Laterality and its Connection with Stress in Several Species of Non-human Primates

Gloria Fernández-Lázaro[a], *Roberto Latorre*[b], *Enrique Alonso-García*[a], *Isabel Barja*[c,d]

[a]Friends of Thoreau Program, Instituto Franklin, Universidad de Alcalá, Madrid, Spain; [b]Grupo de Neurocomputación Biológica, Departamento de Ingeniería Informática, Universidad Autónoma de Madrid, Madrid, Spain; [c]Departamento de Biología, Unidad de Zoología, Universidad Autónoma de Madrid, Madrid, Spain; [d]Centro de Investigación en Biodiversidad y Cambio Global (CIBC-UAM), Universidad Autónoma de Madrid, Madrid, Spain
E-Mail: gloria.fernandez@institutofranklin.net

Cerebral lateralisation has been suggested to have practical implications to improve animal welfare with the left and right sides of the brain specialised to process information in different ways and to control different categories of behaviour and emotions. Combining it with other indicators, strong validation of results could be obtained. In our study at Faunia Zoo (Madrid, Spain), we used hand preferences for simple reaching during normal feeding times as a measure of lateralisation, and faecal cortisol metabolites (FCM) as physiological measure of stress in 8 species of non-human primates: *Callithrix jacchus* (3 males), *Callithrix geoffroyi* (2 males), *Cebuella pygmaea* (1 male, 1 female), *Saguinus imperator* (2 males), *Saguinus oedipus* (1 male, 1 female), *Leontopithecus rosalia* (2 males), *Pithecia pithecia* (2 males, 1 female) and *Nycticebus pygmaeus* (1 male, 1 female). The handedness index score (HI), its absolute values (ABS-HI) and the binomial Z-score were used. An individual was considered to have a significant hand preference if the Z-score was ≥1.96 or ≤–1.96 ($p < 0.05$). Analysis revealed that 15 of our subjects presented a strong hand preference (8 subjects were right-handed and 7 left-handed), while 3 individuals were identified as ambi-preferent. The strength of the lateralisation, independent of the direction, was positively correlated with physiological stress. This study shows evidence of a relation between stress and lateralisation for these non-human primate species although more empirical research is needed to explain it.

Prevalence of Intestinal Parasites in Endangered Ashy Red Colobus Monkeys (*Piliocolobus tephrosceles*) in Tanzania

Olga González-Moreno[a,b], *MJ Kibaja*[c,d], *P Chueca*[e], *P Goñi*[e], *C Nahonyo*[d], *J Torres*[b], *J Huguet*[a], *R Adriana Hernandez-Aguilar*[c,f]

[a]Synlab Diagnostics, Esplugues de Llobregat, Barcelona, Spain; [b]Laboratory of Parasitology, Faculty of Pharmacy, University of Barcelona, Barcelona, Spain; [c]Centre for Ecological and Evolutionary Synthesis, Department of Biosciences, University of Oslo, Oslo, Norway; [d]Department of Zoology and Wildlife Conservation, University of Dar es Salaam, Tanzania; [e]Department of Microbiology, Preventive Medicine and Public Health, Faculty of Medicine, University of Zaragoza, Zaragoza, Spain; [f]Department of Social Psychology and Quantitative Psychology, Faculty of Psychology, University of Barcelona, Barcelona, Spain
E-Mail: olga.gonzalez@synlab.es

Intestinal parasites constitute one of the most frequent causes of gastrointestinal diseases in primates, directly affecting their health. We sampled 3 populations of the Endangered ashy red colobus monkey (*Piliocolobus tephrosceles*) with different levels of anthropogenic disturbance in Tanzania. We collected faecal samples (n=157) soon after defecation and fixed them *in situ* in

70% ethanol. We then re-fixed half of each sample in MIF (merthiolate iodine formaline) for microscopic study and saved the rest for molecular analysis. We examined helminth eggs, larvae and protozoan cysts using a light microscope after faecal sedimentation. We analysed samples positive for *Giardia* using Polymerase Chain Reaction (PCR) to determine genotypes. The overall prevalence of protozoan and helminth infection was 94.3% (148/157), with 64.9% (96/148) being infected by 1 species, 25.7% (38) by 2 species, and 9.5% (14) by 3 or more species. We detected 8 species of intestinal parasites: *Ancylostoma* sp. (13.4%), *Trichuris trichiura* (3.8%), *Strongyloides stercoralis* rhabditoid larvae (2.5%), *Entamoeba chatonni* (82.8%), *Iodamoeba butschlii* (14%), *Endolimax nana* (4.5%), *Blastocystis hominis* (2.5%) and *Giardia duodenalis* (14%). These species were detected in different combinations in the 3 areas, while *Giardia* was detected in only 1 area. The molecular analysis of positive *Giardia* samples showed that all of them belonged to assemblage B, which could also infect humans. However, we could not identify an exclusively anthropogenic origin of the parasitic species found. Our study contributes to our knowledge of parasitic infections in ashy monkeys in Tanzania, allowing us to assess their health status and disease risk, which in turn will help us design more successful conservation strategies for this Endangered primate in Tanzania

Identification of Suitable Reintroduction Sites in China for *Nomascus* Gibbons, using Maximum Entropy Modelling

Emma Horton

Oxford Brookes University, Oxford, UK
E-Mail: emmalouisehorton@hotmail.com

Present in historical records, as far north as Gansu and east to Zhejiang, Chinese gibbons are now present only in Tibet, Guangxi and Yunnan in mainland China. Both human population expansion, and associated habitat loss and hunting, and climate change have been implicated in this range decline. Many of the remaining populations are small and fragmented, and translocations and reintroductions are already being considered by the Central Chinese Government. This study used 21 modern (last 20 years) presence localities for mainland Chinese *Nomascus* species (*N. nasutus, N. concolor* and *N. leucogenys*) across their range in mainland China, Laos and Vietnam, along with 19 bioclimatic datasets (WorldClim) to predict and map suitable climatic regions for reintroductions using Maxent software (Version 3.4.1). The model predicted no suitable climate for *Nomascus* outside of Yunnan due to increased temperature seasonality elsewhere in China. The southwest corner of Yunnan, below Lincang and left of the Red River, was determined as the optimum location in China for reintroductions. This region has a climate highly similar to that experienced by current populations, and spatial data indicates low human population densities (<100/km^2) and numerous large patches (>60km^2) of evergreen broadleaf forests capable of holding viable population sizes. Returning gibbons to these forest patches is not only beneficial for gibbon conservation, but for restoring the presence of important seed dispersers in Chinese forests. It is recommended that the results of this study should be used to guide ground surveys to further investigate human disturbance and vegetation suitability in this region.