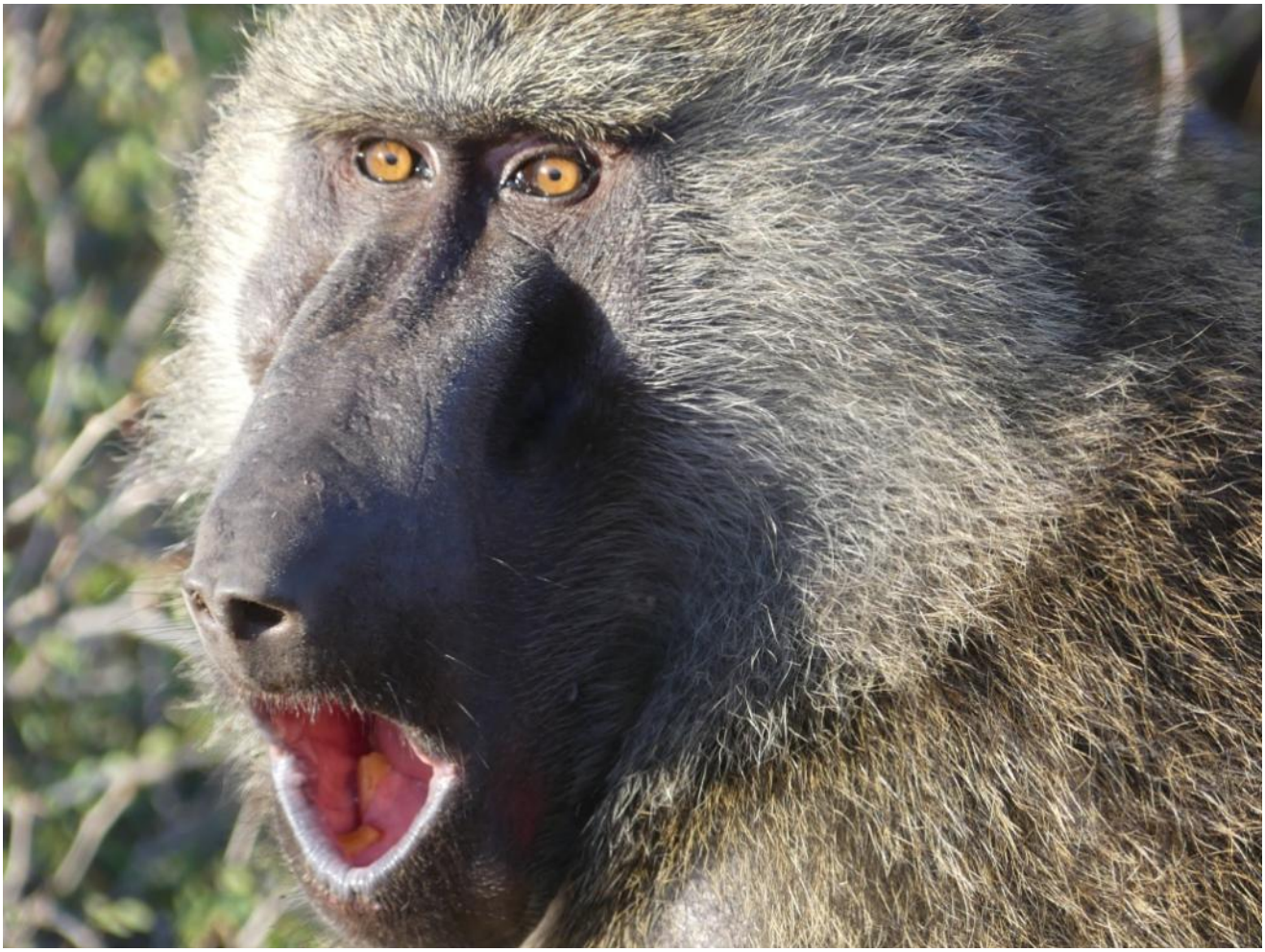
# Primate Tidings



Belgian Group *for* Primatology

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**Editor *Primate Tidings*:** Frédéric de Crayencour
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**For people with an interest in the study of primates**

*Primate Tidings* will appear two times per year.

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Cover: Olive baboon (*Papio anubis)*, Laikipia Plateau Kenya

# Table of Contents

# BELGIAN GROUP *for* PRIMATOLOGY

## Editorial

*Dear BGP members,*

*Here is the first* Primate Tidings *of this year, full of interesting abstracts, news, and more, with a large focus on the previous congress of the International Primatological Society that was held in Nairobi (Kenya) from August 19-25, 2018!*

*Apart from the usual items, I would like to mention the following guide: the 20-page Tropical Pocket Guide on the primates of East Africa (2018), by* ***Yvonne A. DE JONG*** *and* ***Thomas M. BUTYNSKI*** *(Global Wildlife Conservation), intended to help experts or enthusiasts identify animals in the field.*

*Enjoy your "Primate Tidings"!*

FRÉDÉRIC CLEENEWERCK DE CRAYENCOUR

# President's Corner

From August 19 to 25, 2018, the XXVII$^{th}$ congress of the International Primatological Society (IPS) took place in the facilities of the UN headquarters in Nairobi (Kenya). After the quite strict security check, the large park was accessible on foot or by bicycle. You could watch different birds, of which raptors, and especially Sake's monkey (*Cercopithecus mitis*) groups living around in their habitat near the amphitheatres.

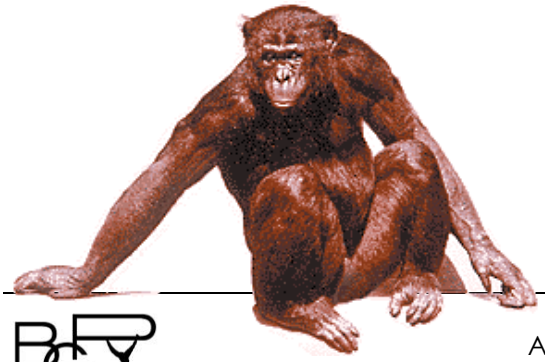
From next October 17 to 19, the Francophone Society of Primatology (Société francophone de primatologie, SFDP) will hold its XXXI$^{st}$ annual meeting in Paris, at the renovated Musée de l'Homme, where an exhibition on *Homo neanderthalensis* is running.

Our joint meeting of the BGP and FNRS contact group "Primatology" is scheduled on November 13, 2018 at the Royal Belgian Institute of Natural Sciences in Brussels. You can still propose to present an oral communication. We are delighted to announce the names of our two prestigious invited speakers: Adrien Meguerditchian (CNRS researcher, station de primatologie, CNRS, Rousset, France) and Tomás Marqués (PhD Instituto de Biología Evolutiva, Universitat Pompeu Fabra/CSIC, Barcelona, Spain).

I am pleased to announce that the next congress of the European Federation for Primatology is organized from September 8 to 11, 2019 by Oxford University and Oxford Brookes University. Its theme is: our primate heritage, our primate legacy.

The 2020 IPS congress will be held in Quito (Ecuador) from August 16 to 22, 2020. The 2018 IPS council meeting voted for the Malaysian bid to organize the 2022 IPS congress.

RÉGINE VERCAUTEREN DRUBBEL



# What's Going on from Belgian Side?

## Recent publications

- ✓ The gibbon's Achilles tendon revisited: consequences for the evolution of the great apes?

***P. AERTS*** [1, 2], ***K. D'AOÛT*** [1, 3], ***S. THORPE*** [4], ***G. BERILLON*** [5], ***E. VEREECKE*** [* 6]

*(2018) Royal Society of London Proc Biol Sci. June 285 (1880)*

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[6] *Department of Development and Regeneration, University of Leuven, Leuven, Belgium*
[*] *evie.vereecke@kuleuven.be*

Abstract: The well-developed Achilles tendon in humans is generally interpreted as an adaptation for mechanical energy storage and reuse during cyclic locomotion. All other extant great apes have a short tendon and long-fibred triceps surae, which is thought to be beneficial for locomotion in a complex arboreal habitat as this morphology enables a large range of motion. Surprisingly, highly arboreal gibbons show a more human-like triceps surae with a long Achilles tendon. Evidence for a spring-like function similar to humans is not conclusive. We revisit and integrate our anatomical and biomechanical data to calculate the energy that can be recovered from the recoiling Achilles tendon during ankle plantar flexion in bipedal gibbons. Only 7.5% of the required external positive work in a stride can come from tendon recoil, yet it is delivered at an instant when the whole-body energy level drops. Consequently, an additional similar amount of mechanical energy must simultaneously dissipate elsewhere in the system. Altogether, this challenges the concept of an energy-saving function in the gibbon's Achilles tendon. Cercopithecids, sister group of the apes, also have a human-like triceps surae. Therefore, a well-developed Achilles tendon, present in the last common "Cercopithecoidea-Hominoidea" ancestor, seems plausible. If so, the gibbon's anatomy represents an evolutionary relict (no harm-no benefit), and the large Achilles tendon is not the premised key adaptation in humans (although the spring-like function may have further improved during evolution). Moreover, the triceps surae anatomy of extant non-human great apes must be a convergence, related to muscle control and range of motion. This perspective accords with the suggestions put forward in the literature that the last common hominoid ancestor was not necessarily great ape-like, but might have been more similar to the small-bodied catarrhines.

- ✓ Food sharing across borders: First observation of intercommunity meat sharing by bonobos at Luikotale, DRC

***Barbara FRUTH**[*1, 2], **Gottfried HOHMANN**[3]*

*(2018) Human Nature June 29(2):91-103*

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*[2] Centre for Research and Conservation, Royal Zoological Society of Antwerp, Koningin Astridplein 20-26, B-2018 Antwerp, Belgium*

*[3] Department of Primatology, Max-Planck-Institute for Evolutionary Anthropology, Deutscher Platz 6, D-04103 Leipzig, Germany*

Abstract: Evolutionary models consider hunting and food sharing to be milestones that paved the way from primate to human societies. Because fossil evidence is scarce, hominoid primates serve as referential models to assess our common ancestors' capacity in terms of communal use of resources, food sharing, and other forms of cooperation. Whereas chimpanzees form male-male bonds exhibiting resource-defense polygyny with intolerance and aggression toward non-residents, bonobos form male-female and female-female bonds resulting in relaxed relations with neighbouring groups. Here we report the first known case of meat sharing between members of two bonobo communities, revealing a new dimension of social tolerance in this species. This observation testifies to the behavioral plasticity that exists in the two Pan species and contributes to scenarios concerning the traits of the last common ancestor of Pan and Homo. It also contributes to the discussion of physiological triggers of in-group/out-group behavior and allows reconsideration of the emergence of social norms in prehuman societies.

- ✓ Population Genetic Structure of an Endangered Endemic Primate (*Leontopithecus chrysomelas*) in a Highly Fragmented Atlantic Coastal Rain Forest

***A.M. MORAES*[1,2]*,A.D. GRATIVOL*[2]*,·K.M. De VLEESCHOUWER*[3]*,·C.R. RUIZ-MIRANDA*[2]*,***
***B.E. RABOY*[4]*,·L.C. OLIVEIRA*[5, 6, 7, 8]*, J.M. DIETZ*[8, 9]*,·P.H.A. GALBUSERA*[3]**

*(2018) Folia Primatol 89:365–381*

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*[6] Pós-graduação em Ecologia e Conservação da Biodiversidade, Universidade Estadual de Santa Cruz, Ilhéus, Brazil*

*[7] Bicho do Mato Instituto de Pesquisa, Belo Horizonte, Brazil*

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*[9] Save the Golden Lion Tamarin, Silver Spring, MD, USA*

Abstract: This study evaluated the genetic structure of wild populations of the endangered primate, *Leontopithecus chrysomelas*. We tested the assumption that populations of *L. chrysomelas*, given their larger population size and a higher degree of habitat continuity, would have higher genetic diversity and less genetic structuring than other lion tamarins. We used 11 microsatellites and 122 hair samples from different locations to assess their genetic diversity and genetic structure, and to make inferences about the isolation by distance. The overall expected heterozygosity (0.51 ± 0.03) and the average number of alleles (3.6 ± 0.2) were relatively low, as is the case in other endangered lion tamarins. Genetic clustering analyses indicated two main clusters, whereas the statistical analyses based on genotype similarities and $F_{st}$ suggested further substructure. A Mantel test showed that only 34% of this genetic differentiation was explained by the linear distance. In addition to linear distance, structural differences in the landscape, physical barriers and behavioural factors may be causing significant genetic structuring. Overall, this study suggests that these populations have a relatively low genetic diversity and a relatively high population genetic structure, putting in question whether the presence of agroforest systems (known locally as *cabruca*) is enough to fully re-establish functional landscape connectivity.

- ✓ Genetic signatures of socio-communicative abilities in primates

***Nicky STAES*** [*1], ***Brenda J. BRADLEY*** [1], ***William D. HOPKINS*** [2, 3], ***Chet C. SHERWOOD*** [1]

*(2018) Current Opinion in Behavioral Sciences, 21:33–38*

*This review comes from a themed issue on "The evolution of language", edited by Christopher Petkov and William Marslen-Wilson*

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[2] *Neuroscience Institute, Georgia State University, 33 Gilmer Street SE, Atlanta, GA 30322, USA*

[3] *Division of Developmental and Cognitive Neuroscience, Yerkes National Primate Research Center, 201 Dowman Drive, Atlanta, GA 30322, USA*

[*] *Obtained her PhD at UAntwerpen in 2016 on "Variation in two candidate genes that code for the receptors for oxytocin and vasopressin, and their association with stable individual personality profiles, both within and between bonobos and chimpanzees." Postdoctoral researcher at the Primate Genomics Lab and the Lab for Evolutionary Neuroscience, George Washington University, Department of Anthropology, Washington, D.C., USA, studying both genetic and neural factors underlying individual and phylogenetic variation on communication in chimpanzees.*

Abstract: Although many studies stress the distinctive aspects of human language abilities, others argue that its foundations stem from a complex reconfiguration of ancestral systems that are shared with other species. This homology is crucial for identifying the genetic basis of human language, as much of the current research focuses on the recent evolutionary changes of the human genome. Here we provide a review of studies describing genetic variation related to socio-communicative abilities in great apes. As human language potentially evolved in tandem with changes in social cognition, it is important to expand our candidate gene selection to those associated with both social and communicative skills in nonhuman primates to obtain a more complete picture of the genetic architecture underlying language.

Highlights:

- Humans and other primates share ancestral mechanisms underlying speech and language evolution.
- Comparing genetic variation in apes can help identify human-specific changes in language genes.
- Great apes show intriguing inter-specific and intra-specific variation in *FOXP2* and *AVPR1a* genes.

- ✓ Significant loss of mitochondrial diversity within the last century due to extinction of peripheral populations in eastern gorillas

***Tom VAN DER VALK[1], Edson SANDOVAL-CASTELLANOS[2], Damien CAILLAUD[3, 4], Urbain NGOBOBO[4], Escobar BINYINYI[4], Radar NISHULI[5], Tara STOINSKI[4], Emmanuel GILISSEN[6, 7, 8], Gontran SONET[9], Patrick SEMAL[9], Daniela C. KALTHOFF[10], Love DALÉN[11], KATERINA GUSCHANSKI[1]***

*(2018) Scientific Reports volume 8, Article number: 6551*

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*[10] Department of Zoology, Swedish Museum of Natural History, SE-10405, Stockholm, Sweden*

*[11] Department of Bioinformatics and Genetics, Swedish Museum of Natural History, SE-10405, Stockholm, Sweden*

Abstract: Species and populations are disappearing at an alarming rate as a direct result of human activities. Loss of genetic diversity associated with population decline directly impacts species' long-term survival. Therefore, preserving genetic diversity is of considerable conservation importance. However, to assist in conservation efforts, it is important to understand how genetic diversity is spatially distributed and how it changes due to anthropogenic pressures. In this study, we use historical museum and modern faecal samples of two critically endangered eastern gorilla taxa, Grauer's (*Gorilla beringei graueri*) and mountain gorillas (*Gorilla beringei beringei*), to directly infer temporal changes in genetic diversity within the last century. Using over 100 complete mitochondrial genomes, we observe a significant decline in haplotype and nucleotide diversity in Grauer's gorillas. By including historical samples from now extinct populations we show that this decline can be attributed to the loss of peripheral populations rather than a decrease in genetic diversity within the core range of the species. By directly quantifying genetic changes in the recent past, our study shows that human activities have severely impacted eastern gorilla genetic diversity within only four to five generations. This rapid loss calls for dedicated conservation actions, which should include preservation of the remaining peripheral populations.

*Gorilla beringei beringei* (Rwanda) ©R. VERCAUTEREN DRUBBEL (ULB)

- ✓ Using abundance and habitat variables to identify high conservation value areas for threatened mammals

***Luc Roscelin TÉDONZONG DONGMO*** [1, 2, 3], ***Jacob WILLIE*** [1, 2], ***Ada Myriane Patipe KEUKO*** [1, 3], ***Jacques KEUMO KUENBOU*** [1, 3], ***Giscard NJOTAH*** [3], ***Martin N. TCHAMBA*** [3], ***Nikki TAGG*** [1], ***Luc LENS*** [2]

*(2018) Biodiversity and Conservation. 27(5): 1115-1137*

[1] *Projet Grands Singes (PGS), Cameroun, Centre for Research and Conservation (CRC), Royal Zoological Society of Antwerp (RZSA), Antwerp, Belgium*

[2] *Terrestrial Ecology Unit (TEREC), Department of Biology, Ghent University, Ghent Belgium*

[3] *Department of Forestry, University of Dschang, Cameroon*

Abstract: The present study used abundance and habitat variables to design High Conservation Value Forests for wildlife protection. We considered great apes (*Gorilla gorilla gorilla* and *Pan troglodytes troglodytes*) as model species, and we used nest surveys, dietary analysis and botanical inventories to evaluate whether the traditional methods that use abundance data alone were consistent with the survival of the species. We assumed that setting a local priority area for animal conservation can be made possible if at least one variable (abundance or habitat variables) is spatially clustered and that the final decision for a species may depend on the pattern of spatial association between abundance, nesting habitat and feeding habitat. We used Kernel Density Estimation to evaluate the spatial pattern of each biological variable. The results indicate that all three variables were spatially clustered for both gorillas and chimpanzees. The abundance variables of both animal species were spatially correlated to their preferred nesting habitat variables. But while the chimpanzee feeding habitat variable was spatially correlated to the abundance and nesting habitat variables, the same pattern was not observed for gorillas. We then proposed different methods to be considered to design local priority areas for the conservation of each great ape species. Alone, the abundance variable does not successfully represent the spatial distribution of major biological requirements for the survival of wildlife species; we, therefore, recommend the integration of the spatial distribution of their food resources to overcome the mismatch caused by the existence of a biological interaction between congeneric species.

# PhD thesis

We received following abstract from the PhD thesis successfully defended in August 2018 by **Sarah MARTIN**.

- ✓ Identifying primate parasites in the Ecuadorian Amazon: A tool for Public Health and Conservation
  *Degree of Doctor of Sciences, University of Liège*
  *Department of Biology, Ecology and Evolution*
  *Behavioural Biology Unit, Primatology Research Group*
  *Advisors: Marie-Claude Huynen (University of Liège, Belgium) and Bertrand Losson (University of Liège, Belgium)*

Abstract: Non-human primates (NHPs) have coevolved with parasites. However, factors such as loss and fragmentation of habitat, pet trade or bushmeat hunting have changed the diversity and intensity of these parasites and exposed NHPs to novel parasites from humans, livestock and wildlife. This study focused on gastrointestinal parasites in New World monkeys. Indeed, gastrointestinal parasites can heavily impact the health and behavior of NHPs, and most studies on NHPs' parasites have focused on Old World primates. Therefore, our study aimed to fill some gap of this research topic on New World monkeys. In order to accomplish this, we used two techniques to determine the diversity of gastrointestinal parasites in the Western Amazon of Ecuador and see if they are a potential reservoir of zoonotic parasites.
After reviewing the various classes of parasites affecting NHPs, we studied two groups of Capuchins (*Cebus albifrons*), one captive and one free-ranging, where we looked how parasitism is affected by host-intrinsic and extrinsic factors. We found microscopically 6 genera of gastrointestinal parasites, the most prevalent being *Strongyloides* sp. (76.9%), followed by *Hymenolepis* sp. (38.5%) and *Prosthenorchis elegans* (11.5%). Zoonotic parasites such as *Entamoeba histolytica* and *Capillaria* sp. Where found only in a minority of the animals tested (3.8%). Adults (6) showed higher parasite richness than the subadults (5) and juveniles (3). Faecal egg/cyst counts were not significantly different between captive and free-ranging individuals, or between sexes or age groups. The free-ranging group had a little higher prevalence than the captive group, but this difference was not significant, maybe due to limited sampling. Additionally, our study demonstrated that a serial sampling of 3 samples per individual significantly increased the test sensitivity. Secondly, we tried to correlate parasites richness and intensity with behaviour as an intrinsic factor. For this, we focused on two captive groups of Woolly monkeys (*Lagothrix lagotricha*), 6 one living in a small enclosure (SE) and the other in a large one (LE). We correlated the size of the enclosure, parasite transmission and social contact through social network analysis. In both groups, an increased number of social contacts per individual and a higher clustering coefficient were associated with a higher parasite richness. Adults (2.3), subadults (3) and juveniles (2.5) did not differ in number of parasites harboured ($F = 3.321$, $p = 0.078$), but between sexes, females (3) harboured more parasites than males (2) ($F = 17.481$, $p = 0.002$). The SE group harboured slightly more parasites (6) than the LE group (5), but this difference was not statistically significant ($F = 4.601$, $p = 0.058$). However, the FEC for *Strongyloides* sp. was significantly higher in the SE group (range 1 to 477) than in the LE group (range 0 to 12) ($F = 6867.753$, $p < 0.001$). Thus, a smaller enclosure seems to be consistent with a higher number of parasites in individuals. As for the first study with capuchins, if we increase sampling maybe parasite richness can increase as well.

We also found that parasite richness of central adult individuals increased the parasite load within the group. Therefore, maintaining the health of central individuals may be an obvious and practical method to increase group health. Finally, we evaluated the presence of gastrointestinal parasites in two populations of NHPs (captive and free-ranging) including ten NW monkey species: *Alouatta seniculus*, *Ateles belzebuth*, *Callicebus discolor*, *Callicebus luficer*, *Cebuella pygmaea*, *Cebus albifrons*, *Cebus apella*, *Lagothrix lagotricha*, *Saguinus fuscicollis,* and *Saimiri sciureus*). We then focused on the molecular identification of *Entamoeba histolytica* in these ten species to assess the role of these primate populations as potential reservoirs of zoonotic parasites. Microscopic identification allowed the identification of 10 parasites of gastrointestinal parasites and molecular identification (conventional PCR) pointed two individual woolly monkeys who had 7 *Entamoeba histolytica*.
We also identified *Entamoeba nuttalli* (the NHP *Entamoeba*), again in a woolly monkey. In our study, in accordance with other studies, we found that host biology (such as age, sex, and primate species) may influence the parasite diversity harboured. Most parasites found in our study were also found in OW monkeys, but some were specific to the neotropical area. Most parasites in our study are widely distributed and have numerous hosts, while others are restricted to some NHPs. Host age and sex may influence parasite richness, but their effect varies depending on the parasite species and on the NHP host. The sensitivity to parasite infestation of NHPs captive or in close contact with humans is related to several extrinsic factors (home range overlap, disturbed habitat, human contact, poor environmental enrichment, contaminated food, among others) and intrinsic factors (social contacts) that increase the diversity and prevalence of parasites. However, free-ranging NHPs have developed strategies such as self-medication to decrease the number of parasites or alleviate their effect. Although we did not observe this kind of behaviour, we observed ad libitum in captive *Cebus albifrons* and *Ateles belzebuth* sequences of rubbing onions and eating sand, which is also considered as self-medication behaviour.
Our study also demonstrated the importance of a serial sampling, which allows to find a higher number of parasite species per NHP species. However, we did not find some of the regular parasites found in other studies, maybe because of the microscopic technique employed. Molecular identification also increased the prevalence of *Entamoeba* sp., from 14.7% to 57.5%. 8 As a contribution to regulation perspectives, we proposed a series of strategies such as environmental education for tourists and local population itself, or such as technical training for caretakers, or basic health major procedures such as treatment administration to implement in NHPs facilities or in communities in close contact with NHPs.
Finally, one general recommendation should be essential for Ecuador, and this is to establish a national network for wildlife diseases' surveillance to enhance the detection of infectious and zoonotic diseases and protect wildlife populations, domestic animals and humans.

## Master thesis

We received following abstracts from master theses successfully defended in September 2018:

- ✓ Management regimes linking man and mammals in the Dja Conservation Complex, Cameroon

***Stef DE BETHUNE***
*Tropimundo (Erasmus Mundus Masters Course in Tropical Biodiversity and Ecosystems)*
*Master en Biologie des Organismes et Écologie, specialisation EMMC in Tropical Biodiversity and Ecosystems, ULB*
*Master's in Biology, specialisation EMMC in Tropical Biodiversity and Ecosystems, VUB*
*Master di I Livello in Tropical Biodiversity and Ecosystems, UNIFI*
*Supervisors: Martine Vercauteren (Anthropology and Human Genetics, ULB)*
*Co-supervisors: Régine Vercauteren Drubbel (Anthropology and Human Genetics, ULB), Nikki Tagg (Centre for Research and Conservation, KMDA) and Jacob WILLIE (Centre for Research and Conservation, KMDA)*

Abstract: Three sites of the Dja Conservation Complex (DCC) in Southern Cameroon were studied to explore the relationship between conservation management regimes, mammal community status and the livelihoods of nearby villagers. Each site comprised a forest area and one or two villages. The forest of the site of Ngouleminanga (NGO) is managed by the local community. In La Belgique (BEL), the Projet Grands Singes (PGS) of the Centre for Research and Conservation of the Antwerp Zoo (Belgium) manages conservation and research activities. The site of Schouam (SCH) is located on the border of the Dja Faunal Reserve (DFR) and its buffer zone. A transect survey showed that the mammal communities of the three forests were different. NGO showed strong signs of depletion, while BEL had the richest and most abundant mammal community of the three sites. Compared to BEL, the SCH community had seemingly less middle-sized mammals. Local communities were interviewed about their monetary income, their sources of revenue and their consumption and procurement of animal proteins, with special attention to bushmeat. People in NGO seemed to find less resources in the wild and relied on livestock as well. In BEL, bushmeat was more consumed than in the two other sites, while in SCH fresh fish was an additional important source of animal protein. Sample size probably explains why some of these differences did not reach the statistical significance level. We recommend pursuing this study with attention to seasonal issues and a more in-depth analysis of the drivers of villager behaviour. We also recommend replicating the activities of PGS in the DCC.

- ✓ Evaluating the importance of the golden-headed lion tamarin for the seed dispersal of fruiting trees in South Bahia, Brazil

***Roberto FIORINI TORRICO***
*Tropimundo (Erasmus Mundus Masters Course in Tropical Biodiversity and Ecosystems)*
*Master en Biologie des Organismes et Écologie, finalité EMMC in Tropical Biodiversity and Ecosystems, ULB*
*Master's in Biology, specialisation EMMC in Tropical Biodiversity and Ecosystems, VUB*
*Master di I Livello in Tropical Biodiversity and Ecosystems, UNIFI*
*Supervisors: Kristel de Vleeschouwer (Project BioBrasil, CRC-RZSA) and Martine Vercauteren (Anthropology and Human Genetics unit of the faculty of Sciences, ULB)*
*Co-supervisor: Régine Vercauteren Drubbel (ULB)*

Abstract: Seed dispersal mediated by animals is a constant force shaping the diversity and distribution of fruiting plants in the tropical forests. This mutualistic relationship initiates when a frugivore manipulates a fruit employing certain handling techniques that may lead to seed intake. Seed size is an important determinant for the probability that a frugivore ingests a seed, with larger animals being able to swallow larger seeds. Most tropical forests are currently affected by degradation with potentially negative consequences for the seed dispersal success of larger-seeded tree species given their higher reliance on larger animals, which in turn are more sensitive to anthropogenic pressures. In the present study, we explore the frugivory patterns and seed dispersal systems of two fruiting tree species with different seed size: *Helicostylis tomentosa* (Moraceae), a larger-seeded species, and *Henriettea succosa* (Melastomataceae), a smaller-seeded species. We evaluate the relative contribution of different frugivore species to the trees' seed dispersal and discuss the particular contribution of the golden-headed lion tamarin (*Leontopithecus chrysomelas*), a small-sized endangered primate inhabiting the fragmented Atlantic Forest of South-Bahia. Our results suggest that the factors driving fruit manipulation and seed intake are different in *H. tomentosa* compared to *H. succosa*. We found that factors related to frugivore performance were determinant to seed dispersal of *H. tomentosa* whereas in *H. succosa* factors inherent to the tree and vegetation type where it was located were more important to define fruit manipulation and potential number of seeds dispersed. Furthermore, we demonstrated that *L. chrysomelas* is a key disperser for both tree species, however, given the high forest fragmentation of our study area and the reduced diversity of the frugivore assemblage present, the presence of *L. chrysomelas* is particularly essential for seed dissemination and eventual recruitment of our larger-seeded tree species.

- ✓ Assessment of a cognitive capacity in the gray mouse lemur: the recognition of facial expressions and the influence of personality.

***Pauline FROT**, Université Libre de Bruxelles (ULB)*
*Master's degree in Biology of Organisms, Faculty of Sciences (ULB)*
*Promotor: Martine Vercauteren (ULB)*
*Co-promotor: Fabien Pifferi (MNHN – CNRS, France)*

Abstract: The ability to recognize and interpret facial expressions is important for non-human primates. Indeed, this ability is based on non-verbal cues and is necessary for social communication and to maintain group cohesion. Many studies on facial expression communication have been conducted on primates, most of them on primates belonging to the suborder of the haplorrhines. However, there are very few studies dealing with facial

communication in strepsirrhines. Moreover, since they have retained many traits similar to ancestral primates, the study of facial recognition in these species would allow to place this ability in an evolutionary context.
In this purpose, we chose to work on a strepsirrhinans primate model, the gray mouse lemur (*Microcebus murinus*). In order to do this, we have developed a first protocol to measure heart rate variations when viewing visual stimuli containing facial expressions of microcebes (neutral, aggressive, fear), humans (neutral, smile) and familiar objects (house, branch, food). In this experiment, only two out of seven of our individuals responded to any visual stimuli. For the other five individuals who reacted to certain categories of stimuli, no difference could be established between these categories. We then developed a second protocol with more representative stimuli which have a more intense impact on physiological responses. We also added other categories of stimuli: "negative" objects (gloves used to handle animals), prey (locusts, mealworms) and predators (snake, owls). In this experiment, all our individuals (4/4) responded to at least three categories of stimuli. In addition, we were able to observe significant differences between the pair of stimuli in an individual. For the two protocols, we find that 3 categories of stimuli provoke a reaction in a large number of individuals: "Microcebe fear" (6/11), "Objects (8/11) and "Predators" (4/4). These results suggest that the grey mouse lemur has visual recognition capabilities that are also present in many species of haplorrhinans primates. In addition to this, personality tests were performed to include an interpersonal behavioral variability aspect; however, this did not allow us to establish a link between personality and facial recognition. Regarding the recognition of facial expressions, although we have not observed a specific physiological response to a given expression, we cannot conclude that microcebes are unable to recognize the expressions of conspecifics. Further studies would be needed to provide additional elements to give an answer to this question.

- ✓ Predation of bird nests by the northern pigtailed macaque (*Macaca leonina*) in a degraded forest fragment of Thailand: the role of spatial distribution of artificial nest

***Clarisse PORCHERON***
*Degree of master's in Biology of Organisms and Ecology 2017-2018*
*University of Liège, Faculty of Sciences, Department of Biology, Ecology and Evolution, Behavioural Biology Unit*
*Advisors: Fany Brotcorne (University of Liège), Marie-Claude Huynen (University of Liège)*
*Research director: Eva Gazagne (University of Liège)*

Abstract: Nest predation is one of the main factors responsible for the nest failure of passerine birds. Consequently, it influences the bird population dynamics, their ecology and selection of nesting sites. Several parameters are known to influence predation rates, including the density of nests and their inter-individual distance. In general, the density-dependence effect refers to an increase of predation when nest density increases. The neighborhood effect states that the fate of a nest is directly linked to the one of its neighbours: predation increase when inter-nest distance decreases. Nest predation is widespread amongst primate species but poorly documented due to the cryptic nature of this foraging behaviour. Usually, nest predation is described as an opportunistic foraging behaviour in primates. In the Sakaerat Biosphere Reserve (SBR) in Thailand, the pig-tailed macaque (*Macaca leonina*) is one of the main predators of passerine bird eggs with important conservation implications for the bird species of this reserve. A previous study (Kaisin et al., in press) suggested that the predation foraging strategy of these macaques was selective, and not opportunistic as usually reported in literature. To confirm these results and deepen the knowledge on the underpinning foraging strategies

involved in nest predation by the study troop, the goal of this study was to investigate the influence of several parameters defining the nest spatial distribution on the predation rate by macaques and on the nest survival against all predators.
To do so, we set up an experimental design using 176 artificial nests and camera traps between February and June 2018. The parameters studied for the nest spatial distribution were the following: density (2 nests/ha *versus* 6 nests/ha), inter-nest distance (20 m *versus* 40 m) and nest height (ground *versus* arboreal nest). We used a GLM to test the effect of these spatial parameters on predation rates by macaques and we run a survival analysis to study the anti-predation strategies of birds against the entire community of predators. We also tested the influence of resource availability by comparing the fruit availability scores and predation rates between 2017 and 2018. Finally, we documented the different patterns of predatory behaviour and compared their frequency between age-sex classes of macaques.
We found that pig-tailed macaques remain the most important predator. Regarding the spatial distribution, only the nest density influenced the macaque predation rate but not as predicted: predation rate was higher in plots with low nest density. None of the other spatial parameters influenced neither the predation rate by macaques nor the duration of nest survival. We did not find any correlation between fruit abundance and predation rate.
Finally, as predicted, adult males predated more nests than immature and female macaques. In conclusion, contrary to the last year study on the same troop, most of our results converge towards the indication that nest predation by the northern pigtailed macaque in SBR might be more an opportunistic foraging strategy than a selective one. Eggs were predated opportunistically rather than spotted through an active foraging search when macaques travelled. Further studies with an improved experimental design and higher sampling effort would allow to confirm our conclusions and understand the implications for bird conservation in this degraded environment.

## PhD project

We were informed of the following PhD project, which resulted in a F.R.S. – F.N.R.S. Aspirant Scholarship.

- ✓ Physiological and behavioural responses of black lion tamarins to habitat fragmentation in the Brazilian Atlantic Forest
  ***Olivier KAISIN*** *(University of Liège – Department of Biology, Ecology and Evolution)*
  *Co-promotors: Fany Brotcorne (University of Liège – Department of Biology, Ecology and Evolution) and Pascal Poncin (University of Liège – Department of Biology, Ecology and Evolution)*
  *Co-supervision: Laurence Culot (UNESP's Rio Claro – Spatial Ecology and Conservation Lab, Brazil)*

Abstract: Habitat fragmentation is one of the major threats hanging over primate populations in South America. Before affecting primates at a population level, environmental perturbations affect the physiology of the individuals. Glucocorticoids (GCs), often referred to as stress hormones, are metabolic hormones which mediate the energetic demands needed to overcome predictable and unpredictable environmental and social challenges. These physiological biomarkers play a key role in enabling individuals to respond to stressors and restore

physiological homeostasis. How primates adapt to habitat fragmentation pressures remains poorly understood.
The aim of this research is to investigate the physiological and behavioural responses of the endangered black lion tamarins (*Leontopithecus chrysopygus*) living in the Brazilian Atlantic Forest, a habitat particularly affected by fragmentation.
The three specific objectives of this research are: (1) reviewing the effect of anthropogenic habitat disturbance on the well-being of primates, (2) analysing variation in chronic stress of tamarins in different forest fragment quality, and (3) relating transient stress levels to behavioural patterns. The first objective will consist of an extensive bibliographic research to identify how habitat disturbance variables affect primate well-being. Regarding physiological markers, we will use two different matrixes to measure GC concentrations. First, GC levels in hair samples (hair cortisol concentrations-HCC) will provide us with information on long term adrenocortical activity, recounting the animal's chronic stress levels. Second, faecal GC levels will inform us about short term exposure to stress unfolding the animal's daily fluctuations. Consequently, to approach the second objective, we will compare habitat quality with the HCCs of six tamarin groups living in fragments of different quality. For the third objective, we will compare faecal GC levels with behaviour patterns collected during daily follow-ups of three tamarin groups. This project will be conducted as a joint-PhD between ULiège and the Sao Paulo State University (Brazil). Evaluating stress levels in primate populations living in fragmented landscapes can shed light on how primates respond to such habitat perturbations and how significant it is for their survival.

## Attended meetings / public conferences

The temporary exhibition entitled "**MONKEYS**" and hosted by the Royal Belgian Institute of Natural Sciences (RBINS) came with 11 evening events allowing to visit the exhibition and attend a lecture or watch a documentary (followed by a debate).

**Thierry SMITH** (palaeontologist, RBINS) gave an exciting lecture entitled:

- ✓ The origin and evolution of primates: progress from branches to branches.
  Thierry Smith is the head of a research team working on the origin of the first modern mammals that appeared 56 million years ago. This is how he studies the first primates.

**Roseline BEUDELS-JAMAR** (biologist, Conservation Biology Unit, RBINS, and Chair of the Board of Directors, WWF Belgium) gave an impressive conference entitled:

- ✓ Keeping non-human primates in this changing world: is it already too late?,
  followed by the two oral communications by:
  **Valentine THIRY** (PhD student, ULB, RBINS) on
  - ✓ Proboscis monkeys *Nasalis larvatus* and their role in forest regeneration along the Kinabatangan River in Borneo;

  **Leslie WILMET** (PhD student, Agro-Biotech Gembloux-ULiège, RBINS) on
  - ✓ The threatened habitat of *Lepilemur mittermeieri* in Madagascar.

Non-human primates, our closest biological parents, are an essential component of tropical biodiversity. They contribute significantly to forest regeneration and dynamics, as well as to the health of ecosystems. They also play an important role in livelihoods, cultures and religions of many human societies.

Abstract: Current data show that 60% of some 504 primate species distributed in the neo-tropical regions (Africa, Madagascar and South and Southeast Asia) are now threatened with extinction (A. Estrada et al., 2017). These data also show that 75% of populations of all species are declining. Many primate species in the wild have less than 1,000 adult individuals.
Primate distribution areas mostly coincide with increasingly populated areas often characterized by high levels of poverty. Comprehensive responses need to be identified quickly if one really wants to reverse the imminent risk of extinction for the majority of primates while sustainably meeting local human needs. The Conservation Biology Unit has conducted and is still conducting numerous research projects on the conservation of primates.

**Roseline BEUDELS**
(RBINS)

**Valentine THIRY**
(ULB, RBINS)

**Leslie WILMET**
(ULiège, RBINS)

✓ Koko: The Gorilla Who Talks to People, by **Jonathan TAYLOR**, 2016
Introduction and debate by **Régine VERCAUTEREN DRUBBEL** (ULB)

For 45 years, Penny Patterson, an American ethologist, has been teaching Koko, a female gorilla born in 1971 and died in June 2018, to communicate in a modified version of the American Sign Language. Project Koko started as a PhD project to teach sign language to a baby gorilla.
Koko's extraordinary life with Penny has been entirely filmed by Dr. Ron Cohn. He has amassed thousands of hours of footage and photos. The archive is part scientific record and part home video. The documentary retraces their shared history.

Abstract: This is an exceptional documentary in many ways. It illustrates 40 years of a gorilla life since her birth in 1971. It shows the financial difficulties in research (which is still relevant). The daily concern for the well-being of the gorilla has a financial cost, but also a cost in terms of human availability. Thanks to her courage and tenacity, Patterson continues her project. An important point for the scientific value is that from the beginning, her companion filmed the evolution of learning. This has created a huge corpus of accessible raw data. This avoids possible bias if the interpretation would only be based on direct observation. In addition, it gives the opportunity to re-examine over time these objective data according to the evolution of scientific knowledge.
With ambiguous feelings, we witness from year to year Patterson's growing attachment to her research subject Koko. We cannot ignore the fact that the female gorilla lives in an environment that is totally different from that of her congeners in the wild.
Gorillas are present only in Africa. They form groups of 10 to 30 individuals: usually 1 or sometimes 2 to 3 adult males (silver back) and several adult females with their offspring (Western lowland gorillas may live temporarily in non-breeding groups, without adult females). They feed mainly on plants and a few insects (termites, ants). Although not aggressive, they are impressive in size and weight (up to 200kg for an adult male). However, they can be very scary when they display intimidation: chest pounding, roaring/barking (tearing of vegetation). The 2 species (*Gorilla gorilla* and *Gorilla beringei* and the 4 subspecies) are all critically endangered (IUCN 2017).
Meanwhile, in more than 40 years, the conditions of research in Primatology have evolved positively i.e. currently,
• Researchers favour observations in the wild without human interaction. Habituation of wild animals to researcher presence (no physical contact, absolute maintenance of a certain distance of observation, no feeding, the use of camera and camera trap to avoid as much as possible disturbing their environment, non-invasive procedures collecting information from faeces, etc.)
• In captivity, research conditions have changed as well: thanks to the scientific ethics committees. For the welfare of primates, they live within their social group. There is for example an increasing awareness to develop individual tests on cognition performed on a voluntary basis i.e. the monkey chooses when he leaves and returns to his group; during the test he is neither locked nor tied up. His motivation is a food reward (dietary not to make him gain weight). The youngest are tested in the presence of their mother (as we do with human infants).

**Penny PATTERSON** and **KOKO**

**Frédéric CLEENEWERCK DE CRAYENCOUR** (Editor *Primate Tidings*) and **Régine VERCAUTEREN DRUBBEL** (ULB)

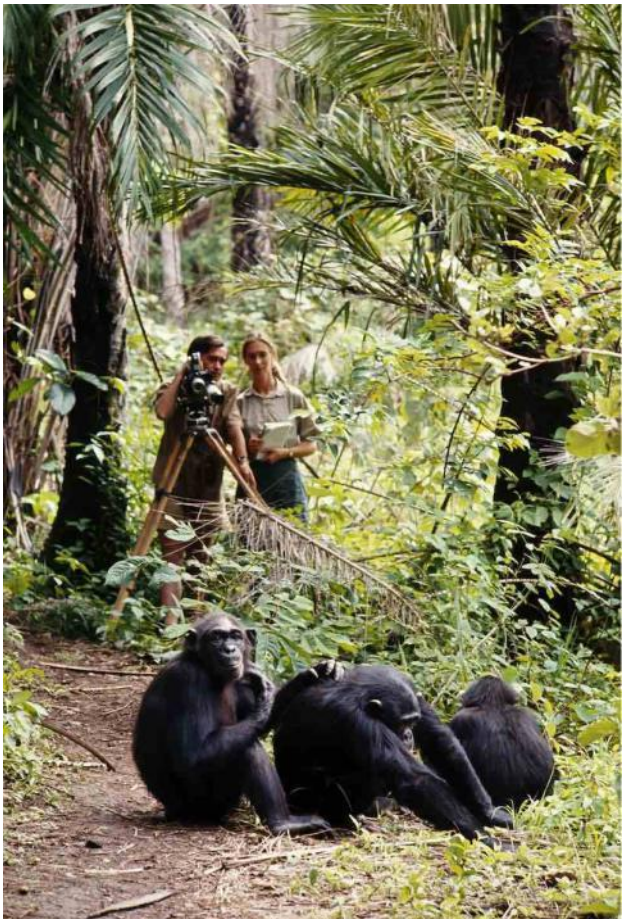

At Cameo Cinema in Liège, in the presence of **Fany BROTCORNE** (ULiège), and in Namur, in the presence of **Régine VERCAUTEREN DRUBBEL** (ULB, BGP), in February 2018: single projection of the documentary

- ✓ Jane

Synopsis: *Jane*, the new documentary from Oscar-nominated director Brett Morgen, has used silent footage shot by renowned filmmaker Hugo van Lawick, who arrived in Gombe in 1962 and was Goodall's first husband from 1964 to 1974.

Drawing from over 100 hours of never-before-seen footage that has been tucked away in the National Geographic archives for over 50 years, Brett Morgen tells the story of **Jane GOODALL**, a woman whose chimpanzee research challenged the male-dominated scientific consensus of her time and revolutionized our understanding of the natural world.
Growing up in Britain while dreaming of living in Africa surrounded by animals, Goodall, a former secretary who had no formal qualifications, jumped at the chance to be a researcher for

paleoanthropologist, Louis Leakey. She describes the opportunity to go and study chimpanzees in the wild as a "magical invitation". "My mission was to get close to the chimpanzees, to be accepted," GOODALL says. When Jane GOODALL first arrived in Gombe, Tanzania, in 1960 as a 26-year-old, it was the beginning of what would become a lifelong journey committed to chimpanzees and conservation. Now 83, the pioneer continues to work tirelessly in her advocacy of animals and environmental issues.
Set to a rich orchestral score from legendary composer Philip GLASS, the film offers an intimate portrait of Jane GOODALL discoveries.



Hugo van LAWICK & Jane GOODALL

Régine VERCAUTEREN DRUBBEL (ULB)

# Meetings Calendar

- ✓ **JOINT MEETING OF THE BELGIAN GROUP FOR PRIMATOLOGY (BGP) AND THE F.N.R.S CONTACT GROUP 'PRIMATOLOGIE'.**
  Date: November 13, 2018. Location: Brussels, the Royal Belgian Institute of Natural Sciences (RBINS).

- ✓ **XXXI$^{ST}$ COLLOQUIUM OF THE FRENCH-SPEAKING SOCIETY OF PRIMATOLOGY (SFDP)**.
  Date: October 17-19, 2018. Location: Paris, Museum de l'Homme and Zoological Park. Theme: Primates, Environments: what pasts, what futures?

- ✓ **WINTER MEETING 2018 OF THE PRIMATE SOCIETY OF GREAT BRITAIN (PSGB)**.
  Date: December 4-5, 2018. Location: Bristol Zoo Gardens, Bristol Zoological Society. Theme: Primates in Peril: Conserving the world's most threatened primates

- ✓ **IV$^{TH}$ EUROPEAN CONFERENCE ON TROPICAL ECOLOGY**.
  Date: April 9-12, 2019. Location: Edinburgh, UK, jointly hosted by the University of Stirling, the University of Edinburgh & the Royal Botanic Garden Edinburgh.

- ✓ **ILII$^{ND}$ MEETING OF THE AMERICAN SOCIETY OF PRIMATOLOGISTS (ASP)**.
  Date: August 21-24, 2019. Location: Madison Wisconsin, USA.

- ✓ **CONGRESS OF THE EUROPEAN FEDERATION FOR PRIMATOLOGY (EFP)**.
  Date: September 8-11, 2019. Location: Oxford, Primate Research Groups of Oxford University and Oxford Brookes University, coordinated with the 2019 PSGB Winter meeting. Theme: Our primate heritage, our primate legacy.

- ✓ **XXVIII$^{TH}$ CONGRESS OF THE INTERNATIONAL PRIMATOLOGICAL SOCIETY (IPS)**, jointly hosted by the Latin American Society of Primatology.
  Date: August 16-20, 2020. Location: Quito, Ecuador. Dr. de la Torre and Dr. Leandro Jerusalinsky. The website will be available soon. Registration will likely open in November 2018.

# Congress of the International Primatological Society

## Nairobi, Kenya, August 19-25, 2018

The last IPS congresses in Africa were held in Madagascar (1998) and Uganda (2006). The 2018 IPS congress hails a return to Kenya after 34 years! The country hosts 20 endemic primate species. The natural environment and landscapes range from the tropical coast and volcanic Rift Valley to the northern drylands and alpine mountain ecosystems. More than 800 delegates, from 63 countries, that participated in the Congress, with a fifth coming directly from Kenya, and other primate range African states.

**Lilly AJAROVA**

**Liliana CORTÉS ORTIZ**

**Inza KONÉ**

## Keynote speaker

❖ **Lilly AJAROVA** is the Executive Director of the Chimpanzee Trust, a global Conservation initiative that manages Ngamba Island, a model African Chimpanzee Sanctuary situated on Lake Victoria in Uganda. Lilly has provided leadership as a member of the Advisory Committee of Pan African Sanctuary Alliance (PASA) and developed the policies, standard operating procedures, and best practices for the 22 sanctuaries and wildlife centres of PASA's 13 African member countries. Lilly, as the committee Chairperson on the Uganda Tourism Board, directed the development and implementation of quality assurance, grading, and classification of hotels in Uganda. She also contributed to the development of tourism policies of Uganda and East Africa. Along those lines, as the Tourism Product Development and Marketing Manager of the Uganda Wildlife Authority, Lilly spearheaded the development of tourism products in the national parks of Uganda. She holds various qualifications in the

field of tourism, business management, and wildlife management. Lilly is the recipient of the prestigious National Golden Jubilee Award, Tourism Excellence Award, and Wildlife Conservation Award. She is a Rotarian described as a fantastic mentor, in both the tourism and conservation sectors.

## Plenary lecture

- ✓ Integrated approach to managing chimpanzee conservation in Uganda: a case of chimpanzee trust

***L. AJAROVA***
*Chimpanzee Sanctuary and Wildlife Conservation Trust, P.O. Box 884, Entebbe, Uganda*

Abstract: The threats to chimpanzees (*Pan troglodytes*) require diverse strategies and solutions to promote conservation of the species. In response, Chimpanzee Trust in Uganda developed several programs to address the threats of illegal wildlife trafficking, habitat loss, disease, and illegal hunting. In this presentation, I will describe our programs' successes and lessons learned, the strategies used in the management of the programs, and recommendations generated from our work. Ngamba Island Chimpanzee Sanctuary program was established to rehabilitate and care for rescued chimpanzees from the illegal wildlife trade. Our environmental education program was designed to create public and stakeholders' appreciation and understanding of chimpanzee conservation and environmental management. A field conservation program was developed to enhance the conservation of chimpanzees in the wild and their habitats. Approaches used to manage the programs include ecotourism, community forest monitors, private forest owners' associations, alternative livelihoods, research, awareness and education, payment for ecosystem services, partnerships among others. The successes of these programs have benefited the welfare and conservation of chimpanzees and other wildlife, created socio-economic development to the benefits of the people, and influenced revision of national policies and laws. However, the threats continue to increase and require expansion of the successful approaches to all wildlife areas. New strategies - including new technologies - require consideration for more efficiency, creating partnerships at national and international levels, and secured funds.

## Keynote speaker

❖ **Liliana CORTÉS ORTIZ** is a Research Associate Professor in the Department of Ecology and Evolutionary Biology at the University of Michigan and Faculty of the Genetics training program of the Department of Human Genetics, also at UM. Dr. Cortés Ortiz received a B.Sc. in Biology from the Universidad Veracruzana, a M.Sc. in Neuroethology also from the Universidad Veracruzana, and a Ph.D. in Biological Sciences from the University of East Anglia in England. She is Vice-President for the Neotropics of the Primate Specialist Group of the International Union for Conservation of Nature and Founding member and Secretary for the Latin American Society of Primatology (SLAPrim). Her research focuses on the evolution and systematics of Neotropical primates. She uses molecular genetics and genomics approaches to address questions related to the diversification of Neotropical primates and the implications of natural hybridization in the origin and maintenance of primate diversity. Her work ranges from field-based data and sample collection, to laboratory-based genetic work; integrating many disciplines (such as phylogenetics and systematics, biogeography, morphology, behavioural ecology, and genomics) to build an integral framework that examines primate evolution. Some of this work is implemented in collaboration with scientists in Latin America, England and the United States.

## Plenary lecture

- ✓ What have we learned from studying primate hybrid zones?

***L. CORTÉS-ORTIZ***
*University of Michigan, Museum of Zoology, Ecology & Evolutionary Biology, Ann Arbor, MI, 48109-1079, USA*

Abstract: Interspecific gene flow through hybridization is an important process that affects the evolutionary trajectories of organisms by allowing the movement of adaptive alleles between species or the generation of genetic incompatibilities that maintain and reinforce their separation. Hybridization in all major primate clades has been confirmed through molecular genetic techniques. Thus, the question as to whether or not hybridization occurs among primates is no longer relevant. We still though lack an understanding of the effects of hybridization on the genetic and phenotypic variation of primates, as well as how this new variation impacts the fitness of admixed individuals. Studies of natural hybrid zones (the geographic areas where hybridization occurs) provide the means to explore the interaction of divergent gene pools and determine the mechanisms that favor or limit the transfer of genome segments into an interspecific genomic background. Only a handful of primate hybrid zones have been studied. I will summarize results of hybrid zone studies that provide evidence of the genetic and phenotypic outcomes of natural hybridization in primates, emphasizing those from analyses of a howler monkey hybrid zone in Mexico. Our understanding of the factors affecting natural hybridization and the mechanisms underlying its impact on primate evolution will benefit from studying hybrid zones among primates with distinct social systems and with different levels of divergence among parental populations using comparative and interdisciplinary approaches.

She also gave following oral communication.

- ✓ Advancing our understanding of the phylogenetic relationships of howler monkeys

***L. CORTÉS-ORTIZ*[1], *M. R. MARCHÁN-RIVADENEIRA*[1], *J. P. BOUBLI*[2], *J. W. LYNCH-ALFARO*[3], *S. REDONDO*[4], *F. M. CORNEJO*[5, 6]**
[1] *Department of Ecology and Evolutionary Biology, University of Michigan, 1109 Geddes Ave, Ann Arbor, Michigan,48109, USA*
[2] *University of Salford*
[3] *University of California - Los Angeles*
[4] *Stanford University*
[5] *Stony Brook University*
[6] *Yunkawasi*

Abstract: The howler monkeys (genus *Alouatta*) were among the first Neotropical primates for which molecular data were used to determine intrageneric phylogenetic relationships. However, after more than 15 years of these first analyses questions regarding the validity of and phylogenetic relationships among several taxa remain unanswered. The gaps in our understanding of phylogenetic relationships within the genus are mostly a consequence of fragmentary analyses and a lack of representation of several putative taxa in phylogenetic studies. We analyzed all publicly available mitochondrial DNA sequence data and included newly generated data from museum specimens from Brazil, Paraguay, Peru and Venezuela hosted in Natural History Museums in the United States and from recent sample collections in Peru, which increased the representation of howler monkey taxa and populations. Our results are concordant with previous findings on the phylogenetic relationships among major lineages,

but still lack representation of a few recognized species (particularly, *A. nigerrima*). Furthermore, we found support for the presence of at least four molecular lineages of red howler monkeys in Peru, which highlights the importance of a broad representation for phylogenetic analyses of individuals within the distribution range of each species. In general, the results provide a more thorough view of the taxonomy, systematics and evolution of the most widely spread primate in the Americas.

## Keynote speaker

❖ **Inza KONÉ**, Ph.D. is a Primate Conservation Biologist. He is a senior Lecturer at the Laboratory of Zoology of the *Université Félix Houphouët-Boigny*, Abidjan, Côte d'Ivoire, and Director General of the *Centre Suisse de Recherches Scientifiques en Côte d'Ivoire*. He has been working for more than 15 years in the fields of natural resource management and the conservation of large mammals, especially primates and their habitats in Côte d'Ivoire and West Africa. His work makes the link between ecology, economy, and culture for the empowerment of rural communities in the field of natural resource management. Inza Koné has won several national and international awards, including the 2009 Future for Nature Award (the Netherlands) and the 2012 Whitley Award for Nature Conservation (United Kingdom). He is Chairman of the African Primatological Society, co-Vice chair of the African Section of the Primate Specialist Group of the IUCN/SSC, Chairman of the Evaluation Expert of the Green List of Protected areas of Côte d'Ivoire (IUCN), Member of the Pygmy Hippo Subgroup of the Hippo Specialists Group of the IUCN, Member of the Conservation Committee, the Education Committee, and the Election Committee of the International Primatological Society (IPS). Inza Koné has authored or co-authored at least 64 publications in the fields of ecology, behavioral ecology, conservation, and environmental education. These comprise 43 papers published in peer-reviewed journals, 9 book chapters, and 10 books.

## Plenary lecture

- ✓ Featured presentation: trans-disciplinary research and community empowerment for the conservation of endangered primates in Southeastern Côte d'Ivoire, West Africa

***I. KONE***[1, 2, 3]
[1] *CSRS, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Abidjan, BP 1303 Abidjan 01, Ivory Coast*
[2] *Laboratoire de Zoologie, Université Félix Houphouët-Boigny, Abidjan, Côte d'Ivoire*
[3] *African Primatological Society, Abidjan, Côte d'Ivoire*

Abstract: Côte d'Ivoire harbours one of the highest primate diversities in West Africa. The primate communities occurring in the country are threatened by the combined effects of rapid habitat conversion and overhunting. The threats to primates are particularly acute in south-central and south-eastern Côte d'Ivoire characterized by industrial scale agriculture and urbanization. Surveys conducted in that ecoregion since 2004 revealed dwindling primate fauna. Among the forests surveyed, the unprotected Tanoé-Ehy forest (12,000 ha), southeastern Côte d'Ivoire is the only forest where several Endangered primate taxa have survived including four of the most endangered five primate taxa of West Africa: *Cercopithecus roloway*, *Cercocebus lunulatus*, *Colobus vellerosus* and possibly *Piliocolobus waldronae*. The failure of conservation policies in Côte d'Ivoire highlights the need for adjustments, especially by promoting the empowerment of local communities for conservation. The case of the

community-based management program of the Tanoé-Ehy forest initiated since 2006, is considered an impactful experience. The program involves 11 communities and its main activities comprise (i) community organization and capacity building, (ii) transborder collaboration with Ghanaian stakeholders (iii) surveillance and technical support to the designation process of the forest as a community-managed protected area, (iv) transdisciplinary research and biomonitoring with the involvement of local communities, (v) awareness campaigns, (vi) support to local development projects. This communication will highlight how transdisciplinary research feed actions and vice-versa for efficiency and sustainability.

**Mewa SINGH**

**Shirley C. STRUM**

## Keynote speaker

❖ **Mewa SINGH** is an Indian mammalian wildlife biologist, specifically a primatologist, who has worked on wild mammals in India for the past 45 years. Mewa Singh did his Master's degree at Panjab University, Chandigarh, Ph.D. at University of Mysore, and training in Wildlife Management at the Smithsonian Institution, Washington DC. He was a Fulbright Scholar-in-Residence at Bucknell University Pennsylvania; a teaching assistant position at the Smithsonian Institution, Washington DC; a Studienstifftung Summer Professor in Germany; a visiting Lecturer in Malaysia; and a summer school teacher at the Russian Academy of Sciences, Moscow. He started his research career in 1973 studying development of social behavior in rhesus macaques in the forests of the Western Himalayas. He later shifted to southern India and extended his research to the forests of the Western Ghats and other habitats. He has carried out extensive field studies on rhesus macaques, lion-tailed macaques, bonnet macaques, long-tailed macaques, Hanuman langurs, Nilgiri langurs and slender loris, in addition to elephants, carnivores, ungulates, bats and rodents. His attempt has been to integrate behavioural ecology and conservation biology. He has published more than 175 research papers in prestigious Journals, and is the coeditor on the book *Macaque Societies: A Model for the study of Social Organization* published by Cambridge. In recognition of his outstanding research contributions, he has been elected a Fellow of the prestigious Indian National Science Academy, honored with several other national and international Fellowships, and received the title of "Distinguished Professor for Life" by the University of Mysore - where he has taught throughout his career. Mewa Singh has hosted many students from several countries at his field stations, for both short and long tern field training, as well as for full time doctoral and post-doctoral research.

## Plenary lecture

- ✓ Conservation of lion-tailed macaques and Bonnet macaques: models for the management of forest dwelling and commensal primates

***M. SINGH***
*Dept. of Psychology, University of Mysore, Mysore, Karnataka, 570 006, India*

Abstract: Habitat loss and fragmentation have led to population declines or local extinction of several primate species across the tropics. The lion-tailed macaque, endemic to the rainforests of the Western Ghats in southern India, largely inhabits isolated and degraded forest fragments and faces occasional local hunting pressures. Due to its late reproductive maturity and long inter-birth intervals, the species population turnover is low. The existing wild population of about 3500 individuals is distributed in 49 subpopulations but none of these appear to be viable in the long term. Field studies on the species and its habitats suggest several management measures, including enrichment of degraded habitats and linking of forest fragments with identified native tree species. Captive breeding has produced mixed results but needs to be taken up more seriously. Data on the species from the field and in captivity can now be used to build an integrative model for the management of endangered forest-dwelling primates.
Our long-term studies on the bonnet macaque, another endemic, but largely commensal, primate in southern India have also shown more than 50% population decline in this unprotected species in the recent past. We now need to urgently develop comprehensive management and conservation strategies for such species, traditionally of no concern, as well.

## Keynote speaker

❖ **Shirley C. STRUM** is a Professor of Anthropology at the University of California, San Diego, and the Director of the Uaso Ngiro Baboon Project (UNBP) in Kenya. Strum has spent over 44 years studying wild baboons in Kenya. Her early pioneering work included a focus on "social strategies of competition and defense" that create a "social contract" based on social sophistication, social intelligence, and collaboration. Tracking the baboons through ecological and social challenges, she uncovered previously unreported social complexity in addition to documenting the evolution of baboon hunting behavior, the development of crop-raiding behavior, the successful translocation of 3 troops of baboons, and the social and ecological adaptation of translocated baboons to new, harsher environments. She also studies the humanized landscape and its significance for baboon adaptation, particularly socialness, and uses the intensive and extensive data on changing environments to monitor the impact on baboon diet, condition, reproduction, and sociality in order to build a new, integrated baboon socio-ecological understanding. Her current baboon research has two tracks. The first set of studies explores how socio-ecological complexity influences individual behaviors and how group level phenomena emerge. The second track focuses on conservation, where Strum makes uses of multiple scientific techniques to understand specific problems, and create innovative solutions. Her field staff of 12 Kenyans currently follows 5 troops of baboons collecting demographic, ranging, feeding, social, conflict and other data. One of the troops included in this study, the Pumphouse Gang, has been featured in numerous award-winning documentaries including David Attenborough's *Life of Primates* and the Discovery Channel's *Baboon Tales*. Strum is widely published in the academic literature and authored a well-regarded popular book *Almost Human: a journey into the world of baboons* (University of Chicago Press, 1987/2001). She is currently working on another book entitled *Darwin's Monkey Puzzle: a baboon's eye view of life and evolution.*

## Plenary lecture

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Olive baboons (*Papio anubis)* Laikipia Plateau, Kenya

- ✓ Why natural history is important to science: a baboon case study

***S. C. STRUM***
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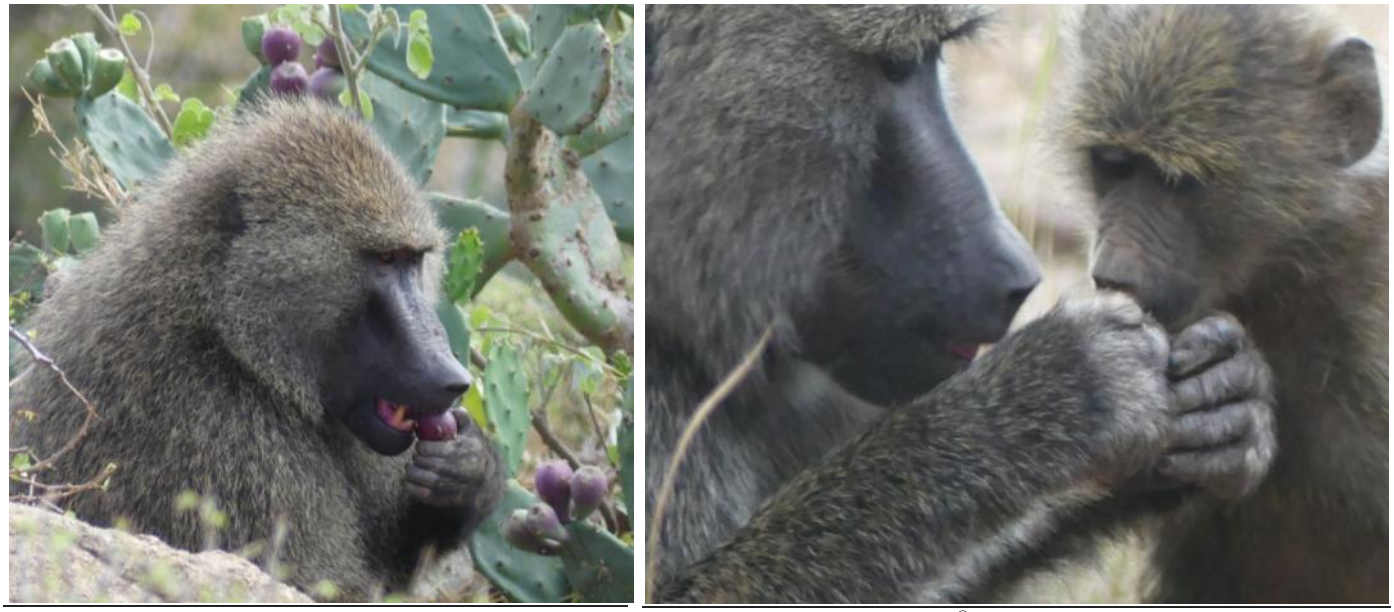
Abstract: My career spans 50 formative years in primate field studies with remarkable advances in both methods and knowledge. Today's behavioral studies are hypothesis driven and quantitative. Non-invasive methods now link behavior and biology. New statistics and modeling offer better ways to interrogate data. These are major accomplishments. But I suggest we need something more. Science needs natural history again---not instead of quantitative approaches but in addition to them. My recommendation is a bit ironic since I was among the first to use systematic and quantitative observational methods in reaction to the contradictory descriptions and interpretations of recent natural history studies of baboons. Decades later, the baboons and the Anthropocene have taught me the value of "natural history" to capture the complexity of baboon lives and to better understand evolution. In this talk, I use data from my long-term study to illustrate why it is important to track the larger "context" in order to make evolutionary interpretations. I draw from information on baboon predation, baboon crop raiding, baboon translocation, baboon home range shifts, several cases of fusion, and the invasion of an exotic cactus plant. It is often said that "the plural of anecdote is not data". I hope to show how natural history (bolstered by quantitative studies and perhaps experiments) can be a valuable addition to science, particularly today, in the Age of Humans.

Beside her outstanding plenary lecture, she also shed light on unexpected positive effects of an invasive plant on a baboon population.



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Olive baboons (*Papio anubis)* eating fruits of an exotic cactus (*Opuntia stricta)*, Laikipia Plateau, Kenya

- ✓ The perfect storm: how baboons (*Papio anubis*) play a role in the invasion of an exotic cactus and benefit from the invasion

***S. C. STRUM***[1, 2]

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Abstract: *Opuntia stricta* is a major invasive plant worldwide yet evidence for the invasion process is limited to historical reconstruction and experiments. Data from 2005 to 2011 on the spread of *O. stricta* into a high altitude dry savanna on the Laikipia Plateau of Kenya, demonstrate that the current invasion, 50 years after the plant arrived in the area, is a response to recent changes in land use, primarily sedentarization of pastoralists. Subsequent continuous heavy livestock grazing produced an ecological state transition to degraded rangeland (before and after settlement grassland biomass: ANOVA: df =1, F=4.98, p=0.026) which created the opportunity for O. *stricta* to invade. Special characteristics of the plant and a wide range of mammalian consumers including baboons, elephants, livestock, and people, fueled the process. Each consumer had its own unique impact on the invasion. The baboon effect was limited to proximity to sleeping sites (density from 0 to 250m; main effects ANOVA: n=5, df= 4, F= 9.12, p=0.001) while the impact of people's settlement extended from 50m to more than 300m with a "cordon sanitaire" nearest the "boma". Elephants dispersed the plant farthest, spreading it along an elephant corridor of more than 25km. In the Anthropocene, adaptable primates like baboons also benefit from the humanization of the landscape by a new and reliable food source almost on a par with human crops.

## Belgian contributions

Vinciane FACK (ULB; UStrasbourg, FR; ANPCP, Peru)

Nikki TAGG (CRC- RZSAntwerp; APGS)

- ✓ Geophagy in a free-ranging group of yellow-tailed woolly monkeys: spatio-temporal and age/sex individual class expression

***V. FACK***[1, 2, 4], ***S. SHANEE***[2, 3], ***R. VERCAUTEREN DRUBBEL***[1], ***H. MEUNIER***[4, 5], ***M. VERCAUTEREN***[1]

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Abstract: Geophagy is the deliberate ingestion of soil, observed throughout the animal kingdom. It is described as a behaviour improving nutritional supplementation, digestion, detoxification of secondary metabolites or self-medication.

Geophagy was recently reported in a free-ranging group of yellow-tailed woolly monkeys (*Lagothrix flavicauda*) in Peru. We aimed to highlight how individuals perform geophagy, the effect of seasonality and age/sex classes on its expression and to characterize geophagy sites. During 12 months of field surveys, data were collected on a habituated group including 21 individuals. Geophagy events were recorded through camera traps located at previously used geophagy sites and through direct observations during behavioural focal animal follows. Our main hypothesis was that geophagy expression depends on seasons. We counted 68 geophagy events – all age/sex classes included but only one event of an adult female with dependant infant. Events were brief with a mean of 14s and occurred significantly mostly in dry seasons (chi-square test). Sites used were small and on slope. As we found a clear seasonality of geophagy, the next step will be to verify if seasonal changes in their diet may determine geophagy expression. Our results suggest that geophagy in *L. flavicauda* is an important behaviour given that these arboreal animals descend to the ground, representing a severe risk in an area of high human population density.

At **San SHANEE**'s request, **Vinciane FACK** (ULB) also presented following oral communication:

- ✓ Primate community population density estimates in mid-elevation flooded forest, San Martin, Peru

***S. SHANEE***[1, 2]***, N. ALLGAS***[2]***, C. OCAMPO***[2, 3]***, N. SHANEE***[1]
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Abstract: The Alto Mayo region of Peru has very high rates of deforestation. It is home to 11 primate species, including 2 endemics, *Leontocebus leucogenys* (Vulnerable) and *Plecturocebus oenanthe* (Critically Endangered). We used line transects to survey primate populations in one of the last remaining mid-elevation seasonally flooded forests in the region, estimating densities using Distance program. We sampled a 257 ha area of within more extensive forest (1869 ha) at an elevation of ~800 m.a.s.l. We recorded *Alouatta seniculus, P.oenanthe, Cebus yuracus, L. leucogenys, Saimiri sciureus, Sapajus macrocephalus* and *Aotus cf. nancymae. Lagothrix lagotricha* was also reported by local hunters. The highest densities were recorded for *A. seniculus* and S. sciureus (14.25 and 15.26 groups/km$^2$ and 87.21 and 303.37 individuals/km$^2$, respectively). The lowest densities were found for *C. yuracus* and *L. leucogenys* (4.51 and 5.39 groups/km$^2$ and 35.66 and 31.64 individuals/km$^2$, respectively). Detections of *P. oenanthe* and *A. nancymae* were too few to calculate reliable density estimates. *P. oenanthe* was found to be more common along waterways and in edge forest, where other species of primate, particularly capuchin monkeys were absent. The persistence of such a diverse primate assemblage within 10km of a provincial capital is of great conservation importance as it represents one of the last remaining intact areas in the Alto Mayo. The area is currently being protected by local community groups.

- ✓ Historical migration patterns and distribution-wide genomic diversity of bonobos (*Pan paniscus*) during a century of anthropogenic habitat encroachment

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Abstract: Despite being one of man's closest living relatives, bonobos (*Pan paniscus*) have been neglected in genome wide studies, compared to other great apes. Here we provide a whole genome analysis of an extensive museum collection of bonobo specimens collected across the species extant distributional range over the last century. Genetic material from the teeth of 46

bonobos (sample time range from 1904 to 1979) was collected using ancient DNA extraction methods. High coverage (on average 15X) genome sequencing was carried out on 15 specimens with the highest endogenous DNA content. The remaining 31 samples were sequenced at low coverage (1X). Using genotype likelihood-based methods on the full data set, we infer at least three distinct genetic population structures with varying degrees of gene flow between populations. By comparison to previous estimates from modern samples, we further show the impact of anthropogenic disturbance on genomic diversity over the last century. Then, from the panel of high coverage sequenced specimens, representing each of the inferred population clusters (five specimens from each), we use standard genotype calling methods for a series of more in-depth analyses. Most notably, this revealed possible clues to the geographical origin of historical gene flow with chimpanzees as well as potential migration patterns. Together, these findings will establish a baseline for future conservation efforts of this threatened ape.

- ✓ Food begging and sharing in wild bonobos: assessing or maintaining relationship quality?

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Abstract: Food sharing among primates is often viewed as a cooperative behaviour serving to create and reinforce bonds, or as a currency in reciprocal exchanges. Evidence for both of these functions exists for chimpanzees (*Pan troglodytes*), but recent studies focusing on bonobos (*Pan paniscus*) have been less conclusive. In contrast to reports from chimpanzees, sharing in bonobos tends to be passive, have little rank effect, and is observed predominantly between females. To explore the patterns and functions of food transfers between wild bonobos, we built two GLMMs using 260 begging events observed throughout nine months at Luikotale, DRC. We found no evidence that sharing was part of a reciprocal exchange for grooming [p=0.15] or sexual opportunities [p=0.43], and only weak evidence that begging increased the likelihood of obtaining food from a possessor, with begging tending to be more successful when dominant individuals targeted subordinates. We propose the "assessing-relationships" hypothesis, suggesting that food sharing and associated begging allow solicitors to gain information about the status of their relationship with the possessor. This hypothesis is similar to one proposed for food solicitation among orangutans, and accounts for our observations of frequent unsuccessful solicitation attempts from recently immigrated younger females, as well as solicitations for easily accessible food items. Our results suggest that patterns underlying food sharing differ between chimpanzees and bonobos, and may serve different functions.

- ✓ First glimpse at an enigmatic chimpanzee population in forest fragments of the Albert Lake escarpment (rafale), Ituri, DR Congo

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Abstract: In Ituri province, Democratic Republic of the Congo, between 2015-2017, mammalian inventory in unexplored forest fragments named RAFALE revealed an isolated population of Eastern chimpanzees (*Pan troglodytes schweinfurthi*).
We studied the site with camera traps and transect surveys (signs, tracks and nests - SCNC, habitat characterization and botanical inventory, level of human activities and collection of genetic material) and conducted structured interviews with locals to understand beliefs linked to primates. The three main fragments studied totaled ±18.15km$^2$ with an estimated forest loss in the period 2010–2015 of 6.11depending on the intensity of anthropic disturbances and proximity to settlements. Interviews and direct observations revealed mammal hunting (galago) and possible funeral rites (watching the dead). We recorded an exceptionally high mammalian and primate density, including a group of 17 chimpanzees with 3 unweaned juveniles and adults with snare-caused mutilation. By DNA barcoding at least 2 Pholidota, 1 Cetartiodactyla, 1 Afrosoricida, 5 Carnivora, 9 Primates, 7 Chiroptera and 21 Rodentia/Insectivora species were identified. We quantified chimpanzee nest density and mammal functional diversity along five line transects (1.1–1.4km). Chimpanzee density was high with 4.34–5.62/km$^2$ individuals due to the relict nature of the fragments and topography of the region creating reduced clustered suitable habitats. The biodiversity rich mosaic of the Albert lake landscape calls for a reflection on the minimum area required to grant official protection status.

- ✓ Geospatial information informs participatory land use planning and conservation efforts for the bonobo (*Pan paniscus*)

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Abstract: Endemic to the Democratic Republic of the Congo (DRC), the bonobo (*Pan paniscus*), has been listed as Endangered on the IUCN Red List since 2007. The University of Maryland collaborates with the African Wildlife Foundation to support conservation planning activities aimed to protect bonobo habitat in northern DRC. We used a combination of

Geographic Information Systems (GIS) and satellite-derived information to develop spatial models identifying areas of highest conservation potential for bonobos, including key habitat blocks and potential corridors connecting them. To help assure connectivity, we initiated conservation land use planning processes with neighboring village communities. For this, we engaged approximately 90 villages in a participatory mapping program to define locations of agricultural areas, community forests, and habitat protection zones supported by agricultural extension to discourage deforestation. We evaluated the effectiveness of the bonobo habitat conservation activities by comparing annual tree cover loss trends in the community forests of both project intervention and nearby non-intervention villages from 2001-2016. Although every village experienced an increase in forest loss, forest loss in intervention villages was 3,585 ha (accounting for 1.7% of all forest loss in this time period) and forest loss in non-intervention areas was 6,075 ha (accounting for 4.3% of all forest loss in this time period respectively). This presentation showcases geospatial data and analysis in the context of monitoring impacts on bonobo habitats and evaluating project impacts.

- ✓ Establishing a reproducible procedure for IVF in baboons as models for saving endangered species

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Abstract: Saving endangered species requires specialized assisted reproductive technology such as *in vitro* fertilization (IVF) that encompasses understanding of gamete biology, embryo development and implantation. This study aimed at establishing a reproducible procedure for IVF in baboons (*Papio anubis*) as models. Twenty baboons (n=20) maintained at the Institute of Primate Research, Kenya were used for the two experimental phases (phase I and II) with each experimental phase consisting n=10. The animals were randomized for studies on menstrual synchronization, ovarian stimulation (OS), IVF and embryo transfer (ET). Diagnosis of pregnancy was made with clinical criteria (amenorrhea with flat and red colored perineum) and Ultrasound at day 24 after ET. Based on randomized studies, two protocols for OS (long protocol and depot protocol) were superior to other protocols resulting in 7-10 MII oocytes. Fertilization by IVF/ICSI for the two phases was 23%-71%. Embryo culture was successful in our culture system up to day 3 and was associated with 80-100% survival rates and 12-57% (4-8cell) embryos. ET resulted in prolonged luteal phase of 28 days, which is much longer than the mean luteal phase duration of 11±5 days) observed in the other baboons after ovarian stimulation and oocyte retrieval. Based on all the findings, IVF was successful in the baboon and this technology can be extended to other primates to save them from extinction.

- ✓ Impact of habituation and ecosystem-sharing on non-human primate and Human strongylid communities

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Abstract: The close phylogenetic relationship between humans and non-human primates (NHP) results in a partial overlap in their pathogens. The disease transmission interface between these two groups has escalated in recent years due to closer and more frequent contacts through habitat encroachment and activities such as habituation for ecotourism.
Although habituation can contribute to the conservation of endangered NHPs and their ecosystem, it also increases pathogen spillover risk. We collected 350 fecal samples from western lowland gorillas (*Gorilla gorilla gorilla*), central chimpanzees (*Pan troglodytes troglodytes*) and agile mangabeys (*Cercocebus agilis*) at different stages of habituation inhabiting forests in the Central African Republic and Cameroon, and 150 samples from humans living in adjacent villages with varying frequencies of entering the forest and/or coming into direct contact with NHPs through ecotourism activities. We described and compared stronyglid communities between non-habituated NHPs, habituated NHPs and humans inhabiting the same area using analyzes of ITS-2 metabarcoding profiles that were based on multivariate Generalized Linear Models and Principal Coordinate Analysis. Results from NHP and human strongylid communities revealed host-specific haplotypes, co-occurring haplotypes, and differences in the strongylid diversity of humans entering the forest at different frequencies. Our findings show that ecosystem-sharing can result in pathogen risks not only to endangered NHPs, but also to humans, and contribute to mitigating threats to both NHP and human health.

- ✓ People believe that naturalistic enclosures make primates happier

***J. M. STEVENS*[1, 2], *S. D'HAEN*[3], *H. ARNOUTS*[3], *H. VERVAECKE*[3]**
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Perceptions of the public on what makes primates in zoos happy matter as much for zoos as the actual welfare of the apes. It may be that enclosures which benefit the apes, may not be perceived as such. In an online query, we asked respondents to rate 6 pictures of natural versus unnatural looking enclosures for bonobos (*Pan paniscus*), following an existing questionnaire used to score subjective well-being in apes. For naturalistic enclosures, respondents gave higher scores for degree of happiness, for duration of happiness; for the degree in which the animals were successful at fulfilling needs; for how happy they would be if they were the animal during one week in that enclosure ($df=1$, $p<0.0001$). Pairwise comparisons of natural versus unnatural enclosures showed that the differences were significant for happiness score; duration of happiness; and happiness if the respondent would be the animal ($df=200$, $p<0.00001$). All pairwise comparisons differed significantly for "efficiency to fulfil their needs", except for the comparison of a natural but relatively empty grassy area with an unnatural indoor enclosure with climbing structures ($df=200$, $p<0.351$). Overall, people feel that naturalistic looking enclosures make bonobos happier. This research helps zoos to understand how the public perceives welfare of apes in human care, so that they can convey efficient conservation messages.

- ✓ Nocturnal activity in wild chimpanzees: flexible sleeping patterns and insights into human evolution

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Abstract: As a follow-up to the IPS 2016 symposium "Burning the midnight oil: great ape nocturnal activity and the implications for human evolution" we investigated occurrences and patterns of terrestrial nocturnal activity in wild chimpanzees (*Pan troglodytes*) and modelled the influence of various ecological predictors. Data were extracted from terrestrial camera trap footage and ecological surveys at 22 chimpanzee study sites participating in the PanAfrican Programme: The Cultured Chimpanzee. From videos demonstrating nocturnal activity, we investigated the effects of percentage of forest, abundance of predators (lions, leopards, hyenas), abundance of large mammals (buffalos, elephants), average daily temperature, rainfall, human activity, and percent illumination. Terrestrial nocturnal activity occurred at 18 sites, at an overall average proportion of 1.80% of chimpanzee activity, and during all hours of the night. We found a higher probability of nocturnal activity with lower levels of human activity, higher average daily temperature, and at sites with a larger percentage of closed forest (full-null model: chi-square =28.762, df=8, p=0.001). Abundance of predators and large mammals, rainfall, and moon illumination had no effect. Thus, chimpanzee terrestrial nocturnal activity appears infrequent, suggesting a consolidated sleeping pattern. Together with evidence that sleep in traditional societies is consolidated, our results suggest that ancestral human sleep was also consolidated.
Chimpanzee nocturnal activity appears flexible, enabling response to fluctuating external pressures. Such flexibility can allow species to adapt to changing environments.

- ✓ Research as a critical conservation tool in non-protected forests of Cameroon

***N. TAGG***[1, 2], ***D. MBOHLI***[2], ***J. WILLIE***[1, 2, 3], ***L. TEDONZONG***[2, 3], ***J. KUENBOU***[2], ***L. LENS***[3]

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Abstract: There is an urgent need for great ape conservation to be based within a social, political and economic context and to foreground landscape-wide planning. It is, therefore, necessary to understand the mechanisms of co-existence of great apes and people in human-dominated landscapes at the peripheries of protected areas, and the effects of disturbance on species survival. Applied-conservation research projects can provide this much-needed information, as well as directly contributing to species conservation through deterring hunting, offering capacity-building, and raising conservation awareness of local people. We report on evidence for the importance of conservation-applied research, using La Belgique research site in the Dja landscape, southeast Cameroon, as an example. As the field site provides opportunities for student training and theses, we hope to inspire and motivate the next generation of conservation scientists to embrace the demands of great ape conservation in this region. Cameroon is an emerging ape research powerhouse: a growing number of universities are producing a generation of researchers who will have a tremendous impact on future great ape conservation and research. The boots-on-the-ground, *in-situ* conservation research conducted at La Belgique offers a potentially great model for wider application in Cameroon and the Gulf of Guinea. In this way, we seek to expand conservation efforts geographically, attract the attention of scholars and conservationists, and ultimately boost great ape conservation in this important region.

**Edwin van LEEUWEN** (UAntwerpen; Max Planck Institute ; University of St. Andrews, UK)

**Jacob WILLIE** (CRC-RZSA,UGent)

- ✓ Social climate mediates information transmission in chimpanzees

***E. J. VAN LEEUWEN***[1, 2, 4]***, S. E. DETROY***[3]***, J. CALL***[4]***, D. B. HAUN***[3, 5]
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Abstract: Social learning entails the capacity to acquire information about environmental contingencies by means of observation. Insights into learning dynamics in nonhuman primates could shed light on the evolutionary trajectory and uniqueness of human social learning. We studied chimpanzees' social learning in two neighbouring groups of chimpanzees housed at the Chimfunshi Wildlife Orphanage Trust, Zambia. We conceived of a token-exchange task in which peanuts were delivered upon the insertion of one wooden ball in a spring-controlled drawer. First, we established that no chimpanzees (n=68) could solve the task by themselves by placing the baited task, including tokens, in their enclosures for three months, and observing that no successful exchanges were made. Then, in the absence of other chimpanzees, we taught

the solution to one mid-ranking female in each group. Lastly, we ran 39 2-hour sessions in each group (one session per day), finding that in total 14 naïve chimpanzees acquired the solution.
Information transmission was faster, more widespread and diverse in the group characterized by higher levels of social tolerance (assessed independently with a group co-feeding task). We found social learning tended to be female-biased (binomial test: p=0.057; 11/14 females). These results extend previous findings by showing that chimpanzees can differ in their conduciveness to social learning. This study illustrates how single-group studies of social dynamics may not be representative of the entire species.

**Leslie WILMET** (Agro-Bio Tech Gembloux-ULiège, RBINS)
***Winner of IPS Students' Oral communication Prize***


R. VERCAUTEREN DRUBBEL (ULB), L. WILMET (ULiège, RBINS), Vinciane FACK (ULB)

- ✓ Great apes may shift ranging patterns in response to anthropogenic pressure
  ***J. WILLIE*[1, 2], *L. TÉDONZONG*[1, 2], *N. TAGG*[1], *J. KEUMO KUENBOU*[1], *L. LENS*[2]**
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Abstract: Central chimpanzee and western lowland gorilla nests were surveyed in "La Belgique" Research Site (East Region, Cameroon) in 2001 and 2016 along 10 6-km transects to measure change in great ape distribution and abundance. To supplement this information and assess temporal change in ranging behaviour, we surveyed chimpanzee and gorilla nests from October 2015 to August 2016 in a sample grid comprising 133 1000x1000 m cells set in "La Belgique" Research Site and adjacent forest patches known as Projet Grands Singes (PGS) area; each cell included a 1200-m transect. Along the 10 6-km transects, encounter rates of chimpanzee and gorilla nests were initially higher in 2001 (3.43 and 1.8, respectively) but drastically decreased in 2016 (1.42 and 0.017, respectively).
However, overall great ape encounter rates in the grid were 1.7 and 0.55 for chimpanzees and gorillas, respectively. Hence, in the 10-transect area, great ape density decreased over the years, and results in 2016 represent lower bound estimates of great ape abundance in the wider PGS area. Although the extensive use of the transect area has resulted in lower ape abundance, great apes persisted and occurred in higher densities in other forest patches within the PGS area. A reduction in great ape abundance between surveys of the same site may be due to an alteration of great ape ranging patterns to cope with human disturbance.

- ✓ Assessing the risk faced by a threatened sportive lemur, *Lepilemur mittermeieri*, endemic to the fragmented landscape of the Ampasindava Peninsula in Northwest Madagascar

***L. WILMET***[1, 2, 3 **], ***C. VERMEULEN***[1], ***R. BEUDELS-JAMAR***[2], ***P. DEVILLERS***[2], ***P. LEJEUNE***[1], ***C. SCHWITZER***[3]

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[**] ***winner of IPS Students' Oral communication Prize (tied for 2nd place)***

Abstract: Madagascar has an exceptional biodiversity of plants and animals, characterized by a high level of endemism, but deforestation is rampant and the remaining forests are fragmented and threatened. Most endemic fauna, including lemurs, are conservation-dependent. The distribution range of *Lepilemur mittermeieri* is restricted to the Ampasindava peninsula, in the northwest of the island. This small nocturnal folivore is exclusively arboreal. A recently approved mining project on the peninsula will likely put this forest-dependent species at risk of extinction.

Our aim is to assess the risk faced by *L. mittermeieri* in this new context and related to the high deforestation rate occurring on the peninsula. We investigated if *L. mittermeieri* is still found in highly fragmented coastal forest patches.

We conducted presence-absence surveys using line-transect methods in the subhumid forests of the northwest coast of the peninsula. We then identified critical areas for *L. mittermeieri* at the scale of the entire peninsula using Morphological Spatial Pattern Analysis. We made 51 observations of different individuals along 11 transects.

Through morphological image processing, we designed a map highlighting high potential core forest and corridors on the Ampasindava peninsula. Our results suggest that forest management should consider connectivity of forest patches and that small, fragmented coastal patches of forest should not be forgotten in conservation strategies of the Ampasindava peninsula as they may meet species' needs.

- ✓ Use of empty nest boxes to increase richness of sleeping trees for the wild black lion tamarins, *Leontopithecus chrysopygus*, in an altered fragment, Pontal do Paranapanema, Sao Paulo, Brazil

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[**] *PhD defended at the University of Liège in 2009*

Abstract: Trees are an important resource for black lion tamarins (BLTs), which preferentially select tree cavities for sleep. In second-growth forests, the availability of tree cavities is limited. Provision of different nest box models (tunnels, shelves or empty) may increase the richness of sleeping cavities for wild BLTs. We investigated behaviors expressed by a BLT group when encountering nest boxes, hypothesizing exploratory behavior by adults. We selected three locations within the group's home range and installed one nest box in each area. We placed a camera in front of each nest box and monitored use by BLTs for six months, adding a partial total of 480 trap-days. We recorded three exploratory events by BLTs (0.6%) in a single nest box. In the three locations, only one single adult individual manually explored the nest box while the others remained distant. The results indicate that there was some exploratory behavior

of an empty nest box. However, the few records and limited time spent in the box may indicate disinterest of BLTs in the empty nest box model, which suggests that it may not provide adequate security to be used as a sleeping cavity. The continuity of the study with different models of nest boxes is important to understand if physical factors of the nest boxes may shed light on the selection of BLT sleeping sites.


Part of the Belgian Team with from left to right Karen **STRIER** (IPS President), Sarie van BELLE, Régine **VERCAUTEREN DRUBBEL** (ULB), Vinciane **FACK** (ULB), Jacob **WILLIE** (CRC), Nikki **TAGG** (CRC), Edwin **VAN LEEUWEN** (UAntwerpen)

The **2018 Lifetime Achievement Award of the International Primatological Society for notably broad and eminent contributions to primatology** is awarded to

**Cliff JOLLY** (retired from New York University)

❖ Professor **Clifford "Cliff" JOLLY**

There are few primatologists, in the broadest sense of the term, who have contributed as much, and in as many diverse areas, as Cliff Jolly. It has been over 50 years (1965) since he completed his Ph.D. at University College London, and ten since he retired from New York University (NYU), where he served as faculty member for more than 40 years. Nowadays, never staying idle, it is with these achievements under his belt that he continues to contribute significantly to our field. In considering his scientific record, we emphasize the individual contributions to of the field of primate genetics, morphology, paleontology, ecology and behavior, and that he has, in fact, undertaken research in almost every field of study that falls within the purview of the IPS. His most influential work involved the integration of ideas and data from various branches of our discipline (a rare skill), and this work has been unique in transforming primatology.

While his early work centered on serological genetics (e.g., Jolly and Brett, 1973) and baboon paleobiology (e.g., Jolly, 1967, 1972), its implications have extended significantly into the fields of human paleontology and evolution – his own research broadening concomitantly. He has co-authored two books, edited two more, and has produced over 100 publications in the fields of paleontology, comparative morphology, behavior, ecology, molecular and population genetics, virology and systematics of primates (including humans). His first publication (1963) combined morphology and behavior in an analysis of the evolutionary origins of the male hamadryas baboon's elaborate mane. Cliff's theoretical perspective permeates all of his work. Some of his most notable and enduring contributions to the theoretical literature include *The seedeaters: a new model of hominid differentiation based upon a baboon analogy* (1970), *Species, subspecies and baboon systematics* (1993) and *A proper study for mankind: analogies from the papionin monkeys and their implications for human evolution* (2001).

Each of these papers stand out as an example of integrative, thoughtful, and data-driven approach he has championed in primatology. Without question, The Seed-Eaters is a classic example of the successful use of morphological and ecological information, on both extant and extinct species of monkeys, as a model for a new and wonderfully rich perspective on the ecology and the evolution of human ancestors. It is widely regarded as having provided a new, and unique perspective regarding the evolutionary forces that underlie human evolution. In addition, Cliff Jolly's academic legacy lives on through both his students (although he has

directly supervised 31 Ph.D. students in his over 40 years at New York University and mentored countless more), and the myriad of scholars he has influenced. In 2008, he was honored through the form of a Wenner-Gren Foundation conference titled Evolutionary Anthropology at the Interface: A Celebration of Cliff Jolly's Contributions to the Field. In 2011, the American Association of Physical Anthropologists awarded him its highest honor: the Charles R. Darwin Lifetime Achievement Award. He is also a Fellow of the American Association for the Advancement of Science. Today, he is honoured by IPS to acknowledge not only his significant individual and widely synthetic contributions to our field, but also his generosity in sharing knowledge and talent in engaging others and stimulating thought. He exemplifies the characteristics of a scholar, by virtue of his intellectual strengths and the spirit of collegiality and cooperation with which he engages others. Cliff Jolly continues to be one of the giants in the field, influential across the spectrum of an ever-expanding primatology.

Lifetime Achievement Award Featured Presentation

- ✓ Historical Primatology

***Cliff JOLLY***
*60 Eighth Street, Hoboken, NJ, 07030, USA*

Abstract: The theme here is contingency, the unpredictable convergence of circumstances, exemplified at two very different levels. One is personal, recounting some influential encounters and collaborations over a lifetime of interest in primate natural history, contemporary with rapid developments in the theory and practice of evolutionary biology. The second, less nostalgic, concerns the effects of paleoenvironmental events in the evolution of the extant baboons. The general problem is to explain the extent and distribution of diversity in baboon morphology and social behavior, especially given the breadth and apparent uniformity of their fundamental ecological niches. To take one example, why do hamadryas and Guinea baboons share behavioral and physical apomorphies not seen in the intervening populations? The explanation suggested here includes a demographic and genetic effect generated by rapid colonization of empty habitat, early in baboon history. At the frontier of colonization, male dispersal would be strongly disfavored, producing population-wide male philopatry and a suite of secondary adaptations. The resulting malephilopatric societies, however, were vulnerable to introgressive "swamping" from male-dispersing neighbors, and today are reduced to marginal populations, or even "mitochondrial ghosts". This is, frankly, a narrative, a "Just-So Story". Devising crucial predictions and tests for such hypothetical scenarios will require paleoecologists, socioecological and population-genetic modelers and genomicists, and probably extensive additional data. Whatever the outcome, however, explanations must accommodate the complex contingencies of evolutionary history.

**Posthumous Lifetime Achievement Award for notably broad and eminent contributions to primatology**: **Colin GROVES**

- ❖ **Colin GROVES** was a Professor of Biological Anthropology at the Australian National University, Canberra, where he taught courses in Primate Evolutionary Biology, Human Evolution, and Primate Ecology and Behaviour.

A student of Professor John R. Napier, he completed his Ph.D. thesis at the Royal Free Hospital School of Medicine in 1966, with a study of the cranial morphology of gorillas where

he used his findings to clarify the taxonomy of the genus. From 1966 to 1973, he worked as a Postdoctoral Researcher and Teaching Fellow at the University of California, Berkeley, at Queen Elizabeth College, London and at Cambridge University. In 1974, he joined the Department of Archaeology and Anthropology at the Australian National University, Canberra, where he worked for more than 40 years. His interests cantered on mammalian morphology, biogeography and taxonomy, focusing on monotremes, marsupials and ungulates, but most especially primates: both human and nonhuman.

A brief review of some of his extensive research on primates includes papers on the morphology, biogeography, phylogeny, systematics and taxonomy of the great apes (1970, 1979, 1985, 1986), specifically orangutans (1985, 1988), the Colobinae (1970), the Cercopithecoidea (1970, 2000), slow lorises (1972), gibbons (1972, 2005), prosimians (1974), the Hominidae (1975, 2007, 2017), mangabeys (1978, 2007), Sulawesi macaques (1980), the bamboo lemurs Hapalemur (1988), all lemurs (1988, 1995, 2008), fork-marked lemurs Phaner (1991), tarsiers and lorises (1998), the dwarf lemurs Cheirogaleus (2000), chimpanzees (2005) and the Mesoamerican primates (2006).

His lifelong endeavors sought to identify, document, and explain the diversity of primates and other mammals, and resulted in significant and influential considerations regarding the parameters that define the concept of species. He published many firm and increasingly clear and logical arguments advocating for the use of phylogenetic or diagnosability criterion to document primate diversity. This underpinned the primate taxonomies he developed, and successfully underscored what he referred to as "taxonomic inertia", which had been omnipresent in 1960s to the 1990s.

While much of his time was spent in museums and laboratories, he also worked in many field sites in Kenya, Tanzania, Rwanda, India, Iran, China, Indonesia, Sri Lanka and the Democratic Republic of Congo (including work at the Karisoke Research Centre and Gombe National Park).

Colin's experiences with wild primates inspired his devotion for primate conservation. He supervised and advised many students working on primate ecology, behaviour, and conservation, and was an advisor and supporter for numerous international conservation institutions and NGOs.

His eclectic and profound research on primate taxonomy resulted in two major books that have had a major influence on our understanding of the taxonomy and systematics of primates - *A Theory of Human and Primate Evolution*, published in 1989, and *Primate Taxonomy*, published in 2001. These serve as benchmarks when it comes to primate classification.

He also made notable and exemplary contributions to a Primate Taxonomy Workshop, organized by the IUCN SSC Primate Specialist Group in February 2000.

The aim of this event, drawing on the prominent experts at the time, was to put together a best consensus taxonomic listing of primates to underline the threatened status assessments of the IUCN Red List. Colin Groves was the only person to contribute as author to all four of the publications that arose from this meeting - reviews of the lemurs of Madagascar as well as the Neotropical, African and Asian primates.

Three of them were published in the International Journal of Primatology. His taxonomic research has touched and deeply influenced our understanding of all primate families, and the taxonomic classification he espoused in his 2001 *Primate Taxonomy* is now broadly accepted as the baseline for primate research and conservation worldwide. He provided the primate chapters for the 1993 and 2005 compilations of the *Mammal Species of the World*. Most recently, he demonstrated his immense expertise and vast knowledge of primate taxonomy in his contribution to the 951-page volume of *The Handbook of the Mammals of the World*, published in 2013 by Lynx Edicions of Barcelona, an issue dedicated to primates. His

taxonomies have been adopted by the IUCN SSC Primate Specialist Group and, consequently, the IUCN Red List of Threatened Species, as well as by numerous macroecological and biogeographical initiatives for documenting global biodiversity.
His profound and recondite understanding of primate systematics and biogeography gave him the status of "unchallenged guru" in this branch of science, yet all who knew him will have experienced the readiness, ease and enthusiasm with which he investigated odd nomenclatural problems and complex relationships amongst the members of the Order Primates.

**Colin GROVES** was selected as this year's IPS Lifetime Achievement Award winner. Sadly, he passed away in November 2017. As this prize cannot be given posthumous, the committee choose to honour also **Clifford JOLLY**.

## Special Presidential Award for contributions to the Development, Promotion, and Advancement of Latin American Primatology: Milton THIAGO DE MELLO

- Dr. **Milton THIAGO DE MELLO** is one of the founders of Brazilian and Latin American Primatology.

Born in 1916, he is one of the oldest active primatologists. Milton's career is large, prolific, and overall has had an outstanding impact on the current academic lives of many primatologists from South America. His research has focused on primate health, wildlife veterinary and Neotropical primate and forest conservation.
He has published more than 220 texts, including books and scientific papers. He received his doctoral degree in the Brazilian National School of Veterinary Medicine. Currently, he is an active faculty member at the University of Brasilia.
He was elected as a member of the American Academy of Microbiology, the Brazilian Academy of Science, the New York Academy of Sciences, the Royal Academy of Veterinary Sciences of London and the Brazilian Academy of Veterinary Medicine, of which he has served as president. He is the recipient of various prizes such as the medal of the World Veterinary Association and the Guggenheim Memorial Award, among others. He recently had the honor of getting the recently discovered Milton's titi monkey (*Callicebus miltoni*) named after him, in recognition for his work and teaching commitment to the Latin American primatological community.
Milton is also universally known as an affable, open, and accessible person. Young students can approach him and exchange ideas with him at any time. He is always available for advice and can always be counted on to express his opinions in a very candid way.
He served as Secretary for the Americas to the International Primatological Society from 1984-1996 and he hosted the XII$^{th}$ IPS Congress in Brasilia in 1988.

## Margot Marsh Biodiversity Foundation Award for Excellence in Primate Conservation

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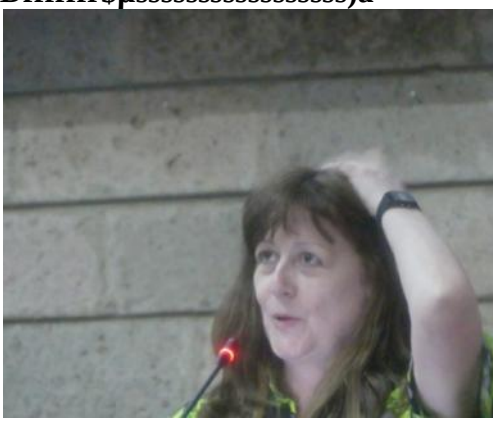

**Liz WILLIAMSON** and Russ MITTERMEIER

- **Liz Williamson,** an Honorary Senior Research Fellow in the Division of Psychology, University of Stirling, received the fifth biennial Margot Marsh Biodiversity Foundation (MMBF) Award for Excellence in Primate Conservation. The award was given by Dr. Russ MITTERMEIER in recognition of Liz's achievements in gorilla conservation.

She completed her Ph.D. thesis on the "Behavioural ecology of western lowland gorillas in Gabon" at the University of Stirling in 1988.
Since then, she has worked in the forests of Cameroon (Dja), Central African Republic (Bangassou), Democratic Republic of Congo (Kahuzi-Biega), Gabon (Lopé), Liberia (Sapo) and Rwanda (Nyungwe and Volcanoes).
For six years (1996–2001) she was director of the Karisoke Research Centre for the Dian Fossey Gorilla Fund International and Vice Chair of the Section on Great Apes of the IUCN SSC Primate Specialist Group for 10 years (2005–2015).
She is Series Editor of the IUCN Best Practice guidelines for great ape conservation (http://www.primate-sg.org/best_practices).
Liz is also the IUCN Red List Authority Coordinator for all great ape taxa (bonobos, chimpanzees, gorillas and orangutans).

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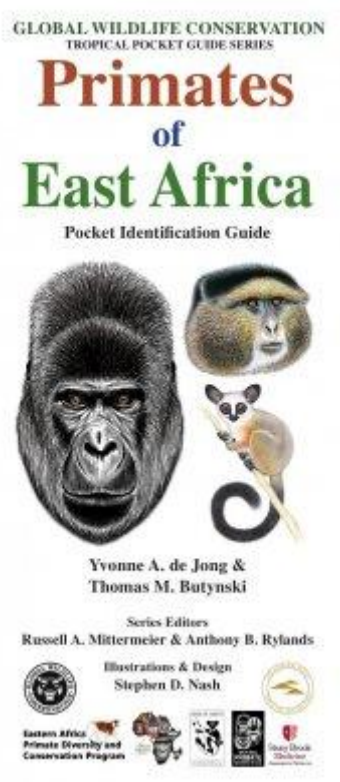
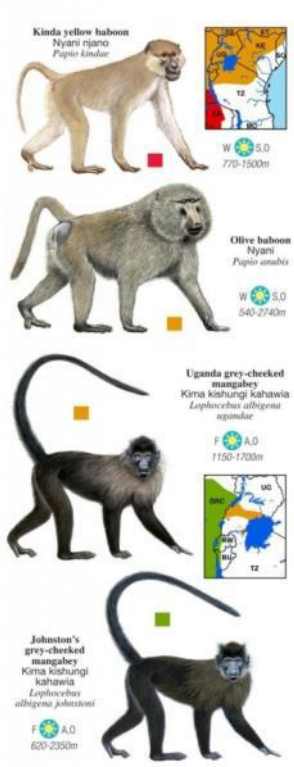
# New Guide

📖 **<u>Primates of East Africa: Pocket Identification Guide</u>, 2018**
***Yvonne A. DE JONG*** *and* ***Thomas M. BUTYNSKI*** *(authors),* ***Stephen D. NASH*** *(illustrator), Global Wildlife Conservation (publisher); 20 pages, 73 colour illustrations, 32 colour distribution maps*
Conservation International's Tropical Pocket Guides are intended to help experts or enthusiasts identify animals in the field.





This laminated pocket guide contains colour illustrations to aid identification and maps for locating the primates of East Africa.
In addition, each species description includes arboreality, the type of habitat where it can be found and conservation status.
Extensive maps of the region show country borders, major rivers and types of natural vegetation zones.
You can use the checklist to note where, when and what you saw.

## Primate Gossip