The content of this text is in natural language and is not a table or diagram. It provides information about membership fees, council members, working party convenors, and other details about the Primate Society of Great Britain. The text also includes the contents page for the June 2011 issue of the Primate Society of Great Britain's journal, Primate Eye.
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Impact. Yes, I admit, on its own it looks very much like a team name from *The Apprentice*. But for most of us in the academic field, it has a specialised meaning. The Research Excellence Framework (REF) evaluation (upon which our research funding depends) census date is rapidly approaching and we are thinking more and more about impact. This is because an important factor considered in REF is the degree to which our research makes an impression on the world outside the ivory tower. Although considered in its previous incarnation (as the Research Assessment Exercise), an important difference introduced in REF is that this must go beyond sheer recognition; a well-rehearsed media campaign resulting in a few lines in the popular press is not sufficient. We are now asked to provide evidence that our research has caused documented change in the ‘real world’.

Now, if you’re like me, the so-called real world has little appeal. I visit it, on occasion, but I prefer academia. Not just for the long holidays, mind; more for the freedom to explore. Provided I churn out a sufficient number of publications in refereed journals and secure adequate funding along the way, I am more or less allowed to follow where my curiosity takes me. And it’s led me to some fairly interesting places, which, if one can judge from the number of citations of those published works, others have found intriguing (or at least useful), as well. But, the overwhelming majority of folk who find it interesting are others who work in academia; few outside of my scientific peers will be familiar with what I do. Thus, any attempt to identify areas in which my research has affected the non-academic populous seems pointless. This begs the question of why the government feels the need to ask for such ultimately useless documentation.

The answer comes from what can be termed a ‘verificationist bias’ that has crept into our culture over the last half-century. Increasingly, a business model has been applied to non-business enterprises, such as education and public health. As soon as this commercial viewpoint is utilised, thoughts will turn automatically to ‘value for money’ assessments of ‘investments’ and, to calculate such value, ‘outcomes’ must be explicitly identified. Thus, targets are produced and paper trails must be established to verify that they are met. Intangibles, such as increasing knowledge and enriching culture, cannot be addressed within such a paradigm, and so are ignored. And what better way to see if the taxpayers’ money is being used efficiently than to prove that the projects it sponsors change things ‘on the ground’? This then leads to decisions based on the model – why teach wishy-washy things like history or animal behaviour, which don’t even produce any real-world outcomes that can be measured in the system, when you can use the same resources to train up some engineers who can build a better bomber? As we all know from statistics, applying an inappropriate model produces nonsensical and/or misleading results.
But, this isn’t the full story. One of the outcomes of the process of thinking about impact is to focus the mind on how our work may be useful to those outside the profession. This is especially true for conservation, for example, where studies often produce recommendations, but there may be little uptake on such proposals. By forcing researchers to concentrate on how their work might change the world in a small way, the REF’s emphasis on impact may affect how we might change the emphasis of what we do, or at least move us to work harder to engage with our ‘real world’ colleagues on the application of our research. It may be the only small silver lining of the very dark cloud of impact.

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After an energetic introduction by PSGB president Kim Bard, conference participants were treated to speaker Simon Bearder (Oxford Brookes)'s discourse on the joys of life-long fieldwork and the wonders of nocturnal primates (including what may be two newly discovered species of rondo galago). A splitter as opposed to a lumpers, Bearder's descriptions of live-tapping, biopsies and photography gave strength to his argument that taxonomy is “required before studies of behaviour and ecology”. Alongside the close-up slides of male reproductive anatomy, Bearder also tantalised his audience with the statement that he and his colleagues soon hope to be revealing the “Ur-Bushbaby”. He spoke movingly of the direct impacts of forest destruction, making the clear link between conservation and public recognisance of diversity, and emphasised that the concentration on species variation is a good tool to combat environmental destruction (even for lumpers). This fine beginning was followed by lunch and dessert (which itself featured what numerous conference attendees within my earshot described as the best cake they had ever tasted, so it was not just our intellectual appetites that had been whetted).

Next up was the positional behaviour in wild Bornean orangutans, presented by Abigail Philips (Birmingham). In this talk on locomotor behaviour, Philips displayed her background research and the answers to whether larger orang-utans use thicker supports and suspend more frequently (yes and yes).

Philips's conference presentation was followed Vernon Reynolds (Oxford) on adaptations made amongst Budongo chimpanzees to the loss of sources of sodium. Chimpanzees make holes at the bases of dead raffia palm trees, and pith as a source of sodium is then extracted, and it was pointed out that there is competition amongst chimpanzees for this pith. Though raffia palm only fruits once (at 20 years of age), the tobacco farmers are cutting down the young trees (thus the sodium source). There is currently an un-enforced ban on raffia, and it was emphasised in the talk that the BCFS is strongly promoting the use of cotton. In the meantime, chimpanzees have started feeding on the dead wood of *Cleistopholis patens* (it was pointed out that this is not a new chimpanzee discovery, but one which is being made much more use of, recently). Reynolds talked us through the methodology and laboratory analysis of the dried wood residuals, including the mineral content. The presenter personally tried eating the dead one, and informed us that it didn't taste of salt, though added that perhaps chimpanzees could taste it, since as human beings we are very spoiled for salt (!).
Pleasantly salt-saturated, we were further stimulated after this point by the student poster presentations, all done to the nerve-wracking countdown stopwatch overhead. Fortunately, it was not necessary for session chair Russell Hill to wrestle anyone to the ground, as all of the oral poster presentations were made within good time – and, even under such countdown pressure, the presentations were lucid and intriguing.

Thus whetted, we moved on to Harvard’s Alex Georgiev, who talked us through the sociality of the Kokolopori bonobos, making the point that amongst the bonobos there may well be aggression, but no lethal aggression.

Phyllis Lee (Stirling) was the final invited speaker for the first day, with the talk entitled “Why Tinbergen Studied Fish”. Lee spoke movingly and convincingly of elephant behaviour, and reminded us all that it is important to look at other taxa when studying life history amongst other social animals, for similarities and abstractions as well as differences. Elephants, with their fission-fusion societies, long lives, slow life histories and large brains, are therefore particularly relevant for primatologists (alongside cetaceans and social carnivores), and anyone not convinced of this fact certainly was by the end of Lee’s presentation.

Lee’s talk meant we finished the first day’s presentations on an up-note, and the poster session meant a further chance to mingle and distil new ideas. At the evening’s social event, the evening drinks were followed by dinner and the primate-themed quiz, where many teams were fooled by the trick question regarding the Beatles’ (primatology-themed) longest song title, as they remembered the Johanson Lucy-discovery anecdote and thus answered “Lucy in the Sky with Diamonds” – the correct answer being “Everybody’s Got Something to Hide Except for Me and My Monkey.” Curses! (Er, I mean, congratulations to the winners!)
The second day of the conference started with invited speaker Matthew Bennett, from the University of Bournemouth, who helped us visualise our ancestors’ environmental context as he spoke of sediments and landscape in terms of anatomy and gait, and drew our attention to the fact that fossilised footprints aren’t as rare as commonly perceived – they just haven’t been recognised as such – for example, the footprints left in “fantastic quantities” in a Namibian Holocene site. Alongside an explanation of the advanced scanning equipment used (including pSPM, new software that identifies tendencies within print populations), Bennett explained how information is deduced from what would have been sub-aqueous and sub-aerial environments (where swimming pygmy hippos and wading hominins once passed by). Of particular footprint significance was Ileret near Lake Turkana with its *Homo erectus* prints.

Next up was Nienke Alberts (Roehampton), who spoke of the socioecology and spatial associations in olive baboons, pointing out that those troops that crop-raid have denser social networks. The talk was clear and informative, and she wowed us with a stunning presentation. Alberts was followed by Steven Chance (Oxford), who discussed recent research involving the human brain and cognition, including the mini-column lateralisation that is absent in non-human primates. The videos shown were particularly intriguing to the audience, as they supported Piaget’s observations on child categorisation methods. Mark Adams (Edinburgh) presented next, speaking
on genetic effects and repeated measures, and showed us very distinctly the importance of statistical analysis (in this case, R). Emily Lodge of Roehampton then spoke on energetic status amongst Nigerian olive baboons and its relation to the balance in behaviour, physiology, growth and longevity, amongst other traits. She asked whether urinary c-peptides and calculated energy accurately measured indicated energetic status, and her conclusion was that yes, it did.

Richard McFarland (Lincoln) then spoke on reconciliation amongst wild Barbary macaques, and this was a captivating presentation on the inequality of relationship investment between victims and aggressors: we were informed that it is actually victims who tend to repair social relationships, rather than the inverse (whereas “aggressors use reconciliation to gain access to social benefits; i.e., grooming”).

At this point, the Poster Prize was presented to Hannah Jones from the University of Chester, who won with a poster co-authored by Alison Fletcher entitled “An assessment of the use of bouts and frequencies to measure lateralised hand use in naturalistically-housed chimpanzees.”

Poster prize recipient Hannah Jones receiving her award from President Kim Bard

Lunch followed, and the invited speaker Christophe Boesch from the Max Planck Institute in Leipzig spoke on chimpanzee culture and the use of camera traps in observing different cultural expressions in different
chimpanzee groups. Boesch began by speaking of the goal of making primatology a “hard science”, and pointed out that the most-studied primate is, of course, the animal called human, and that additional animal culture studies are “fragmentary” and therefore under-estimated. Boesch explained how he and his colleagues used camera traps on non-habituated chimpanzees, and we watched the mesmerising acquisition of underground honey by the Loang chimpanzees, as Boesch went on to discuss cumulative cultural transmission in chimpanzees, arguing that such complex honey extraction in the videos that we watched, for example, were strong evidence of such cumulative cultural evolution, and that the pounding techniques displayed were also cumulative. Boesch ended by calling for an expansion of such camera trap studies, and pointed out that “human uniqueness is less important than learning about evolutionary developments.”

Isabelle Winder (York) was the next to speak and she lucidly and engagingly linked primate foot anatomy to ecology and tectonic influences in primate/hominin evolution, and discussed how foot anatomy is epigenetic, and can be studied within this framework. Kit Opie (Oxford) followed Winder, and spoke of the evolution of pair-living in primates via quantitative phylogenetic methods, particularly in terms of infanticide, and displayed the different routes towards pair-living, some with previous infanticidal models (and some without, although he asserted to audience laughter that “once in pair-living, there is no route out”). Opie drove home the point that there has been infanticide right from the start of primate evolution.

Miguel Pita (Universidad Autónoma de Madrid) was next up, and presented his work on the estimation of human-chimpanzee DNA homology using whole-genome research, which showed a citogenetic identity of 80 percent (CHECK!) homology between the compared-species genomes, a study which obviously was of great interest to many present. Alexander Weiss of the University of Edinburgh then spoke on epidemiology and personality and subjective well-being in orang-utans, and suggested not only that unhappiness might make you ill, but also that “happiness” may be an evolved marker of genetic quality, at which most audience members found themselves self-consciously grinning widely.

With this happy conclusion, the Charles A Lockwood Student Prize, awarded to the best student podium presentation, and inspired by Lockwood’s “thought, dedication and inspiration”, was presented to Nienke Alberts from Roehampton University for her talk entitled “Troop differences in patterns of spatial association and social interactions in olive baboons (Papio hamadryas anubis) in Gashaka-Gumti National Park, Nigeria.”
Lockwood Prize winner Nienke Alberts is presented with her medal by President Kim Bard

The raffle and the closing remarks by PSGB president Kim Bard, and the many thanks given to the University of Liverpool hosts, concluded an inspiring and sparkling two days.

Kathleen Bryson
University College London
INVITED SPEAKER: Shining a light into the darkness: the advantages of life-long fieldwork

Simon K. Bearder
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In some cases the modern primatologist may need to take a step back and reunite with the early naturalist/taxonomists as our paths increasingly converge. With the accelerating erosion and removal of natural ecosystems by humans for short-term commercial exploitation, many species of plants and animals are facing the risk of extinction, including those that have yet to be named. Despite the wealth of scientific studies of the Order Primates from an early date, modern primatologists are still uncovering species and genera at a surprising rate. This paper summarises the experience of the author in discovering the true diversity of galagos or bushbabies in 18 African countries over the last 43 years. Genetic sequence comparisons, although still quite preliminary, show that these nocturnal primates are not particularly closely related. For example, some species have not shared a common ancestor for as long as 30 million years. Yet living representatives...
may look almost identical, both in the wild and in captivity, to the extent that species from different genera may not be distinguished even by experts. The result is that specimens of different species in museum collections may have been given the same name and correct identification in the field requires specialised knowledge. Fortunately vocal profiling provides a rapid, indirect and ethically suitable means of identification and selected morphological characteristics of each vocally distinct species can be traced back to museum specimens. The application of a powerful set of new techniques has caused a burgeoning awareness of new species, but this is just tip of an enormous iceberg that has far-reaching implications for our understanding of species diversity, taxonomy and phylogenetic relationships, giving new meaning to the term crypto-zoology.

The development of positional behaviour in wild Bornean orangutans (P. p. wumbii): Using lasers to investigate the effects of body growth
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Keywords: Orangutan, ontogeny, positional behaviour, locomotion
Orangutans (Pongo spp.) are the largest predominantly arboreal mammal and have a diverse repertoire of positional behaviour (locomotion and posture) which allows them to travel and forage within the complex and fragile forest canopy. Orangutan life history is characterised by an extremely long immature phase during which orangutans slowly acquire their arboreal skills. During this prolonged period of immaturity, young orangutans experience changes in body mass and limb length that affect the way they interact with their habitat and therefore must adjust their positional behaviour accordingly. Here we investigate the effects of growth and development on the positional behaviour of wild orangutans. When studying wild orangutans it is not possible to take body measurements (e.g., limb length) directly, therefore this study used a non-invasive photographic technique whereby parallel laser beams provided a scale bar from which to take measurements. Data collection was carried out for 1 year at Tuanan Research Station, Central Kalimantan, Indonesia. The study was a cross-sectional design with 17 subjects including adults of both sexes and immature orangutans aged 1 to 11 years. Behavioural data were collected using 1-minute instantaneous sampling of positional behaviour and support use. Results show that orangutan growth is correlated with positional behaviour, specifically the level of suspensory behaviour decreases with body size. Support use variables: type, diameter and number of supports used also showed ontogenetic correlation. Patterns of positional behaviour and support use found by this study help explain how growth and skill acquisition shape the positional behaviour of orangutans during ontogeny.
Adaptation to loss of a source of sodium in Budongo chimpanzees

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Keywords: Chimpanzee, adaptation, sodium, Budongo forest, conservation

In recent years chimpanzees (Pan troglodytes schweinfurthii) of the Sonso community, Budongo Forest Reserve, Uganda have progressively lost a prime source of sodium due to removal of Raphia farinifera palms from the forest by tobacco farmers. We report on a change of feeding habits by these chimpanzees from dead pith of Raphia farinifera to dead wood of Cleistopholis patens. Analysis of the sodium content of Cleistopholis samples by inductively coupled plasma optical emission spectrometry shows levels of sodium which are lower in concentration than those found in Raphia but significantly higher than those found in other local plant samples tested. We conclude that the Budongo chimpanzees have successfully adapted to loss of one source of sodium by replacing it with another.

Seed-eating, diet and energetic balance in wild bonobos at Kokolopori, DRC

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Keywords: Kokolopori, bonobo, C-peptide, Guibourtia, seed-eating

We compared the feeding ecology of the Hali-Hali community of bonobos (Pan paniscus) at Kokolopori, a new field site in the Democratic Republic of Congo, between two periods five months apart. During the first study period (SP1: Nov & Dec 2006) bonobos relied heavily on the dry seeds of Guibourtia (Caesalpiniaceae), mostly eaten from the ground. The second period (SP2: Jun & Jul 2007) was characterized by high consumption of ripe tree fruit. Terrestrial herbaceous vegetation (THV) contributed little to the diet in either study period. Low amount of ripe fruit and high reliance on seeds in the SP1 diet was associated with high cortisol production and low levels of urinary C-peptide in females, suggesting nutritional stress. However, female gregariousness was not constrained during the fruit-poor period, because high seed abundance on the ground probably ameliorated scramble feeding competition. This is the first description of extensive seed-predation by bonobos. It suggests that bonobo plant diets may be more similar to those of chimpanzees than previously recognized. Additionally, this is the first study to report on measures of urinary C-peptide and energetic condition in wild bonobos. Our results, albeit preliminary, agree with previous work validating the applicability of this bio-marker to studies of wild ape physiology and nutrition. Our use of C-peptide sampling on
filter paper at a remote location where refrigeration is not available highlights the potential of a low-cost field protocol for efficient monitoring of physiological condition of ape populations in the wild.

INVITED SPEAKER: Why Tinbergen studied fish
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Primatology straddles disciplinary boundaries among comparative cognition (psychology), socioecology, reproductive biology and ethology (biological and biomedical sciences), and comparative evolution (anthropology). It is often useful for modern primatologists to take stock of their approaches and try to understand primates as just one of many mammal species with common problems of survival, reproduction and adaptation. I will present some results from a long-term study on African elephants to illustrate the ways in which disciplines can blur across their boundaries and distinctive approaches, and to illustrate where primatologists as individuals may end up.

INVITED SPEAKER: Lake front to dunescapes: tracking our ancestors
Matthew Bennett
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A key part of being human is our 'bipedal' posture. Its evolution was a critical stage in our evolution. Its development proved such an asset that it transitioned from early habitual bipeds such as *Australopithecus africanus* to more modern humans like *Homo erectus* and *Homo sapiens*, which were, and are, endurance walkers and runners. Our ancestors' ability to walk efficiently influenced how they foraged and hunted for food, how they gathered raw materials for tools and how they migrated across the globe. But despite more than a century of research, our understanding of the function of the modern foot is still relatively poor and our knowledge of our ancestors' feet is even more uncertain. The foot is a complex structure of 22 bones held in place by a lattice of soft tissue. It interfaces with the ground to create pressures which decelerate, balance and accelerate the body during walking and running. Little wonder this complex machine has not given up its secrets easily. Added to which fossil foot bones are rarely found with skeletons of known species and the fossil record is fragmentary. More importantly, fossil foot bones rarely give a definite indication of how our early ancestors walked, since they act through a series of complicated soft tissues which are not preserved. As a result some of us believe that human footprints provide a better record of the function of our ancestors’ feet; in fact we would argue that they provide a record of 'fossilised motion' since the prints directly record the forces our forebears applied to the ground to balance and propel their bodies. As a field scientist I have spent the last five
years working on this premise, developing novel excavation and recording techniques designed to provide footprint data for anatomists and biomechanical modellers such as the team here at Liverpool led by Professor Robin Crompton. This paper explores some of the challenges involved in the field-based study of footprints with specific reference to the second oldest footprint site reported in 2009 from Northern Kenya where I was involved in excavating prints attributed to Homo erectus. Using these prints and a range of other footprint sites in Africa the paper explores the sedimentological controls on footprint preservation and the role of substrate in mediating the preservation of anatomical and kinematic data within footprints. The scope of future research and the challenges faced are explored.

Troop differences in patterns of spatial association and social interactions in olive baboons (Papio hamadryas anubis) in Gashaka-Gumti National Park, Nigeria

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Keywords: Olive baboons, spatial association, social interactions, social network analysis, weighted network metrics

Understanding how ecological conditions affect spatial organisation and social relationships is a key goal in primatology. Here, we use social network analysis to compare patterns of spatial association and social behaviours between two troops (Gamgam & Kwano) of wild olive baboons in Nigeria. The two troops differ in ecology: the Gamgam troop ranges just outside Gashaka-Gumti National Park, they supplement their diet with local crops, and experience a higher perceived risk of predation (predominantly from humans); the Kwano troop ranges inside the park, and consequently is wild-feeding and has much less contact with humans. We collected data over a 12-month period on spatial associations and rates of grooming, grunting, agonistic and affiliative behaviours, and used these data to construct social networks. We found a marked difference in association networks of the two troops. The network of the Gamgam troop was denser and more compact than that of the Kwano troop. Gamgam baboons had closer associations with, and were associated to, a greater proportion of their troop. Networks based on social behaviours followed the same pattern. For example, Gamgam grooming and grunting networks were denser, more compact, and individuals interacted with a greater proportion of their troop, even when the potentially confounding effects of spatial associations were controlled for. This indicates that Gamgam baboons maintain closer social relationships than those in Kwano, which may be due to increased food availability and/or levels of predation risk. Consequently, this study provides insights into how local ecology may affect primate social relationships.
Anatomy of the cerebral cortex reveals selective expansion of microcircuits in chimpanzee prefrontal cortex but greater difference between brain regions in humans

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Insights into primate cognitive capacities may be gained by examining the underlying brain structure. We have recently shown that the microscopic columnar organisation of neurons in human cerebral cortex relates to cognitive ability and IQ, and that these minicolumns are wider in humans compared to primates with smaller brains. Studies in other primates have found correlations between cognition and minicolumn organisation in prefrontal cortex that are specific to this brain region. The differences between regions are therefore assumed to relate to differences of function. The present study measured minicolumn organisation in the dorsolateral prefrontal cortex (DLPFC) and several temporal lobe regions, in human (Homo sapiens) and chimpanzee (Pan troglodytes) brains, to assess the differences between species. Post-mortem microanatomy was studied in 68 humans, and 14 chimpanzees. Minicolumns were wider in humans than in chimpanzees. In humans, wide minicolumns were found in DLPFC with a range of variation across other regions and the narrowest minicolumns in primary auditory cortex. In chimpanzees, there was very little regional differentiation except for DLPFC which contained markedly wider minicolumns than other regions. The species difference suggests that there has been a selective expansion of the minicolumnar units of cells (microcircuits) in the prefrontal cortex in chimpanzees, whereas in humans there is a more fine-grained hierarchy of regional differentiation. The greater neuroanatomical differentiation between cortical regions in humans, compared to chimpanzees, may relate to species differences in brain regional gene expression.

That’s my family, that’s not me: genetic effects and repeated measures

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Primatologists have begun turning to multilevel modelling to make better inferences while capturing the structure of their data. These models are often applied when the assumptions of ordinary linear models are violated, such as pseudo-replication where repeated observations of an individual are not statistically independent. When studying primate troops, observations of different individuals may also not exhibit complete statistical independence because of shared genes and rearing environments. Multilevel models that can separate genetic from environmental effects have been developed and
are readily applicable to study populations where pedigree or microsatellite data are available. I explored the power of these models using simulated and actual primate pedigrees. Even if heritability and genetic correlation estimates are not of chief interest to the researcher, neglecting these additional sources of non-independence can lead to biased inferences and overconfidence in the precision of parameter estimates. Pedigree-based power analysis and multiresponse models should be part of the modern primatologist’s toolkit when studying multigenerational samples.

**Calculated energy balance and urinary c-peptides: a comparison of methods for assessing the energetic status of Nigerian olive baboons**

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**Keywords:** Energy balance, C-peptide, baboon, food enhancement

In recent years the analysis of urinary C-peptides has been used to quantify the energetic status of great apes in a number of settings. C-peptides are a by-product of insulin synthesis and their analysis in urine provides a sensitive, non-invasive indicator of individual energetic status, with high levels indicating positive energy balance. Despite its potential for assessing health and condition in wild primates, the applicability of this technique to wild monkey populations remains virtually untested. Data presented here address this issue by comparing the daily energetic status of female olive baboons (*Papio hamadryas anubis*) using two methods: Urinary C-peptide analysis and the more established, but time-consuming, method of Calculated Energy Balance (determined by combining behavioural observations of food intake and activity budgets with published data on the costs of primate activities). Calculated Energy Balance values for individuals were compared with C-peptide values from urine samples collected on the same day. The effects of food enhancement, season, reproductive state and rank on energetic status were assessed for both measures. Evidence for within individual correlation between the two measures was found but there was no overall correlation. Both measures varied significantly between seasons but in different ways. Food enhanced animals exhibited significantly higher Calculated Energy Balance, under certain conditions, but not higher C-peptide levels. Conversely, rank and reproductive state had a significant effect on C-peptide levels but not on Calculated Energy Balance. Reasons for the disparity in results are discussed including problems associated with storage and reconstitution of dried urine samples.
Repairing relations or reaping rewards? The differential benefits of reconciliation in wild Barbary macaques
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Keywords: Reconciliation, conflict management, aggression
Reconciliation is defined as the postconflict attraction of former opponents in the minutes immediately following a conflict. An increase in postconflict anxiety is linked to both uncertainty surrounding renewed aggression and disruption of the opponents’ social relationship. The aim of this behavioural study was to explore the benefits of reconciliation from the perspective of the victim and the aggressor independently in wild Barbary macaques, Morocco. Data were collected using the PC-MC method. Our results suggest that reconciliation holds differential benefits to the victim and aggressor. Anxiety was lower following reconciled conflicts compared to non-reconciled conflicts in the victim but not in the aggressor. Moreover, high quality relationships from the victim’s perspective were more frequently reconciled than low quality relationships, whereas no such relationship was observed for the aggressor. However, aggressors appeared to use reconciliation, or indeed aggression itself, to gain access to grooming opportunities: aggressors received significantly more postconflict grooming than victims, at proportions higher than baseline levels. This suggests that aggressors might trade reconciliation and subsequent social tolerance of the victim, in exchange for grooming. Our results suggest that reconciliation functions differently for victims and aggressors: victims appear to use reconciliation to repair damaged social relationships, whereas aggressors appear to use reconciliation to gain access to other social benefits such as grooming.

INVITED SPEAKER: Chimpanzee culture and camera traps
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Culture is one of the central concepts proposed to distinguish humans from other animal species. However, by definition, culture rests on our ability to grasp the full extent of socially determined behavioural differences existing in one animal species. Since Homo sapiens remains today the most studied animal species, we have to presume that animal culture is still widely underestimated. One way out of this is to use remote observational methods that have the potential to decipher the breadth and diversity of cultural traits in one species. Chimpanzees have been studied extensively by following habituated individuals from long-term field projects, but recently such knowledge has been complemented by the use of video traps that allow for detailed behavioural observations of non-habituated individuals. This has allowed for important progress in our understanding of the cultural
behavioural variation in the central African chimpanzee, which has for decades been unstudied and therefore was very badly known. New data gained in this way from the wild chimpanzees living in Loango National Park, Gabon, or Goualougo Triangle, Congo, have helped reveal that some proposed unique traits of human culture, like cumulative cultural evolution and sequential tool sets, can spontaneously emerge in wild chimpanzees. I am predicting that more implementation of such approaches with more new chimpanzee populations will extend our knowledge about wild chimpanzee culture and help us to define the uniqueness of human culture.

Linking primate foot anatomy, ecology and landscape use
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Keywords: Foot anatomy, locomotion, landscape use, emergence, adaptation, epigenesis

Landscapes were important elements of the selective environment that shaped the evolution of primate (and human) locomotion. However, they are also complex combinations of interacting biotic and physical components, difficult to describe in the present and challenging to reconstruct in the past. This presentation reports work that aims to link extant primate foot anatomy, ecology and landscape use to provide a basis for exploring hominin evolution. It uses a substantial dataset of measurements on eight tarsal and metatarsal bones in 13 species of non-human primate - including the African hominoids and a range of Old World monkey taxa with varied ecological and phylogenetic histories (120 specimens) - as well as modern \textit{Homo sapiens} (150 specimens). A key finding of the early stages of this work is that a simple model of foot anatomy as adapting to selective pressures exerted by the physical environment is unrealistic. Primate anatomies seem to arise through a complex synergy of interacting (co-evolutionary) factors. Foot anatomy is epigenetic – influenced by interactions between development, phylogeny, genetic exchange, body mass, behaviour and ecology, as well as substrate use - and can be investigated within such a framework. I am using the anatomical data collected already to find interesting patterns and generate testable hypotheses about their origins. These hypotheses help identify additional smaller case-studies of primates from specific habitats or landscapes that could possibly be used to characterise the emergent pattern and complex causal factors more accurately and explore interaction effects.
The evolution of pair living in primates
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Keywords: Primates, pair living, phylogenetics, bayesian methods, infanticide, parental care
Pair living is relatively rare among mammals due to the physiological constraints of gestation and lactation. Nevertheless, pair living has evolved independently in all of the major primate radiations. A number of hypotheses have been proposed for the evolution of this mating system among primates: that it is a defence against infanticidal males; that it arose because of the benefits of male parental care; or that males are forced into a mate guarding strategy because females are dispersed. To date these competing hypotheses have not been tested using quantitative phylogenetic methods. Here we test the validity of these competing hypotheses for the evolution of pair living using Bayesian Markov Chain Monte Carlo methods. This enables direct testing of alternative evolutionary scenarios, describing how traits arose and coevolved. We used a large set of phylogenetic trees, based on genetic data, covering 230 primate species. Data on mating systems, paternal care and infanticide were taken from the literature for these species. We use Bayesian methods to infer the model of evolution for primate mating systems and to test for correlated evolution with infanticide risk, paternal care, and mate guarding. We then evaluate the support for the alternative hypotheses for the evolution of pair living. We suggest that some traits may act as drivers for pair living, whereas other traits represent secondary transitions following the initial move to this system. Thus, we provide the first quantitative evaluation of evolutionary models of pair living.

Estimation of human–chimpanzee DNA homology using comparative whole-genome research
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Keywords: Genome homology, highly repeated DNA sequences
Several methods exist to estimate DNA sequence homology between species based on comparison of particular regions (mainly codifying genes) of the compared genomes. We developed an innovative approach to estimate species homology which main contribution compared to all existing methods is employing every sequence on the genome simultaneously, instead of just particular genome regions. It proceeds establishing a competition between two independent DNA fluorescent probes harbouring the two compared-species genomes, to hybridize over denatured lymphocytes nuclei in a whole-comparative genomic hybridization (W-CGH) protocol. Digital image analysis of probes proportional contribution to the resulting hybridization and application of a
Citogenetic Identity rationale formula, provide the percentage of homology between the compared genomes. The method has been tested to compare human and chimpanzee whole-genomes revealing a high degree of divergence between the two species, mainly caused by differences in highly repeated DNA sequences. This situation had remained unrevealed to the date because this type of non-codifying DNA sequences had never been compared between any primate species. Altogether this approach has allowed us concluding that this particular sequences show a high mutation-accumulation rate between human and chimpanzee.

Melding epidemiology and differential primatology research: personality, subjective well-being, and longevity in orangutans (Pongo spp.)

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Keywords: Orangutan, personality, happiness, well-being, health, mortality
Epidemiological studies have found that individual differences in cognitive abilities, personality, and subjective well-being are related to important health outcomes, including mortality. Most impressive in this area of research are multiple studies showing that higher intelligence, conscientiousness, and happiness are linked to longer life. Similarly, studies of rhesus macaques have shown that personality traits in nonhuman primates are related to disease progression. We sought to determine whether personality or subjective well-being in 174 orangutans (Pongo spp.) was related to longevity. Each orangutan’s personality was assessed via rating on the Hominoid Personality Questionnaire; positive effect was assessed via four questions based on human measures of subjective well-being. We used discrete time survival analyses to test whether personality dimensions or subjective well-being are related to survival over periods ranging from three to seven years after ratings. Even after controlling for sex, age, species (Sumatran, Bornean, or hybrid), and number of life events. Higher subjective well-being was significantly related to reduced mortality risk. No similar effect was found for any of the orangutan personality dimensions. These findings indicate that ostensibly “subjective” measures may reflect objective health. These findings are suggestive with respect to the evolution of happiness. One possibility consistent with previous findings in humans, chimpanzees, and orangutans is that happiness is a marker of genetic quality and evolved via sexual selection. The null findings with respect to personality may be explained by the absence of a conscientiousness dimension or the conditions of captivity, including health monitoring and prompt medical care.
Abstracts for poster presentations

Conserving the world’s rarest ape: investigating the factors constraining the recovery of the Hainan gibbon (*Nomascus hainanus*) in Hainan, China

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Keywords: Gibbon, conservation, population, China, ecology, genetics

Threatened species conservation requires an understanding of the causes behind species decline, and the intrinsic and extrinsic factors that constrain population growth. Conservation management based on one of these components alone is insufficient, but this has largely been the case for the world’s rarest ape, the Critically Endangered Hainan gibbon (*Nomascus hainanus*). This species has been restricted to a single population of c. 20 individuals or less for the last 30 years, found only in 15km² of suitable habitat within Bawangling National Nature Reserve, Hainan, China. Limited previous research on the species means the evidence-base for conservation action is severely inadequate, and management planning has been predominantly founded upon an understanding of only the factors responsible for the decline of the species. There is still little systematically obtained information on the gibbon’s current ecology and biology. However, various ecological, behavioural, genetic, and/or anthropogenic factors may be acting (and interacting) to constrain the recovery of the last surviving population. In order to elucidate the role and relative influence of these possible ongoing constraints and inform on-the-ground management action, this project focuses on collecting new field data and information on the species’ spatiotemporal resource use, behavioural ecology, and genetic diversity. However, for a species such as this, where substantial cultural, logistical and political barriers affect both data robustness and implementation of future management plans, it is necessary to expand our approach to consider the way in which the broader conservation science framework may enlighten the development of a sound conservation recovery strategy.

Hand preferences in 94 bonobos (*Pan paniscus*) for a variety of actions: spontaneous daily actions, tool-use, begging gestures and the "tube task"

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Keywords: Bonobos, hand preference, laterality, brain lateralization, evolution, handedness
The literature on manual laterality in nonhuman primates provides inconsistent and inconclusive findings; and is plagued by methodological issues (e.g., small samples, inappropriate measures, comparability issues) and gaps. Few data are available on bonobos and these are only from small samples and for relatively simple tasks. I examined hand preferences in a large sample of bonobos, for a variety of actions. I studied 94 bonobos from three zoos (Twycross, Stuttgart, Apenheul) and one sanctuary (Lola Ya Bonobo). Five studies were performed to record hand use for: 1. spontaneous daily actions (non-social). 2. the “tube task” that requires a precise, bimanual coordinated manipulation. 3. using a stick as a probe (similar to “termite fishing”). 4. spontaneous social actions and gestures (intra-specific). 5. induced begging gestures (begging for food from the observer). The results show significant manual laterality in almost all the behaviours studied. Laterality was particularly marked in studies 2, 3 and 5. The preferences were present on an individual basis, with similar numbers of right-handed and left-handed individuals. There was no group-level bias. There were no effects of the settings, rearing history, sex and age (except in study 2 where adults were more right-handed). We considered several factors that have been proposed as selective pressures for the emergence of handedness. Laterality was influenced by: postural demands (posture, activity of the other hand), precision (grip type), manipulation, bimanual coordination, tool-use and communication. The results are discussed in relation with theories on the evolution of human handedness.

Intra-species and predator vigilance among samango monkeys (Cercopithecus mitis labiatus) in the Soutpansberg Mountains, South Africa

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Keywords: Cercopithecine, guenon, predation, competition

How does vigilance vary spatially in a group of arboreal monkeys? This project seeks to utilise alarm-calls, inter-group interactions and vigilance behaviour to address the question of how threat is perceived spatially throughout a home range. Sixteen months of field work were completed in December 2010, in which 1300+ contact hours were clocked with a wild habituated group of samango monkeys. Regular conflict was observed with at least three other groups, whilst a constant predation threat existed from crowned eagles (Stephanoaetus coronatus) and African black eagles (Aquila verreauxii). This project will take a novel approach, by mapping a “landscape of vigilance”, which will shed new light on how predation and competition influence the primate foraging/risk trade-off.
Does YouTube imperil the slow loris? The impact of social networking sites on the conservation of Nycticebus spp.

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Keywords: Nycticebus pygmaeus, Lorisidae, pet trade, Southeast Asia

Nycticebus (slow loris) is a legally protected genus consisting of five species (listed as CITES Appendix I and Endangered/Vulnerable on the IUCN Red List) found to be in high demand within Southeast Asia for pets, meat and traditional medicine. The Internet is now playing a central role in the activities of illegal wildlife traders world-wide and is identified as one of the main smuggling tools for illegal trade. The extreme difficulty of breeding slow lorises in captivity means they provide an excellent avenue for exploring the illegal pet trade on social networking sites, as most pet slow lorises will have been wild-caught. Here we focus on a popular YouTube video that has promoted slow lorises as pets to more than 6 million viewers. We analyse more than 4000 comments, categorising them into pro- and anti- “slow loris as pet” comments. We also analyse more than 10,000 ‘like’ and ‘dislike’ votes of the video. Overwhelmingly, observers liked the video and a statistically significant portion of them were in favour of keeping slow lorises as pets. Those who voiced their dislike or pointed out the illegal nature of the video were in general met with vitriolic and aggressive comments. Our results highlight the universal deficiency of knowledge relating to the scale and impact trade may have on protected primates like the slow loris. We also discuss the potential negative and positive impacts that viral social networking may have on their conservation.

An assessment of the use of bouts and frequencies to measure lateralised hand use in naturalistically-housed chimpanzees

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Keywords: Laterality, handedness, measurement, chimpanzees

As laterality research has progressed, doubt has been shed on the validity of the two most common measures used to collect data: (1) bouts, where only the first occurrence of series of movements is recorded until an intervening behaviour occurs; and (2) frequencies, where every occurrence of a behaviour is recorded, even if it is performed repeatedly. It has been claimed that recording frequencies increases the likelihood of discovering population-level hand preferences. However, it has also been claimed that bouts could under-represent hand preferences. The aim of this study was to compare resultant hand preferences for data collected using both bouts and frequencies, and to explore which, if any, behaviours would be most affected by the measurement of lateral bias. Data were collected from ten
adult (five male, five female) at Chester Zoo between October 2008 and February 2009. Hand use for spontaneous manual behaviours was recorded in both bouts and frequencies simultaneously. Results show that differences do occur in resultant hand preferences, with more individuals showing significant preferences when data were recorded in frequencies, with these preferences also tending to be stronger. In addition certain behaviours were more highly affected than others. It was concluded that data recorded using either method should be interpreted with caution in the future, especially for highly affected behaviours. Ideally, until a more accurate measure is developed and tested, researchers should record laterality data using bouts and frequencies in order to ensure that the conclusions of their research are accurate and to enable comparability between studies.

Identifying personality from the faces of humans and chimpanzees: evidence for a shared signalling system
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Keywords: Evolution, signals, face, personality, chimpanzee
Many aspects of personality are honestly signalled on the human face. Previous research has shown accurate identification of socially-relevant information from static images of unknown faces with neutral expressions. Here, we examined the evolutionary history of this signal system. In four studies, we investigated accuracy in perceiving extraversion-related characteristics from chimpanzee (Pan troglodytes) faces using both forced-choice and ratings tasks. In addition, we explored whether the ability to accurately perceive human extraversion showed any relationship with performance on these tasks. We found that untrained human observers reliably discriminated characteristics related to extraversion solely from non-expressive facial images of chimpanzees. Observers were also able to accurately perceive extraversion in humans but performance on these two tasks was not correlated. In chimpanzees, as in humans, there is information in the static, non-expressive face that signals aspects of an individual’s personality. We suggest this cross-species ability to receive information is best explained by shared personality structure and signalling in the two species. However, there also appears to be a more uniquely human aspect to the system.
Defining oscillatory behaviours in orangutans: a new method for the classification of positional behaviour

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Keywords: Clustering analysis, primate, locomotion

Oscillatory behaviours (e.g., tree sway) are used by orangutans (Pongo abelii) to cross gaps in their arboreal habitat, but appear to be used only by the great apes due to their large body mass. Tree sway has been found to be an energetically beneficial mode of locomotion for orangutans, and yet the body postures that facilitate the movement have yet to be recorded or defined. We developed a new method based on a form of movement notation, Sutton Movement Writing (SMW), to record the spatial arrangement and use of limbs, and support use during this unique and vital behaviour. Biomechanically similar positional behaviours (locomotion and posture) are usually grouped based on the judgements of the observer, but the use of SMW provided an opportunity to cluster the data more objectively based on key traits. Clustering analysis was employed to quantitatively group the behaviours observed based on their similarities. Limb position, the proportion of weight borne by a limb, the method of weight bearing and torso orientation were the input traits for analysis. Dendrograms were then created and relevant groupings established using homogeneity analysis. Overall, clustering analysis appears to provide a method by which positional behaviours can be grouped successfully, although it seems particularly appropriate for static postures. Furthermore, this method has the potential to assess the fine-scaled relationships between postural behaviours, habitat variables (e.g., support compliance) and behavioural context to further our understanding of how arboreal primates utilise their complex habitat.

Occupancy modelling as a method for assessing detectability of highly vocal mammals

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Keywords: Hylobates pileatus, Potos flavus, Cardamom Mountains, La Suerte, density

Field investigation of rare species in logistically challenging habitats (mountainous terrains, at night) requires an approach that balances available resources for study effort with the study goals. Occupancy is a species population state variable that assesses the proportion of a landscape at which local abundance of a species is >0. As a possible surrogate for density, often requiring substantial effort, occupancy provides insight into
The adoption process of a hand-reared chimpanzee infant - a behavioral study of a captive group

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Keywords: Adoption, introduction, care-giving behaviour, chimpanzees, adaptive explanations

Rejection of neonates among non-human primates occurs occasionally in the wild as well as in captivity. In captivity, controlled adoptions of orphans and introductions of individuals into new groups are thus sometimes necessary. However, behavioral research on introduction procedures and on the acceptance of infants by adoptive mothers is scarce. In this study, the introduction and subsequent adoption were examined of a one-year-old hand-reared female chimpanzee (Pan troglodytes) into a captive group of conspecifics at Furuvik Zoo, Gavle, Sweden. Continuous focal data (108 hours) were collected over nine consecutive weeks, including frequency and time dedicated to infant handling, display towards group members. In addition, data on the infant’s secure base behaviour patterns were examined by proximity to an attachment figure, bout frequency and duration. An adult primiparous female chimpanzee adopted the infant and thus an attachment figure shift occurred from human to chimpanzee. However, the female initially showed very limited interest in the infant. It was, in fact, two other younger female group members who showed most interest and cared for the infant at first. The infant’s secure base behaviour patterns show that the infant became more secure as the integration progressed. This study shows that an adopter does not necessarily initially show interest and that there is a behavioural flexibility in displaying maternal motivation in adult chimpanzee females. These findings contribute to a better understanding of introduction procedures and attachment in chimpanzees.

Comparative anatomy, morphology and biomechanics of primate and human lower limbs

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Keywords: Comparative anatomy, human evolution, great apes

The range and morphology of the human bipedal gait is of great interest and forms a popular research topic. Current theories on bipedality and development of the foot, arches are based mainly on bone morphology, specifically drawing on the fossil record. To further investigate the foot structures, a range of extant great ape species and humans are being assessed to assess soft tissue morphology. The results will include gross anatomy and muscle architecture data, muscle fibre typing, and biomechanical analysis of a key structure in the foot the plantar species population dynamics and habitat requirements. Through a statistical likelihood approach, we investigated the population of two mammal species, specifically accounting for the probability of detection the piloted gibbon Hylobates pileatus of southwestern Cambodia and the bushbaby-like kinase lemur Potos flavus in Costa Rica. The aim of our study was to assess their overall occupancy and detectability as estimated by repeated detection/non-detection surveys. H. pileatus was detected at a total of 29 sites out of 82 producing a naïve probability of occupancy of 0.44; P. flavus was detected at 19 sites out of 29 producing a naïve probability of occupancy of 0.66. Detection data led to be an efficient approach for elucidating the spatial distribution and habitat requirements of the two species. Our results support the use of occupancy modelling as a means of increasing the naïve detectability and estimation of protected species in difficult habitats. Since our surveying method required only a relatively short visit to each fixed point, repeated surveys are possible, thereby allowing for the incorporation of detectability into our analysis, a factor particularly important in primate habitats where visibility is often low.

Analysis of levels of illegal primate trade using data from Ecuadorian animal rescue centres

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Keywords: CITIES, wildlife trade, conservation

Wildlife trade is one of the leading threats to biodiversity conservation. While international trade is regulated and monitored through the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), data on domestic trade are often difficult to obtain. In South America the off-take of primates for bushmeat has been estimated to involve millions of individuals a year but levels of primate traded alive are not readily available. We obtained access to one of the largest datasets on trade in live animals in any South American country (8920 individuals over a 18-year period). Detailed records from 23 animal rescue centres in Ecuador allowed us to analyse which primates are prevalent in trade, in what volumes, and determine the fate of the individuals that arrive in these centres. Primates are the in the centres (46% of all mammal species, 12% of all individuals) with the most common species being the common squirrel monkey (455 individuals) and the white-fronted capuchin monkey (155 individuals). Some species that are rare in international trade and are on display in few zoos are present in the hundreds in these centres. Infants or juveniles are the most common age-groups in the live primate trade (with often the mother being killed) and indeed > 65% of primates arriving at the centres were under 3 years of age. Despite receiving care and respect, the majority (68) died in the first months due trauma experienced prior to arrival, thus exemplifying primates’ unsuitability as pets.
An interdisciplinary approach to ethnoprimatology: using participatory film-making to explore human-wildlife interactions among the Tikuna Indians of Amacayacu, in the Colombian Amazon

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Using fuzzy set theory to investigate polyadic grooming relationships among captive chimpanzees

Yvan I. Russell

Keywords: Chimpanzee, grooming, fuzzy sets, statistics, social, cooperation

A novel methodology is proposed for the analysis of primate social groups. Fuzzy set theory can provide quantitative information about the social dependence of one individual on another, in relation to the entire group. Instead of mapping one-to-one relationships, this procedure maps one-to-many relations. Whereas classical set theory is limited to crisp set membership (membership of x in set A = 0 or 1), fuzzy set theory allows degrees of membership (membership of x in set A = range 0–1). The latter is more suitable for analysing primate social interactions because primate social relationships (measured as number of interactions) typically follow a pattern whereupon relationships can be classified within a range of 0–1 (depending on number of interactions). Here, fuzzy set theory provides a method for demonstrating that one set can be included within another – applicable to situations for measuring general social dependence of one chimpanzee within the social context of another individual (or clusters of individuals).

Making (PFM), an innovative research method that promotes all-inclusive film-making among local residents, was designed and implemented in two communities, Jatunmán (2010 inhabitants) and San Martín (480 inhabitants) made 60 short films on the Tikuna lifestyle, their environment, and their culture. Women produced films documenting the preparation and cultural re-enactments of local folk stories. PFM proved a thoughtful and sensitive means of surveying highly vocal but rare arboreal mammal species in the two species. Our results support the use of occupancy modelling as a means of assessing species population dynamics and habitat requirements. Through a statistical analysis of the proportion of species in the centre of occurrence of the pileated woolly monkey (Hylobates pileatus) in southwestern Cambodia and the bushbaby-like kinkajou (Potos flavus), we assessed the effectiveness of national parks in conserving non-human primates.

Keywords: Conservation, biodiversity, Wildlife trade, CITES, Flora and Fauna (CITES), data on domestic trade are often difficult to obtain. In this study, we provide an analysis of international trade in primates and its impact on biodiversity conservation. Wildlife trade is one of the leading threats to biodiversity conservation. In this study, we provide an analysis of international trade in primates and its impact on biodiversity conservation.
Maria Thunström1, Mats Björklund1 and Tomas Persson2

behavioural study of a captive group

The adoption process of a hand-reared chimpanzee infant - a

introduction and subsequent adoption were examined of a one-year-old

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adaptive explanations

Keywords: Adoption, introduction, care-giving behaviour, chimpanzees,

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human lower limbs

procedures and attachment in chimpanzees.

These findings contribute to a better understanding of introduction

flexibility in displaying maternal motivation in adult chimpanzee females.

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Fuzzy set theory can provide quantitative information about the social

dependence of one individual on another, in relation to the entire group.

is more suitable for analysing primate social interactions because primate

pattern whereupon relationships can be classified within a range of 0–1

(normal). Here, fuzzy set theory is applied to analyse social interactions

interspersed with data on the age of the orangutans, their sex, and their

combining experience and observation

between chimpanzees A and B, in relation to all others in the group (C, D,

E, etc.). Sets A and B include those who groom chimpanzee A and B,

respectively. Degrees of membership in these sets are assigned according to

...animal rescue centres...
The adoption process of a hand-reared chimpanzee infant - a behavioural study of a captive group

Maria Thunström1, Mats Björklund1 and Tomas Persson2

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Rejection of neonates among non-human primates occurs occasionally in the wild as well as in captivity. In captivity, controlled adoptions of orphaned and introductions of individuals into new groups are thus sometimes necessary. However, behavioural research on introduction procedures and on the acceptance of new infants by adoptive mothers is lacking. The aim of this study was to examine the infant's secure base behaviour patterns by proximity analysis to determine the adoption of an infant chimpanzee by a captive female chimpanzee (Pan troglodytes) into a captive group of conspecifics at Furuvik Zoo, Gävle, Sweden. Continuous focal data (108 hours) were collected over nine consecutive weeks, including frequency and time dedicated to infant-related display of grooming and proximity. In addition, data on the infant's secure base behaviour patterns were examined by proximity to an attachment figure, bout frequency and duration.

The infant's adoption by the adult female chimpanzee occurred 5 weeks following introduction and thus an attachment figure shift was observed. The infant's secure base behaviour patterns show that the infant became more secure in the presence of the adult female chimpanzee than in the presence of other group members. However, the female chimpanzee initially showed very limited interest in the infant. It was, in fact, two other younger female group members who showed most interest and cared for the infant at first. The infant's secure base behaviour patterns show that the infant became more secure in the presence of the adult female chimpanzee than in the presence of other group members. However, the female chimpanzee initially showed very limited interest in the infant. It was, in fact, two other younger female group members who showed most interest and cared for the infant at first. These findings contribute to a better understanding of introduction procedures and attachment in chimpanzees.

Comparative anatomy, morphology and biomechanics of primate and human lower limbs

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Keywords: Comparative anatomy, human evolution, great apes

The range and morphology of the human bipedal gait is of great interest and forms a popular research topic. Current theories on bipedality and development of the foot arches are based mainly on bony morphology. The results include gross anatomy and muscle architecture data, muscle fibre typing, and biomechanical analysis of a key structure in the foot the plantar aponeurosis. Development of the foot arches are based mainly on bony morphology, specifically drawing on the fossil record. To further investigate the foot structures, a range of extant great ape species and humans are being dissected to assess soft tissue morphology. The results will include gross anatomy and muscle architecture data, muscle fibre typing, and biomechanical analysis of a key structure in the foot the plantar aponeurosis.
aponeurosis. The results will allow correlations between different extant locomotor groups to be made, giving further insight into the role of soft tissue structures in supporting the arches of the foot and which muscles are recruited for certain locomotor behaviours. Finally, the soft tissue differences between different locomotor groups will provide further insight into anatomical changes that may have taken place during the evolution of the modern human foot.
Future Meetings

PSGB Winter Meeting 2011 &
4th Annual Bristol Conservation and Science Foundation symposium
1st December 2011

Gardeners of the Forest
Primate Ecology and Forest Conservation
Clifton Pavilion at Bristol Zoo Gardens

2011 is the UN International Year of Forests, celebrating the central role of people in the sustainable development of the world’s forests. The symposium will serve to reinforce the message that forests are vital to the survival and wellbeing of people everywhere. Special emphasis will be placed on apes and the potential role of zoos in helping to mitigate the effects of forest clearance and the demise of primate populations.

Sustainable Palm Oil Debate
30th November 2011

The one-day symposium will be preceded by an evening debate on the complex palm oil problem. Contributors to the debate will include a representative cross-section of stakeholders, such as producers, consumers and conservation groups. It is hoped that the debate will explore the integration of environmental and socio-economic aspirations of stakeholders and aim to identify how primate conservation goals can be integrated into sustainable palm oil production practices.

Delegate Fees

The one-day symposium will be held in the Clifton Pavilion at Bristol Zoo Gardens, starting at 09:45 am and finishing at 5.30 pm. Registration fees are £70 per person, £55 for PSGB Members and £45 for students. Fees include a buffet-style lunch as well as coffee/tea breaks between the sessions and entry to Bristol Zoo Gardens. A list of accommodation in Bristol is available on request. To register, to submit a poster abstract or to find out more, please check our website <www.bcsf.org.uk>, or send an email to <cbryant@bristolzoo.org.uk> or <sdow@bristolzoo.org.uk>.
PSGB Spring Meeting 2012

TBA
Port Lympne Wild Animal Park, Kent

PSGB Winter Meeting 2012

Biogeography
Zoological Society of London, Regent's Park, London

PSGB Spring Meeting 2013

TBA
University of Lincoln
HUMAN AND PRIMATE EVOLUTION

A one-day conference organised by The Galton Institute
Wednesday, 9th November, 2011
at
The British Academy
10-11 Carlton House Terrace, London, SW1Y 5AH

SPEAKERS:

Professor W. Tecumseh Fitch
Language (or culture) Evolution

Professor Robert A. Foley, FBA
Human Evolution and Diversity

Dr Andrea Manica
Human Evolutionary Genetics

Dr Nicholas Mundy
Primate Evolutionary Genetics

Dr Rebecca Sear
Human Behavioural Evolution

Dr Susanne Shultz
Brain Evolution in Primates

Professor Chris Stringer, FRS
The Bones and Stones of Human Evolution

Dr Stephen J. Suomi
Behaviour, Biology and Genetics

Admission is free but strictly by ticket obtainable from:

The General Secretary
The Galton Institute, 19 Northfields Prospect, London SW18 1PE
email: betty.nixon@talk21.com
www.galtoninstitute.org.uk
15th International Symposium on Dental Morphology
Newcastle Business School and School of Law
Northumbria University, City Campus East
Newcastle Upon Tyne, UK
24th August 2011 - 27th August 2011

The 15th International Symposium on Dental Morphology will bring together scholars from around the world to present research in all aspects of dental morphology. The range of presentations will be broad and include topics such as dental anthropology, dental evolution, dental function, growth and development, dental tissues, and the genetics and clinical aspects of dental morphology. The symposium is sponsored by the Newcastle University School of Dental Sciences. A special Conference Dinner will be held Friday 26th August 2011.

- Registration Fee £200.00
- Student Registration Fee £75.00
  (student identification may be requested upon attendance)
- Accompanying Guest, Social Events Only £65.00

Car parking is limited but public transportation from the airport is available (Metro from 'Airport' to 'Manors' approx 30 minutes).

Accommodation is walking distance from the venue.

For further information please contact:

Wendy Dirks
School of Dental Sciences
Newcastle University
Wendy.Dirks@ncl.ac.uk
0191 222 7918
ANNOUNCEMENT: CWP GRANT SUPPORT

The Society is thrilled to announce that Knowsley Safari Park (http://www.knowsleysafariexperience.co.uk/) is once again supporting PSGB conservation studies. After a £1500 donation in 2008, they have now agreed to donate £750 to the Conservation Working Party’s funds each year for the next three years, to help towards a project taking place in Africa. This help is much appreciated by the Society.
Monitoring Orang-utan Reintroduction in Indonesia

Hannah Rose Trayford
<hrtrayford@gmail.com>

Awarded a PSGB grant in March 2009

Reintroduction raises public awareness, increases donor support, relieves welfare issues for ex-captive orang-utans and, perhaps most significantly, boosts the number and distribution of remaining populations. Monitoring this conservation strategy for orang-utans, however, has suffered historically from a lack of coherent documentation, limiting the ability to evaluate, assess, and support this conservation strategy.

The goal of this project was to increase the capacity for monitoring rehabilitant orang-utans after release to the forest in Indonesia. The project was used to initiate a comprehensive study of rehabilitant orang-utans’ behaviour and ecology within the current reintroduction framework; develop, apply, and assess monitoring techniques for orang-utan reintroductions to assist informed conservation decision-making; standardise data collection methods; conduct capacity building of Indonesian research assistants in collecting orang-utan behaviour data; and to demonstrate the reliable and empirical application of science for the successful conservation application of reintroduction. To date, the project has been conducted on a population of reintroduced Sumatran orang-utans (Pongo abelii) in Indonesia and the second field site will be based on a population of reintroduced Bornean orang-utans (Pongo pygmaeus). Data-collection methods were tested for a 6-week period from March-April 2009 at another facility for orang-utans which enabled a detailed ethogram and protocols to be developed prior to the study. Focal observations occur at 1-minute intervals and are conducted for full-day follows. Whilst there is substantial scope for improving monitoring methods and the accuracy with which behaviours of the reintroduced orang-utans are measured, training staff in this capacity cannot guarantee its implementation without continual assessment and guidance. Given the limited number of reintroduction sites for orang-utans, developing means for better assessing the monitoring methods used after release is recommended and these should be transferable between field sites and between reintroduced populations of orang-utans. These measures of reintroduction outcomes are also being assessed in relation to rehabilitation techniques prior to release. The project is still ongoing for another year so final results will be available after full completion of the project.
The BMCRif Education and awareness programme achieved significant success in 2010. The aims of the programme were to increase local awareness regarding the importance of the Barbary macaque and its habitat locally and to explain our work on the Barbary macaque in and around Bouhachem oak forest in Northern Morocco. Funding from the Born Free Foundation (awarded through the PSGB Conservation Working Party) and from PSGB was used to purchase educational materials for lessons in local schools delivered by BMCRif’s Education & Awareness Officer in 2010.

Lessons about the Barbary macaques and their habitat were delivered to three schools in the local area. The children were taught all day in each school once a month (all age levels are taught in one class). Prior to BMCRif’s involvement, the children were given the day off because their teachers had to visit the local markets to buy their provisions for the month (the villages are very remote and this takes most of the day). BMCRif was
approached by one local teacher and asked if we would be interested in stepping in. The first lessons were such a success that two more teachers from nearby villagers requested if we could do the same thing for them. This practice is continuing in 2011 and we are extending it to other villages. The programme also produced an information leaflet for locals around macaque habitat which was read out in every village mosque on the periphery of the forest. Additionally, cloth shopping bags were made by local women and printed with the BMCRif logo, along with t-shirts. The bags are distributed to both men and women in the area. Everyone receiving a bag is told that it is to replace the use of plastic bags, which are discarded in the villages and streams. T-shirts have been distributed to our shepherd informants and are often requested by other shepherds who have seen their friends wearing them. Volunteers wore these t-shirts whilst vaccinating dogs against rabies during the BMCRif Dog Health Programme, thus emphasising the connection between the project, the macaques and a programme benefiting both dogs and people by decreasing the risk of rabies in the target villages.
The BMCRif football tournament involved four schools from three Bouhachem villages. We distributed football shirts to every player. Due to the low opinion people have of the macaques in the area, I was doubtful if the children would wear them because of the monkey on the front. However, they proved very popular and some little boys were so disappointed when there weren’t any left that they burst into tears. They cheered up when we gave them adult t-shirts.

These actions resulted in youths from two villages pledging to stop hunting and killing macaques for sport, locals reporting anybody trying to capture macaques for the pet trade and individual shepherds now preventing their dogs from harassing the macaques in the forest. BMCRif is now extending its work to the other main area of Barbary macaque distribution in the north of Morocco. In the light of the drastic decline of the species in its stronghold of the Middle Atlas Mountains, these northern populations can no longer be ignored, and education and awareness work has a vital role to play in their conservation in this area of Morocco. For more information see our website - www.barbarymacaque.org.

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**LOCKWOOD GRANT PROGRESS REPORT**

**Diurnal primate survey in Nakai Nam Theun National Protected Area, central Eastern Lao, PDR [January to March 2011]**

Camille N. Z. Coudrat
<camillecoudrat@gmail.com>

This is to report on the progress of my research project that I am currently conducting in Nakai Nam Theun National Protected Area (NNT NPA) (Figure 1), as part of a PhD study. The NNT NPA (~3,700 km2) supports an impressive population of threatened mammals and therefore should be regarded as a priority area for Lao wildlife conservation. Nine primate species inhabit the area: Vulnerable pygmy loris (*Nycticebus pygmaeus*), Vulnerable bengal slow loris (*N. bengalensis*), Endangered red-shanked douc (*Pygathrix nemaeus*), Endangered Hatinh langur (*Trachypithecus f. hatinhensis*), Endangered southern white-cheeked gibbon (*Nomascus siki*), Vulnerable pig-tailed macaque (*Macaca leonina*), Vulnerable stump-tailed macaque (*M. arctoides*), Least Concern rhesus macaque (*M. mulatta*) and Least Concern Assamese macaque (*M. assamensis*). The area represents one of the most important sites for primate conservation in Lao PDR. Distribution and status of each of these species remain unknown in NNT NPA. All primate species and other wildlife are threatened in the area because of illegal hunting. This research aims to relate distribution and/or abundance of primate species to anthropogenic factors (proximity to Vietnamese border, proximity to villages, threats encountered, etc.) and to
environmental factors (various vegetation characteristics). Information will help to improve management of the area, notably with prioritization of some key areas. Note that original project was supposed to focus solely on the red-shanked douc monkey (*P. nemaeus*); due to the lack of previous knowledge of the research site, time constraints and hunting occurring, the project now focuses on all primate species in the area. This, however, will help to establish the best areas for a behavioural study of doucs in the future. Basic data of primate detections and threats are presented here.

Fieldwork will be carried out over the year 2011; different sites will be visited at each field trip. From January 2011 to March 2011, I visited three field sites within NNT NPA. All primate species were recorded along transects in Nam Chae zone (“1” in Figure 1), Near Ban Xeuk (“2” in Figure 1) and Maka (“3” in Figure 1).

![Figure 1: Nakai Nam Theun National Protected Area with sites visited from January to March 2011. Transects walked are represented on the Map. 1: Nam Chae site, 2: Ban Xeuk site, 3: Maka site.](image-url)
Northern pig-tailed macaque (*Macaca leonina*)
Only recorded in Nam Chae site – the species was encountered on three occasions. On the 22nd January, 12h03, calls were heard ~300 away from the observers, one of the team members went to identify the species (0529334 E, 1977671 N). On the 25th January, 7h49 and 9h42, the species was encountered twice on the same transect.

Assamese/rhesus macaques (*Macaca assamensis/M. mulatta*)
Only recorded in Ban Xeuk and Maka sites – macaque species were sighted on seven occasions over the period: four times in Ban Xeuk and three times in Maka. Dense canopy and/or distance from the observer did not permit identification of the species. From the colour of the fur and the form of the tail, these only may have been rhesus macaques (*M. mulatta*) or Assamese macaques (*M. assamensis*). Sightings occurred from 735 up to 1051 m altitude. Whenever sighted, the animals would flee from the observers. Remains were seen along a snare track in Ban Xeuk site.

Stump-tailed macaque (*M. arctoides*)
Only recorded in Maka site – one live stump-tailed macaque was caught in a snare along one of the transects in Maka site and was released.

Red-shanked doucs (*Pygathrix nemaeus*)
In Nam Chae site, doucs were encountered on three different occasions. On the 23th January, one group was observed; dense canopy did not allow an estimate of group size (0528580 E, 1978600 N). On the 30th January, 11h21, one group was observed sleeping in trees (0531447 E, 1982407 N). One male made an alarm call at first sight of the observers but the group afterward did not flee. On the 1st February, the same group was sighted three times on the same transect (0533119 E, 1933640 N).

In Ban Xeuk site, doucs were sighted on two different occasions at the approximate same location (1063 and 1043 m altitude), which suggests the same group was sighted. On sightings, the group fled from the observers right away.

In Maka site, doucs were sighted on two different occasions, at two different locations approximately 2 kms apart; the two sightings may be of two different groups. The first sighting occurred at an altitude of 1255 m; the group fled from the observers right away, no alarm calls were heard. The second sighting occurred at an elevation of 770 m. Some individuals fled from the observers while others stayed above us hiding in the canopy for about 15 minutes, some alarm calls were heard during that time. Three juveniles were sighted as well as a mother and its infant on her belly. Group size estimate is 25-30 individuals.
Southern white cheeked gibbons (*Nomascus siki*)
In Nam Chae site, gibbons were heard daily between 6h00 and 7h30 am. Number of groups calling was assessed from each camp with approximate direction of call. Eight groups may be present in the research site covered. The species was never encountered during transect walks.

In Ban Xeuk and Maka sites, no gibbons were heard or seen during the totality of the fieldwork, which suggests their absence from the area covered. When asked, villagers said that they usually hear the gibbons around October-November. One group was, however, heard in the morning from the village Maka Tai, coming from a mountain South-East of the village (area not visited).

**Threats**

Threats encountered in these areas were: snares (either isolated traps or several along a track), people camps, Vietnamese marks on trees. Snares were sometimes old and not functional (although some wires were still hanging on the branch). People using snares may come back every season to put in place old and new wires. Both Vietnamese people crossing the border and people from villages in the area may put in place the snares. Vietnamese people come into the NPA legally or illegally to trade goods (rice, noodles, clothes, gasoline, beer, etc.) with villagers and may get in return wildlife hunted by villagers.

**Preliminary Recommendations:**

- Focus on key areas within the NPA: Resources should be directed to some key areas until these are controlled for illegal activities.
- Control of illegal hunting: Patrouls and law enforcement should be increased and directed to those focus areas; patrolling should be done regularly and along different routes; patrolling teams should be regularly supervised by the area’s management authority; fines should be increased when illegal activity is witnessed; increase patrols along the Lao-Vietnam border to control illegal entry of Vietnamese within the Area.
- Encourage National and International experts and students to conduct studies in NNT and use data collected for management decisions.
- Make Lao products available to villages close to Vietnam border that depend on Vietnamese goods and may trade them with hunted wildlife.
When you first see the cover of this book you realise you are not in for the standard evo-devo affair. Instead of the expected vertebrate skeleton or diagram of bird fingers, there is a rather stunning picture of a centipede. This should tell you straightaway that this book is not going to concentrate on the model species so beloved of developmental biologists, and there is almost no mention of mice or fruit flies within its pages. In fact those wanting to know anything about vertebrates should probably look elsewhere, but if you are interested in some of the marvellous developmental tricks demonstrated by some of the more obscure invertebrate species then this book is a veritable treasure trove. What is less expected is that there is also plenty in here to interest the historian. The background to the descriptions revolves around the personalities and achievements of the great early naturalists of the 17th and 18th centuries. Some of these are familiar names such as Geoffroy and Cuvier, and others less so such as Daubenton and Belon but they are all described with a vivid familiarity that is completely unexpected.

The first section of the book is about forms and numbers. In fact the first two chapters of the book are primarily about the history of the formulations of ideas about body plans. How do we define the ventral and dorsal sides of diverse species? What is homologous and how can embryological investigations help us make sense of this diversity? The organisms range from squid to crayfish and even include plants in the discussion! After this the book turns its attention to the more complex problem of how bodies count. *Scolopendra* species (a genus of centipedes) mostly have 21 pairs of legs, sometimes 23 pairs, but never 22. Why? Sadly there are no answers yet but the importance of the problems to a developmental biologist is clearly spelt out. It is only when we get to the last chapter in this section that the book starts talking about genes in relation to appendage specialisation and even then there is nothing to scare those of us who know very little biochemistry.

Part two delves deeper into traditional embryology and starts discussing evolution and development. Again there is a huge range of example organisms with the main focus now turning to the origins of particular tissues. The various roles of cuticle and the changes from larval to adult forms are discussed with possible evolutionary scenarios offered. I was
fascinated to know that there was an ongoing argument about which end of a tapeworm is actually the head end! It just goes to show that those of us who specialise on vertebrates are missing out on a whole lot of fun.

The final part moves into more traditional territory from an evolutionary point of view. This time looking at parasitoids and competition but always with a slightly different take compared to behavioural ecologists. A whole range of topics get a brief mention: symmetry, novelties, re-use. These are used to try and explain some of the phenomena introduced earlier but it is quite clear that we are still very much in the dark about the processes that lead mammals, for example, to (mostly) reliably have seven neck vertebrae but to have variable numbers of all the other regional vertebrae. The take-home message is that whilst we do have some good ideas about how simple things happen, the link between evolution and development needs to be embraced if we are to make sense of the origin of the complexity of life on the planet. "But a giraffe cannot be reduced to its neck, and its neck cannot be reduced to a series of vertebrae". At some level we need to deal with whole organisms not merely concentrating on the parts in isolation.

Bill Sellers
University of Manchester

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**SEEDS OF AMAZONIAN PLANTS**
Fernando Cornejo and John Janovec (2010)
Princeton University Press
ISBN: 978-0-691-14647-8 (soft cover) £24.95
ISBN: 978-0-691-11929-8 (hardcover) £52.00

For most neotropical researchers, this book will immediately be placed side by side with Marc van Roosmalen’s *Fruits of the Guianan Flora* (Utrecht University Press, 1985). They complement each other wonderfully – Roosmalen provides rather good black and white drawings of fruits, and very few images of actual seeds. Those that do appear are not always that helpful. Cornejo and Janovec provide just the opposite – beautiful colour close-ups of whole seeds, but barely a fruit in sight. There is a splendidly simple and fuss-free key that is not only pleasingly lacking in complex botanical terminology, but is clear enough that my medical student son-in-law (a non-native English-speaker and definitely not a plant person) could use it accurately.

The book is organized alphabetically by family and genus. There is just enough text accompanying each entry to tell you if you have gone wrong. There is no attempt to go to the species level (hardly surprising given the huge number of species involved), so this book is functioning like a very
useful signposting system; a bit like an A-Z it will get you close to where you need to go. After that, you need to ask again.

A slight quibble is the decision not to put a scale in the picture, but to include the size along with the caption (e.g., *Stenostephanus*, Acanthaceae 6.19x4.56x4.12). It also seems that the brief to illustrate the seeds has been interpreted a little too enthusiastically in some instances. Clearly cleaning off the pericarp, aril, and other attendant fruit parts to allow the seed-based key to be used is not going to be too bothersome in many cases – but it is hard to understand the rationale of including only the seeds of orchids (so small that they have to be shown as electron-micrographs and then showing only five representative genera). It should also be pointed out that the ‘Amazonian’ of the title is not the entire Amazon basin (not that you would know that from the jacket blurb), but the Peruvian end of it. Genera outside of this (*Helosis* in the Balanophoraceae, for example) are not represented. Similarly, this is very definitely a book of non-flooded terra firme forests. Exclusively flooded forest genera such as *Panopsis* (Proteaceae) are absent, as are those from white-sand forests. However, these are minor objections to what is a remarkable effort – with 750 photos of 544 genera and 131 families, it is going to save an awful lot of zoologists (including primatologists) an awful lot of plant-related heartache and uncertainty. Botanists too will almost certainly breathe a sigh of relief that their animal-oriented colleagues might now leave them alone a bit more and stop asking for help with identifications.

Adrian Barnett,
Roehampton University

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**EXTENDED FAMILY: LONG LOST COUSINS – A PERSONAL LOOK AT THE HISTORY OF PRIMATOLOGY**

Colin Groves (2008)
Conservation International

This is, as the title implies, a wonderfully individualistic book, and combines wry humour, a splendid grasp of human history, intriguing academic perspectives and an erudition that is envy-inducing both in its depth and breadth.

Beginning with the story of how he began in primatology (in the post-war years when a phone call between supervisors was, it seems, all that was needed to secure a PhD position), Groves takes us on a primate-themed tour of European history that includes what species of primates were known to the Minoans, ancient Greeks, Egyptians and Romans all the way through to present-day academic and social preoccupations with conservation, ethics,
language learning and the debate about whether the genera *Pan* and *Homo* should be amalgamated.

The seven chapters follow a fairly direct historical path, beginning with a combination of etymology, archaeology and superstition, moving on to a treatment of primates that becomes increasingly recognizable as scientific. By chapter three we are discussing Ray, Linnaeus and the early classifications of primates, before moving on to Buffon, Cuvier, Daubenton, Geoffroy St Hilaire father and son, as well as the contemporary and subsequent German and British luminaries of primate classification. There is a masterly grasp of academic genealogies, of conceptual interconnections and how the perception of what primates are and how they are inter-related has been the product of genius, hard work, sudden insight and ferocious academic factionalism. Old enmities are given new perspectives as John Edward Gray-v.-Richard Owen, Huxley and Darwin-v.-Owen, Owen-v.-Darwin and Edward Blyth-v.-seemingly everybody, are discussed from a primatological perspective. Groves’ fine grasp of character comes to the fore again and again, with a telling quote or incident that brings to life the rivalries (often decades long) that helped shape the developing enterprise of scientific natural history and, along with it, what was known about primates and how these facts were interpreted.

Chapter six brings us to the age of imperial exploration, of the rapid expansion of western museum collections, and the giant conceptual leaps in taxonomy required to deal with them. It is also the story of such dedicated workers as Alfred Grandidier who, during a five-year sojourn to Madagascar, filled so many notebooks that publishing the detailed observations occupied most of the rest of his academic life; of Georg Matschie whose adherence to the idea of one-taxon-per-river-basin led to proliferations in described primates and ungulates that took years to rectify and of Walter Rothschild and Major Percy Powell-Cotton, both of whom founded their own zoological museums. From this we move smoothly on to the beginnings of studies of primate cognition and field-based ecology. The Yerkes’ studies are reviewed, complete with charming personal narratives, along with studies by less familiar workers, such as the Russian developmental psychologist Nadezhda Ladygina-Kohts, and the key roles of Carpenter’s work on Thai gibbons and Altmann’s insights on the quantification of behaviour. Reflecting the slightly British slant to the book, there is also plenty about the Napiers, Osman Hill and Le Gross Clark.

There are, along the way, some splendid diversions: of primates in art and in the conscience of ancient civilizations, of the strangeness of the medieval world view where symbolism was all, apes were evil and the Western world’s knowledge of them came from bestiaries that were confections of Greek and Roman writings, spiced with the tales of travellers and fabulists. Following a bent of which he is the acknowledged world authority, Groves
leads us deep into the thickets of taxonomy and nomenclatural practice, succeeding all the while – no mean feat as far as I am concerned – in making the pursuit of paratypes, synonomies and priorities feel like a detective story as fascinating as any of the current crop of crime-scene cop shows. There are also tantalizing hints of the might-have-beens of history: how different, for example, might the history (and indeed the structure) of zoological taxonomy have been if Petrus Arctaedius, a young Swedish ichthyologist, had not fallen into an Amsterdam canal and drowned. Had he but lived it was planned that he would ‘do’ animals while his botanist friend and fellow countryman Carl worked on the systematics of plants.

The style is such that, even though you are frequently amazed that any one person could have the time to research this much, let alone remember it all, it is as though you are being gently and constantly reminded of something that had slipped your mind, rather than being bombarded by new facts and interpretations. In the face of such a tour-de-force, such a glorious combination of erudition and glee, it seems churlish to find fault and, indeed the only complaint is that one wants more. In his defence, Groves himself points out that this is a personal rather than a general history of primatology and acknowledges that gaps exist, but it is a little frustrating that Neotropical primatology plays such a very small second fiddle to the developments in the Old World and that next to nothing of the development of primatology by home-grown primatologists in, say, Brazil or Mexico is covered. However, this is a mere quibble in a story that is told with such relish, brio and gusto that you are reminded that, as Colin Groves tells us John Napier always told him, primatology is always, and above all, fun.

Adrian A. Barnett,
Roehampton University

| **THE SIMIAN TONGUE: THE LONG DEBATE ABOUT ANIMAL LANGUAGE** |
| Gregory Radick (2008) |
| Chicago University Press |
| ISBN: 978-0-226-70224-3 (hardback) £31.00 |

The use of facets of primate biology to explore the putative origins of similar aspects of human biology of humans is an academic method which has deep historical roots. Whether it is optimal foraging, reproductive strategies, locomotion and social organization, all have seen extant monkeys and apes used to provide ‘windows to the past’ that provided snapshots of the kind of past states that might have been possessed by species ancestral to modern *Homo sapiens*. Though sometimes frowned upon, such techniques are defended by pointing out that such a comparative approach is one of the few ways in which non-fossilizing aspects, such behaviour and
physiology, can be located in amongst a suite of characters sufficiently complex to have anything like the hope of providing a model that even approximates to a biological reality.

In *The Simian Tongue*, Gregory Radick explores what has been, at times, one of the most contentious uses of this comparative approach; the use of primate vocalizations to explore the origins of human language. The book is divided into three parts, each with three chapters. Part one looks at how the possession of complex language by humans and not by other species was seen as a developmental chasm which could not be crossed by the gradualistic means by which Darwin proposed evolution occurred. Quite how human ancestors had managed it was, as Radick shows, the subject of some highly innovative thinking on behalf of those who accepted human fossil ancestors, but believed that possession of language to be a truly defining trait of humankind. Lost instincts and special pleading featured prominently, as did some fairly racist ideas about the complexities of the world’s various languages (English, French and German each having their supporters as being the most highly developed language, while those of tropical Africa and South America were almost universally derided).

The anti-Darwinian charge was led for over 30 years by Max Müller, a comparative linguist and sometime holder of the Chair of Sanskrit at Oxford, who tried to do for language what Richard Owen tried to do for hippocampus minor: provide an inviolable distinction between humans and non-humans. One of the reasons for the vigorous defence of the linguistic bastion was the perceived relationship between thought and speech and, from there, to rationality and reason. In a world without CAT-scans and where electrophysiology was barely nascent, the idea of speech as one of the few windows into the functioning of the mind was an understandable one, especially for a word-based academic. Radick provides splendid coverage of how Müller and his adherents gradually changed their ideas (if not their intentions) across nearly four decades, a time which saw the rise of psychoanalysis and the study of aphasia, where clearly intelligent individuals had lost the ability to speak.

Chapter four deals primarily with Richard Garner and his use of Edison’s newly-invented phonograph to record primate vocalizations. By subsequently running the wax cylinders at different speeds and, indeed, re-recording low speed sounds, Garner was able to analyse calls in a way no one had before. His interpretations, full of perceived parallels between consonants and vowels of human speech and the structural similarities to human languages at the time considered ‘primitive’, may make one blink a bit. But there is no doubting his energy and innovativeness. Nor, indeed, his dedication and patience as he manoeuvred and manipulated finicky wax cylinders and heavy acid-lead batteries around the monkey houses of late 19th-century North America’s zoos and menageries. He was also the first
person to experiment with primate call playbacks. Garner was a household name, his work fascinated people and he lectured to packed auditoria, both academic and popular. His fall from grace, following an ill-judged trip to test his idea and methods on free-living chimpanzees and gorillas, was so sudden and so complete that when Dorothy Cheney, Robert Seyfarth and Peter Marler began their work on vervets, they were completely unaware of his work.

One reason Garner became so academically unacceptable was the heavy dose of anthropomorphism in his data interpretation. Chapters five and six document the rise of the counterblast, the vigorously anti-anthropomorphic trial-based studies of animal problem-solving of Edward Thorndike, and Margaret Washburn, and the less constraining and more flexible, but no less rigorous, experimental psychology of Leonard Hobhouse and Robert Yerkes. This is nicely balanced by overview of the much more relativistic, race-rank avoiding, culture-centred social anthropology that began with Franz Boas and his academic scions Alfred Kroeber and Edward Sapir and continued until, in the mid 20th century, cultural influences were seen as the sine qua non of primate behavioural development.

And so to the more recent studies, those that form the last third of the book. Here we are on ground that we will all feel a bit more familiar with. Opinions and results are published in academic journals rather than the pages of gentlemen’s magazines and there is a methodological rigour and a well-founded sense of the pitfalls and confounding variables. But this was not always so. While the first two sections illustrate an academic field seeking to establish its philosophical underpinnings and set scientific limits on interpretations of experimental results, the third section tracks the development of modern methodologies, equipment and, indeed, academic genealogies. Beginning with British botanist-turned-bird communication investigator par excellence, Peter Marler, and his studies of the intricacies of bird song, it tracks the development of the spectrograph and of the recognition of the extent of variation in bird calls, moving on, via the conceptual insights and methodological developments of Lorenz and Tinbergen, it takes us through the late-1950s searches for semantic meanings in gibbon calls before ending in Amboseli among vervets and baboons.

Gregory Radick is a Professor of History and Philosophy of Science, and as such feels comfortable embedding the narrative in a thick bed of social context. This determination provides the reader with an idea of the surrounding social climate at the time the ideas were being debated. Indeed, one of the key themes that can be derived from Simian Tongues is how the conceptual underpinnings that are taken for granted by one generation of researchers were things that had had to be fought for tooth and nail by visionary academic dissidents of preceding generations. There is an
immense amount of information in the book (there are just under 100 pages of notes) and the more biologically-minded reader might find themselves skipping some of the half-page quotes illustrating the particular point of view of one protagonist in a mid-19th-century philosophical argument. But it is a fine guide to the road travelled by an academic discipline that is still, after all this time, trying to understand what goes on in a monkey’s mind.

Adrian A. Barnett,
Roehampton University

EVOLUTIONARY WORLDS WITHOUT END
Henry Plotkin (2010)
Oxford University Press
ISBN: 978-0-19-954495-0 (hardback) £29.95

“Ernest Rutherford famously asserted that ‘all science is either physics or stamp collecting’” (p1). This is the opening sentence of Evolutionary Worlds Without End by Henry Plotkin. This might seem an odd way to begin a book which is so obviously concerned with the life sciences, but it transpires that it is Plotkin’s goal to convince us, as the reader, that the fundamentals of biology are every bit as profound as those of physics.

All the same, I remained surprised by the implication that the typical reader would naturally assume biology to be an inferior science to physics. Do all biologists really suffer physics-envy? OK some probably do, but if all of us do then I think most of us are hiding it pretty well. Also, isn’t it just possible that Rutherford, like anyone else, exhibited a natural bias towards his own interests and occupation (and dare I suggest it, that he might have even had a sense of humour) and that we shouldn’t necessarily take his comments quite so seriously? Nonetheless, the spectre of Rutherford (and his disparaging remarks) looms large throughout the chapters that follow, as we are continually reassured that, in considering evolution as a general process, we might just be learning about the sort of science of which Rutherford would have approved.

Perhaps I don’t represent the intended reader for a book making this argument, since Plotkin is very much preaching to the converted in telling me this. It’s fair to say that I was already sold on the idea that trial-and-error learning, culture, science and language could all be considered to represent evolutionary processes. Actually, in my own head the situation was rather simplified in that I would have included science and language under the umbrella term of culture, as instances of behavioural inheritance. Plotkin, however, sees things differently and clearly considers science to be a very special case of culture, exhibiting much more obvious parallels with biological evolution.
The overall message of *Evolutionary Worlds Without End* is quite simply that variation, inheritance, and selection, together generate adaptation to whatever is causing the selection, and that this represents a powerful mechanism for coping with unpredictability. It therefore provides us with a general theory of change which ought to apply to pretty much anything that reproduces itself in some way (be it genes, experimental paradigms, words, or views on climate change). And Plotkin’s book certainly does succeed in communicating the momentousness of this idea, as well as the pervasiveness of evolutionary processes within a variety of different contexts. Indeed evolutionary theory is so general that this process should also be seen outside of the life sciences, a point that Plotkin does not make explicit, but one which would no doubt strike yet another powerful blow against Rutherford’s claim. Evolutionary algorithms are proving themselves to be a useful tool for those working in computer science, engineering, and even physics (promise you’ll be nice, and not rub it in though).

So, even though I began the book considering myself amongst the ranks of the already-converted, I nonetheless reached the end with a renewed appreciation of the true hugeness and generality of evolutionary theory, and the connectedness of various evolutionary processes. Competition between replicating organisms causes change, which generates additional environmental unpredictability, which then favours the evolution of other mechanisms of adapting to that unpredictability (themselves evolutionary), generating further sources of change...

Truly, evolutionary worlds without end. Take that, Rutherford.

Dr Christine Caldwell
University of Stirling
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