communication

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Olfactory communication uses the release and reception of semiochemicals to convey information about the releasing individual's state such as sexual maturity, dominance rank and group membership. The effects of chemical signals on receiver behaviour have implications for reproduction, by influencing mate choice (sexual selection). Primates harbour a diverse array of microorganisms both on and in their bodies, many of which have co-evolved with the host to facilitate metabolic pathways that the host alone would be unable to use. For example, the fermentation hypothesis holds that microbes inhabiting scent-glands digest secretions, producing odour signals. Mandrills (Mandrillus sphinx) are one of the few catarrhine species to possess scent-glands, which produce odour that differs with age, sex, male dominance rank, group membership, and possibly individual identity. We aimed to determine the composition of the mandrill scent-gland microbiome and investigate how composition differs with the same traits as odour does, as well as with glandular activity. We collected 120 skin swab samples from the scent-glands of mandrills living in a large, semi-free ranging mandrill colony in Franceville, Gabon. We isolated genomic DNA from these samples, then used 16S rRNA amplicon sequencing and bioinformatic analyses with QIIME2 to determine bacterial composition and diversity measures. At the time of writing analysis is ongoing. Across subjects the mandrill scent-gland is dominated by four phyla: Firmicutes (47.6%), Bacteroidota (16.5%), Actinobacteriota (12.9%) and Proteobacteria (11.9%). We also identified multiple genera present in the scent-glands of other mammalian species including Staphylococcus (9.8%), Prevotella (9.1%), Lactobacillus (3.4%), Corynebacterium (0.4%), Fusobacterium (0.3%) and Anaerococcus (0.1%). This first description of the mandrill glandular microbiome tests the potential for microbiota to mediate signals used in sexual selection, the capacity for hosts to control the composition of their microbiome, and the co-evolutionary consequences of this symbiosis in relation to signalling theory.

Societal perceptions and interactions between Barbary macaques and residents in Gibraltar, and the potential for citizen science to play a role in their management within the Upper Rock Nature Reserve

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This research focuses on the complex relationship between humans and Barbary macaques in Gibraltar. The study seeks to explore the perceptions, behaviours, and interactions of both residents and tourists with the macaques, shedding light on their cultural significance and areas of conflict or harmony. To achieve a comprehensive understanding, this research employs a multi-disciplinary approach. It begins with understanding the social perceptions of macaques amongst Gibraltarian residents. This has been done through an online survey addressing the impact of exposure on perceptions, factors influencing individual perceptions and the understanding of management. The analysis of responses reveals predominantly positive and neutral terms used to describe the macaques, indicating admiration, but also some concerns about potential conflicts and risks. Secondly, this research quantifies the behaviours and interactions between visitors and macaques using behavioural observation methodologies at two key sites; Prince Phillip's Arch and St. Michael's Cave, in the Upper Rock Nature Reserve. These observations aim to provide valuable insights into the dynamics within the reserve and examine the implications of human-macaque interactions. Behavioural data collected through state and event sampling reveal differences between macaque troops at both sites. These variations highlight potential disparities in environmental factors and human presence, which can be crucial for macaque management. Differences in movement and foraging behaviours suggest that the two sites offer distinct conditions for macaque activities. Thirdly, and the current phase, the research explores the perspectives of various stakeholders involved in macaque management. Their insights are crucial for developing effective strategies for sustainable macaque management and conservation. Lastly, the research explores the potential for citizen science to play a role in monitoring and management. The combination of data collected within this research will inform a comprehensive understanding of the current scenario and identify challenges and opportunities for a monitoring and management plan.

Are captive, Red-bellied lemurs (*Eulemur rubriventer*) cathemeral? An investigation into their activity patterns in European zoos

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TThreats to wild lemurs are causing a decline in the population and may have modified their behaviour including their activity patterns as they develop coping strategies via speciation. All wild species of Eulemur studied exhibited cathemeral activity patterns. *Eulemur rubriventer* (Red-bellied lemur) is classified as Vulnerable by the IUCN and is part of the European Endangered Species Programme which aims to establish viable insurance and source populations. Existing research fails to define the activity pattern of *E. rubriventer* in captivity. This project aims to investigate the activity patterns of captive *E. rubriventer* and assess the effect of enclosure design on activity. The hypotheses tested were as follows: there is no difference in their active activity pattern between the 23-hour slots, and there is no difference between the activity of *E. rubriventer* in walkthrough or outdoor enclosures. Camera traps were placed at Yorkshire Wildlife Park (n=2), Zoological Park Calviac (n=2), and Zoological and Botanical Reserve Mulhouse (n=2). Behavioural ethograms were created by noting their activity patterns. A Gaussian GLMM and GLM were carried out in RStudio. Results showed E. rubriventer displaying a diurnal activity pattern with evidence of cathemerality. Significant hours of activity in the lemurs were 6:00 (sunrise), 8:00-11:00, 14:00, 16:00-20:00 and 21:00 (sunset). In the walkthrough enclosures, activity was highest outside of public access hours, and in the outdoor enclosure, activity was highest during public access hours. The peaks of activity correspond with astronomical twilights (crepuscular pattern), providing evidence to suggest that this environmental variable is acting as a zeitberg that controls their biorhythm. By providing captive lemurs with conditions as close to the wild as possible, due to their temporal flexibility, enhanced welfare and husbandry may play a role in the ex-situ conservation and recovery of the species.

Investigating the effect of personality on maternal style in zoo-housed bonobos

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Among primates, differences exist in maternal behaviour between mothers of the same species, that are commonly referred to as 'maternal styles'. In humans, one of the most important predictors of these differences is a mother's personality. Although personality is known to affect many behavioural aspects of non-human primates, its contribution to maternal style remains largely unexplored. Therefore, the objective of this study is to investigate whether personality predicts maternal style in zoo-housed bonobos (*Pan paniscus*). To test this, we collected behavioural data of 26 mother-offspring pairs in 5 different European zoos: Zoo Planckendael (Belgium), Twycross Zoo (UK), Apenheul (Netherlands), Wilhelma (Germany) and Zoo Frankfurt (Germany). Personality ratings were collected by bonobo experts using the Hominoid Personality Questionnaire. We predicted that maternal style would be influenced by maternal scores on three personality traits (Conscientiousness, Assertiveness and Agreeableness), alongside testing potential effects of offspring age, offspring sex and maternal experience. Maternal style was defined by scores on two dimensions: Protectiveness and Rejection. We found that only maternal scores on Rejection were significantly predicted by a mother's personality, with more Agreeable mothers scoring lower on Rejection than less Agreeable mothers. Then, mothers with multiple offspring were more likely to have a rejecting maternal style while mothers with older offspring tended to behave less protective. Mothers were also more likely to be rejecting towards older sons than towards younger ones, whereas the opposite relationship was found for daughters. Our results, despite the small sample size, confirm that personality influences inter-individual differences in maternal behaviour in bonobos, and are in line with findings in humans. The added contribution of offspring age, sex, and maternal experience suggests that maternal style is determined by a complex set of individual characteristics of both mother and offspring.

Investigating population trends of the endangered Sanje mangabeys (*Cercocebus sanjei*) in Udzungwa Mountains National Park between 2011-2018

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'Investigating interbirth intervals, birth and death rates of the endangered Sanje mangabeys (*Cercocebus sanjei)* in Udzungwa Mountains National Park between 2011-2018.'

The endangered Sanje mangabey is endemic to the Udzungwa Mountains in Tanzania, which are located within the Eastern Afromontane Biodiversity Hotspot. This study focuses on a habituated group of mangabeys in the Udzungwa Mountains National Park, a group that has been studied since 2008. Here, we present a large dataset from over 7 years of regular data collection, which includes both census data and troop dynamics.

The main objectives are to investigate interbirth intervals, birth rates and death rates, and understand the variables affecting them. This will help predict population trends leading to population viability analysis, which will be used to make decisive conservation actions, guiding the allocation of funding and targeting specific groups or areas. We will investigate through statistical analysis on R version 4.3.2 using Mann Whitney-U and survival analysis to examine for both trends in population and confounding factors linked to their changes. We expect to see variance in interbirth intervals, birth and death rates based on environmental influences including both with seasonality and ecological succession.



Posters



Assessing the use of drones for conducting nest surveys of Bornean orangutans (*Pongo pygmaeus*)

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A global advancement in technology is rapidly assisting with conservation practises, facilitating new methods to survey wild populations. The potential of drones as a survey tool for threatened primate species is being increasingly investigated and has previously demonstrated considerable promise. In this research, we aimed to evaluate the use of drones for conducting nest surveys of the critically endangered Bornean orangutan (*Pongo pygmaeus*) within the Sebangau National Park, Central Kalimantan, Borneo. We hypothesised that counts of nests surveyed using drones would correlate with nests surveyed from the ground using traditional methods. Nests spotted on the ground were matched to nests spotted from the air by estimating the GPS locations of each nest recorded on both survey types. From 10.2km of nest surveys, a total of 348 orangutan nests were recorded from ground surveys, and 93 nests were recorded on the drone surveys, thus giving detection rates for the drone of 26.7%. The drone spotted an additional 3 nests per km that were missed from the ground surveys, reinforcing previous research that ground surveys may underestimate nest counts for areas. The number of nests spotted from the drone per 500m were significantly positively correlated with the number of nests spotted from ground transects. This indicates that population estimates using drones may be possible, however may be hampered by substantial variation between transects and areas. Age of the nest, nest height, and canopy cover significantly affected the likelihood of detection with the drone. The ease of the methods demonstrated potential in using drones for rapid surveys of areas of difficult areas to access. Nevertheless, further investigation is recommended to highlight any further predictors of nest detectability and to determine the extent of variation between sites and habitats.

Self-regulation, emotional contagion and sociality in captive chimpanzees

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Self-regulation - an umbrella term for the ability to control one's behaviour, attention, emotions and cognition- has been well studied within the cognitive literature. Self-regulation is intimately linked to basic emotional processes, and can determine the fundamental ways in which we relate to others. However, little research has addressed the importance of self-regulation for socio-emotional functioning in primates. How self-control relates to basic forms of empathy and the sharing of emotions and behaviours is particularly unclear, and the human literature points to multiple possible relationships. In this study, we explore chimpanzee self-regulation within the context of emotional processes and social skills. We collected data on captive chimpanzees at Edinburgh Zoo (n=12), using a combination of experimental and observational methods. We used multiple measures of self-regulation, including two experimental tasks and naturalistic observations, to assess regulation skills in a range of emotional contexts and ecologically relevant scenarios. We also collected social scan data and observational focals of grooming and play interactions, to analyse social integration and behavioural contagion. Data analysis is ongoing; we are studying individual differences in self-regulation through coding the chimpanzees' emotional responses and behavioural regulation strategies across the tasks and observations. We will compare individual differences in self-regulation with social integration and behavioural contagion patterns. We hypothesise a positive correlation between self-regulation and measures of social success (central social position and high dominance rank), and a negative correlation between self-regulation and behavioural contagion. Studying self-regulation within a socio-emotional framework should elucidate new aspects of this suite of skills and enrich our understanding of the evolution and importance of primate socio-cognition.

Ten years of positive impact of a conservation education program on children's knowledge and behaviour toward crested macaques (*Macaca nigra*) in the Greater Tangkoko Area, North Sulawesi, Indonesia

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In areas where primates are threatened, environmental education interventions are a key way to increase the local population's knowledge of their environment and encourage positive attitudes and habits to preserve the environment and wildlife on a local and global scale. This study assesses the impact of Tangkoko Conservation Education (TCE), the Macaca Nigra Project's conservation education programme, running since 2011 in North Sulawesi for school children, teachers, and the local population. TCE's goal is to help people increase their knowledge of their environment and develop more positive habits and behaviours towards their local environment, especially the Critically Endangered and endemic crested macaques (*Macaca nigra*). We measured the efficacy of TCE's programme for pupils using questionnaires provided one month before and one month after a year-long conservation education programme at school. Pupils' knowledge and behaviour scores increased significantly after their participation in the programme. Their habits score also increased but this increase was not statistically significant. Girls scored significantly higher than boys in terms of positive behaviour towards wildlife. Children participating in the programme more than once seemed to obtain higher scores in their second participation, although the sample size was too small for formal analysis. Despite some limitations, this study demonstrates the positive impact of our programme on young people living in an area where primates are threatened. We hope that this research will inspire similar programmes in Sulawesi and elsewhere by providing methods and activities to help prevent primate extinction.

Unique calls: Investigating the individuality of chimpanzee vocal signatures

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As with human speech, variations in individual vocal signatures have been identified in vocalisations produced by non-human primates, such as in chimpanzees, gorillas and bonobos. Also, research suggests that group membership influences vocal acoustics in primates. However, few studies have examined the acoustic characteristics of individual vocal signatures within and between different populations. Hence, the aim of this study is to investigate individual differences in chimpanzee vocalisations and how they develop in different populations to understand how different factors may shape chimpanzee vocal acoustics. We aim to achieve this by identifying which, if any, acoustic parameters are i.) reliable at discriminating individuals within each call type, ii.) consistent to each individual across different call types and iii) reliable at discriminating between individuals within different populations. This study uses audio recordings which were previously collected from 36 individuals at Gombe National Park, Tanzania (1971–1973), and previously collected from 18 individuals at Chimfunshi Wildlife Orphanage, Zambia (2018). All vocalisation types were pre-identified for each recording and were predominantly laughs, grunts, whimpers and hoos. A total of 17,127 measurements of a range of spectral and temporal acoustic parameters were extracted from the recordings. We expect to be able to discriminate individuals between different types of calls based on certain acoustic parameters and identify consistent patterns of acoustic parameters within individuals across different types of calls. The findings of this study will contribute to the ongoing acoustic research of understanding vocal communication in chimpanzees and help improve our knowledge of the evolution and development of human language.

Refining the monitoring of weight in Rhesus macaques (*Macaca mulatta*): Use of percentile growth curves

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Weight loss is a key metric in animal health and welfare. In laboratory research certain levels of weight loss (5%, 10% and 20%) are part of project licences. However weight loss is usually a calculation that relies on the last recorded weight and fails to capture whether an animal is growing as expected. Juvenile and adolescent animals should still be growing and increasing in weight. In human health, percentile growth curves for weight and other measurements are used to identify whether a child is growing as expected. We propose that percentile growth curves are a more refined way of monitoring growth in rhesus macaques and take into account healthy growth.

We used 15 years of breeding colony weight records to construct percentile growth curves for male and female rhesus macaques (*Macaca mulatta*; 8291 weights in total from 830 macaques; taken between 2008 and 2023). We used the GAMLSS package in R to fit Lamda-Mu-Sigma models to the weights (separate models for males and females). This allows both the plotting of an individual animal's weight across time on the centile growth curves and given an animal's weight and age to calculate a Z-score. We demonstrate with five case studies showing how the percentile curves and Z-scores can be used to capture both weight loss and failure to grow and how events such as removal from natal group and injuries may impact growth. This is now being used on a routine basis in the breeding colony to identify animals with potential weight issues.

Non-invasive psycho-physiological techniques to measure affective states in free-ranging Japanese macaques (*Macaca fuscata*)

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To navigate our complex social world, humans have evolved rich socio-emotional capacities which have deep evolutionary roots. Studying the evolution of emotional processes in our primate relatives offers an opportunity to understand their unique behaviours, and to comprehend how physiological and psychological processes evolved in our own species. An emerging technique, infra-red thermal imagery (IRT), offers an opportunity to study socio-emotional processes by non-invasively monitoring physiological changes in the autonomic nervous system via facial temperature changes. Thus far, studies using IRT in free-ranging animals are limited to chimpanzees, with findings suggesting that competitive/high-intensity social events lead to lower nasal temperatures as compared to cooperative/low-intensity, showing higher nasal temperatures. This study addresses this imbalance by using IRT to investigate emotionality and its link to social behaviour in a captive population of free-ranging Japanese macaques at Affenberg Landskron (Austria). Being a social and despotic species, Japanese macaques behavioural patterns are strongly impacted by linear dominance hierarchies and rank, especially during periods of high competition including the mating season. My project explores the relationship between macaques emotional responding, as measured using IRT and behavioural markers, and key social events within their daily lives. Through focal behavioural observations of 13 adult macaques (>4.5 years of age; 6 males, 7 females), I am investigating the impact of agonistic behaviours, allogrooming and social feeding on the occurrence of self-directed behaviours, a behavioural marker of anxiety, nasal temperature and respiration by using IRT. I test the hypothesis that anxiety-inducing events lead to conspicuous changes in nasal skin temperature, respiration, and the occurrence of SDB, with an influence of social affiliation and rank. The on-going data collection will be presented, with a focus on the using a multi-methods approach to understand primate affective states.

Drivers of exotic plant use in Eulemur

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The inclusion of exotic plants into primates' diet can be used as a measure of their ecological flexibility. The genus *Eulemur* (brown lemurs) have been documented displaying considerable ecological flexibility, however the drivers of this flexibility remain unknown. We sought to determine potential factors that influence the proportion of exotic plants in *Eulemur* diets. To investigate this, we filtered an existing database containing observations of 'lemur food plant' use across Madagascar, and added additional variables for each entry on *Eulemur*, totalling 10 *Eulemur* species over 26 publications. We ran a generalised linear mixed model to determine which variables affected the proportion of exotic plants in *Eulemur* diets. Our results highlighted annual rainfall, protection status of the study area, and observation hours as significant factors, however there were no significant differences in exotic plant use between the different species of *Eulemur*. We conclude that the underlying influence of this proportion is likely the availability of exotic plants due to the protection status of the study area, coupled with the overall ecological flexibility of the genus, rather than individual species' propensities. This highlights the importance of continued conservation efforts in protected areas, as well as demonstrating the flexibility of *Eulemur* in modifying their diet to include exotic food plants in a range of habitats.

Elevated hair cortisol and decreased hair testosterone indicates chronic disruption of the HPA/HPG axis and is reflective of poor welfare in Rhesus Macaques used as performing (dancing) monkeys in Pakistan

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Throughout South and South East Asia it is common to see monkeys being used in public entertainment as Dancing Monkeys (DM). In Pakistan, native rhesus macaques are captured from the wild during infancy and trained using negative reinforcement methods to perform for public entertainment. This study aimed to quantify and compare physiological stress in 50 DM with 77 controls from an outdoor harem- housed colony of captive rhesus macaques, and to assess whether certain behavioural indices observed in DM were reflective of physiological state. DM had significantly higher hair cortisol concentrations ($t(77.358)=-2.8099$CI(-0.519,-0.088), $p<0.01$, $d= 0.531$) and lower hair testosterone concentrations ($t(66.6)=4.917$, 95CI(0.474, 1.1108), $p<0.0001$, $d=1.16$) compared to the controls. Linear modelling indicated that hair cortisol was positively associated with fear and ectoparasite load, and negatively associated with ectoparasite presence. Hair testosterone was negatively associated with aggression and body welfare and positively associated with abnormal behaviour. The results were assessed relative to semi-structured trainer interviews to better understand observed negative physiological and behavioural markers indicating stress and hence poor welfare. Overall, the results exemplify the merit of using a two-fold biobehavioural approach for assessing welfare and indicate that DM are under chronic physiological stress which is associated with negative behavioural outcomes.

Assessing significance of a museum primate collection: A case study on the Osman Hill specimens

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Museum primate collections can be an important resource that provide a wealth of anatomical, morphological, and ecological data. However, their value to research is dependent on the information associated with the specimens. This study considers the historical significance and biological value of specimens collected by one individual, William Charles Osman Hill (1901-1975). Described as a founder of comparative primatology, Hill amassed a considerable collection of predominantly primate material over his career. Today 1300 specimens and 2500 histological slides reside in the museum collections at the Royal College of Surgeons of England. While many museum primate specimens comprise of skeletal preparations, Hill's specimens also include fluid preserved bodies and dissected soft tissue which have the potential to provide a greater range of biological data than skeletal material. However, Hill's original catalogues no longer survive, and the accuracy of subsequent catalogue data had been unverified. As part of this research a dataset of evidence is being created to test the accuracy of current records and enhance the information associated with the collection. This collates data from a variety of sources including the specimens, labels, archival records, surveys, and interviews. Current results from analysis of the dry specimens showed some inaccuracies in the current catalogue records which could affect how a specimen is used, and how it should be cared for in the future. We recommend that users of museum specimens do not assume that all known data is included in catalogue records and that the level of cataloguing should be asked about before conducting research. The study also highlights the value of interdisciplinary data demonstrating for example, how interviews with individuals who have worked with the collection in the past can record knowledge that may otherwise be lost.

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