

The 14th International Symposium on Primatology and Wildlife Science

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	September 11th (Fri)	September 12th (Sat)
9:00		session4:
9:30		Chair: Lira Yu Chris Martin (20min), Yuri Kawaguchi (20min) Akiho Muramatsu, Shenwen Xu, James Brooks (15min×3)
10:00	Opening remarks by Gen'ichi Idani	
	session1:	
10:30	Chair: Yuko Hattori Kristin Havercamp (20min)	Coffee Break
11:00	Zhihong XU, Vanessa Gris, Sikha Hariharan, Hanling Yeow (15min×4)	session5:
11:30	Lunch Break / REMO practice	Chair: Kodzue Kinoshita Takashi Hayakawa (20min) Annegret M. Naito, Qi Luan Lim, Xiaochan Yan, Liesbeth Frias (15min×4)
12:00		Closing remarks by Gen'ichi Idani
12:30		
13:00	session2:	
	Chair: Gen'ichi Idani Yukiko Uchida (40min) Andrew MacIntosh(20min)	Online Student Workshop 13:30–14:30 For undergraduate & graduate students
13:30		
14:00	Coffee Break	
	session3:	
14:30	Chair: Nahoko Tokuyama Ryoma Otsuka, Akito Toge, Sota Inoue, Mayuko Nomoto (20min×4)	
15:00	Yu Kaigaishi (15min)	
15:30		
16:00	Poster session (Remo Conference) 16:00-16:45 Poster number 01 to 11、24 16:45-17:30 Poster number 12 to 23	
16:30		
17:00		
17:30	Get-together Party (Remo Conference)	
20:00		

Presentation time
 *40min: presentation 30min + discussion 10min
 *20min: presentation 15min + discussion 5min
 *15min: presentation 12min + discussion 3min

The 14th International Symposium on Primatology and Wildlife Science

PROGRAM

Day 1 September 11th (Fri)

Time		(min)	Title	Speaker	Affiliation
9:50	Zoom Open				
10:00-10:10		(10)	Opening Remarks	Gen'ichi Idani	PWS Program Coordinator
Session1					Chair: Yuko Hattori
10:10 11:30	O-01	(20)	Chimpanzee sleep and aging	Kristin Havercamp	Wildlife Research Center, Kyoto University
	O-02	(15)	Comparative look at the transmission of parasites in macaque social and spatial networks	Zhihong Xu	Primate Research Institute, Kyoto University
	O-03	(15)	Recognition of Pain in Japanese Macaques by Neural Networks - Preliminary Analysis	Vanessa N. Gris	Primate Research Institute, Kyoto University
	O-04	(15)	Drivers of natural resource extraction in rainforest habitats of the endangered lion-tailed macaque	Sikha Hariharan	Centre for Wildlife Studies, India Conservation Initiatives, India
	O-05	(15)	Chimpanzee behavioural reactions to cues of death	Hanling Yeow	Wildlife Research Center, Kyoto University
11:30 13:00		(90)	REMO practice <Lunch Break>		
Session2					Chair: Gen'ichi Idani
13:00 14:00	O-06	(40)	The Ways of Well-being and the Self: A Cultural Psychological Approach	Yukiko Uchida	Kokoro Research Center, Kyoto University
	O-07	(20)	Monkeys in the Middle: Navigating the Costs and Benefits of Social Centrality	Andrew JJ MacIntosh	Primate Research Institute, Kyoto University
		(15)	<Coffee Break>		
Session3					Chair: Nahoko Tokuyama
14:15 15:50	O-08	(20)	Tourist Expectation and Satisfaction in Mountain Gorilla Tourism in Bwindi Impenetrable National Park, Uganda	Ryoma Otsuka	Graduate School of Asian and African Area Studies, Kyoto University
	O-09	(20)	Differences and Similarities in insect feeding behavior of three species of forest guenons in the Kalinzu Forest Reserve	Akito Toge	Primate Research Institute, Kyoto University
	O-10	(20)	Herding in feral horses	Sota Inoue	Wildlife Research Center, Kyoto University
	O-11	(20)	Diet of forest elephants by fecal analysis at Moukalaba, Gabon: effects of season and body size	Mayuko Nomoto	Graduate School of Science, Kyoto University
	O-12	(15)	An exploration of multiplex grooming network in a free-ranging group of Japanese macaques at Awajishima	Yu Kaigaishi	Graduate School of Human Sciences, Osaka University
		(10)	<Coffee Break>		
Poster session (Remo Conference)					
16:00 17:30	coretime1 16:00-16:45 (P01~P11, P24)				
	coretime2 16:45-17:30 (P12~P23)				
17:30 20:00	Get-together party (Remo Conference)				

Day 2 September 12st (Sat)

Time	(min)	Title	Speaker	Affiliation
8:50		Zoom Open		
Session4				Chair: Lira Yu
9:00 10:35	O-13	(20)	Indianapolis Zoo's upcoming chimpanzee exhibit will promote authentic behavior through innovative design	Christopher Flynn Martin Department of Life Sciences, Indianapolis Zoo
	O-14	(20)	Cognitive responses to infants in apes: Comparative cognitive studies	Yuri Kawaguchi Primate Research Institute, Kyoto University
	O-15	(15)	Comparing Social Style in Zoo-housed Macaques by Open Lab Style Experiment	Akiho Muramatsu Institute for Advanced Study, Kyoto University
	O-16	(15)	Chimpanzees use video as a representation of next-door situation to locate hidden food	Shenwen Xu Primate Research Institute, Kyoto University
	O-17	(15)	Outgroup threat promotes ingroup tolerance despite increased stress in chimpanzees	James Brooks Wildlife Research Center, Kyoto University
	(15)	<Coffee Break>		
Session5				Chair: Kodzue Kinoshita
10:55 12:15	O-18	(20)	Molecular evolution of chemosensory receptor genes in the egg-laying mammals: echidna and platypus	Takashi Hayakawa Hokkaido University
	O-19	(15)	Genetic diversity of the endangered Japanese golden eagle	Annegret M. Naito Wildlife Research Center, Kyoto University
	O-20	(15)	Genetic diversity of the Malayan tapir's captive population in Japan	Qi Luan Lim Wildlife Research Center, Kyoto University
	O-21	(15)	Functional divergence of species-specific MC1R variants in seven endemic Macaca species in Sulawesi island	Xiaochan Yan Primate Research Institute, Kyoto University
	O-22	(15)	THE FAST FOOD EFFECT: COSTS OF BEING A GENERALIST IN A HUMAN-DOMINATED LANDSCAPE	Liesbeth Frias Danau Girang Field Centre
12:15-12:25	(10)	Closing remarks	Gen'ichi Idani	PWS Program Coordinator

<p>Online Student Workshop 13:30-14:30 For undergraduate & graduate students</p>
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Poster Session

coretime1 16:00-16:45 (P01~P11, P24)
 coretime2 16:45-17:30 (P12~P23)

No.	Presenter	Title
P-01	Yutaro Sato	Chimpanzees' (<i>Pan troglodytes</i>) inter-temporal choices when post-reward delay is present/absent
P-02	Makiko Take	Seed-eating primate still have advantage in forest fragment? Comparison with a non-seed-eating primate
P-03	Nelson Broche Jr.	Studying the acute stress response of the monkeys at Koshima
P-04	Kota Onizawa	Evaluation of the food provisioning efficiency to three sympatric primate species in a forest fragment, Manaus, Brazil
P-05	Tamao Maeda	Different groups also synchronize in multi-level society
P-06	Hiroto Yoshimura	Rotational exhibit and scent communication in captive snow leopards (<i>Panthera uncia</i>)
P-07	Ena Onishi	Synchronized urination in captive chimpanzees: possible effects of social closeness
P-08	Tomoe Torii	Group Size Estimation of Finless porpoises by Aerial Videos
P-09	Elio de Almeida Borghezan	Size-assortative pairing and mating in an Amazonian fish, the sailfin tetra <i>Crenuchus spilurus</i>
P-10	Pandora Pinto	Do macho horses have all the mojo? Examining testosterone concentrations in feral stallions
P-11	Yige Piao	The Operant Conditioning of Short-tailed Pit Vipers (<i>Gloydius brevicaudus</i>) Based on Different Infrared Shapes
P-12	Haruka Kitayama	Zoo acts as a "melting pot" of spider monkeys
P-13	Ayumu Santa	Comparative research about the illusion "brightness contrast" in primates and cetaceans
P-14	Mi Yeon Kim	The Survival Story of O-Rae: A Report of Indo-Pacific Bottlenose Dolphin without a Tail in the Wild.
P-15	Shohei Shibata	Aggressive interactions and spacing pattern among Male Bonobos in Wamba, Luo Scientific Reserve, Democratic Republic of the Congo
P-16	Halmi Insani	Geographic factors and inter-island connection correlates to mandibular morphological divergence of insular macaques over Sunda Shelf
P-17	Rena Numabe	The change of bitter sensitivity to PTC in each of individuals and the relationship between TAS2R38 polymorphism and food preference
P-18	Toshiki Minami	Grooming to a dead monkey in Japanese macaques & Effects of infant handling on behaviors and development of infant/juvenile Japanese macaques
P-19	Chika Zemmoto	Relationship between Personality traits and gene polymorphisms in two dog breeds (Miniature Dachshund and Toy Poodles)
P-20	Kenneth Keuk	Primate and Parasite communities in Sabah: the biodiversity-disease relationship across a Bornean landscape
P-21	Boyun Lee	Interest Shown in Infants by Non-mother Individuals in Yakushima Japanese Macaques (<i>Macaca fuscata yakui</i>): Changes in the first 8 weeks after birth
P-22	Yeong-ju Lee	Social bonds between female horses and the influence on the offspring's social development
P-23	Scott Jenkins	Preliminary Results of RNA-Seq Meta-Analysis Comparing Grasscutter Tissue Expression to Other Rodents
P-24	Mikuho Yokoyama	Progress report of the visual discrimination of materials in chimpanzees and humans

Chimpanzee sleep and aging

Kristin Havercamp^{1*}, Naruki Morimura^{1,2}, Satoshi Hirata^{1,2}

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Diurnal primates, like many other animals, spend around half of their lifetime sleeping, yet night-time behavior is considerably understudied compared to daytime activities. In their natural habitats it may be difficult or impossible to directly observe nocturnal activities, but in captivity the opportunity exists to closely monitor both day and night activity and thus better understand individual and/or group sleep patterns. Sleep quality decreases with advancing age in humans, but it is unknown if a similar pattern exists in our closest evolutionary relatives. We examined whether similar changes in sleep described among humans also occur in captive chimpanzees living at Kumamoto Sanctuary (KS), and described their sleep behaviors as very few reports exist.

Morimura et al. (2012) published sleep data gathered in 2007-2008 on male chimpanzees living in Building 1 at KS; twelve of those individuals are still alive and continue to live in the same conditions. From 2018-2019 we recorded 123 night videos using custom-built apparatus and infrared night vision cameras which were installed and maintained on a daily basis above each individual's indoor night enclosure. We analyzed 72 of these videos using instantaneous sampling at 1-min intervals (936 h, 6 nights per individual) to describe their sleep patterns and partly replicate Morimura et al.'s study to examine whether individual sleep quality changed over the decade-long period. In this presentation I will report the results of our recently submitted manuscript, as well as provide a brief overview of the projects I've been working on over the course of my PhD so far as this is my PWS L5 report.

Comparative look at the transmission of parasites in macaque social and spatial networks

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Pathogen transmission is key issue in both public health and wildlife conservation. Predicting pathogen transmission using social network analysis (SNA) has been trending upward following numerous studies of wildlife showing positive relationships between an individual's social network centrality (a measurement of its importance in a network) and its probability or degree of infection; including in macaques. Based on this work, we aimed to test whether social network centrality can predict parasite infection in different macaque species and populations. We constructed 4 data sets based on behavioral observations and parasitological investigation using 2 groups each of rhesus macaques (*Macaca Mulatta*) and Japanese macaques (*Macaca Fuscata*). We modeled the relationship between social network centrality and intestinal parasite infection intensity in each group and compared the results among them. We also conducted simulations to control for the effect of sample size (i.e. number of fecal samples for parasitology) on the determined relationship. Generalized linear mixed models suggest a positive relationship between centrality and infection in only one macaque population (Japanese macaques of Koshima). Simulations show that small sample size was unlikely to have affected our results. Overall, our results suggest that social network centrality does not generally predict parasite infection across species and populations, which may relate more strongly to the various local ecologies of the studied groups. However, we cannot rule out the possible influence of seasonality in our study because our data were collected at each site in different seasonal conditions. Furthermore, human influences such as degree of provisioning and population management may also play a role. Ultimately, this work emphasizes the importance of understanding the mechanisms underlying transmission and how they might vary across populations and groups when attempting to relate social factors to infection.

Recognition of Pain in Japanese Macaques by Neural Networks - Preliminary Analysis

Vanessa N. Gris^{1*}, Thomás R. Crespo², Nelson Broche Jr¹, Akihisa Kaneko¹, Munehiro Okamoto¹, Takako Miyabe-Nishiwaki¹, Daniel S. Mills³, Jun-nosuke Teramae², Juri Suzuki¹

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Changes in facial expression provide a means of assessing pain in mammals. While biomedical research has a continuing demand for primate models, evaluation of welfare is a crucial issue for the validity of the research and an important ethical concern. Artificial Neural Networks (NN) are models loosely inspired by biological neural networks, which enable a computer to learn from observational data. Given the wide range of successful applications of NN in image classification, our aim is to test if NN can differentiate the presence and absence of pain in Japanese macaques based on their facial expression.

Twenty-three adult females undergoing laparotomy were used in the present study. Video recording was performed with captive Japanese macaques (*Macaca fuscata*) undisturbed in their cages at least one day before (no pain, NP) and 1 day after the surgery before scheduled analgesia (pain, P). Videos were then submitted for facial detection and extraction with the NN based algorithm *RetinaFace*. We used 75% of the extracted pictures for training with the pre-trained NN called ResNet-50. Pictures used for testing (25%) were not included in training. Fully automatic sequential video processing resulted in 70,852 pictures. Deletion of redundant data according to pairwise similarity given by a histogram of gradients (HOG) reduced this number to 15,987 (NP = 10,805; P = 5,182).

Test accuracy for Experiment 1 (E1) was 0.69. For E2, we manually excluded non-frontal, blurred, occluded and misclassified images. The number of pictures dropped 28%, but the accuracy only changed slightly (E2 = 0.70). As a standard, only the last layer of pre-trained NN was modified, but for the 3rd experiment we decided to allow synapses to be modified in all 50 layers, this resulted in an accuracy of 0.94. Then we proceeded to evaluate NN capacity to generalize to any given macaque. Data of 2 individuals was excluded from training and used as test data. Accuracy of the test dropped to 0.48. This preliminary analysis concludes that when the NN is allowed to modify all layers of synapse, it is able to recognize and memorize many features not relevant for pain: background, illumination, skin color or objects in the enclosure, instead of focusing exclusively on features related to the face. To minimize confounders, the next aim of the study includes refinement of the image pre-processing methodology by excluding the image background and standardizing color and brightness.

This set of experiments is part of a larger project of observation and description of facial expressions using a morphometric approach. Comparison of both methods may give us a better understanding of the facial signs of pain in captive Japanese macaques.

Drivers of natural resource extraction in rainforest habitats of the endangered lion-tailed macaque

Sikha Hariharan^{1,2}, Divya Vasudev^{1,2,3}, Yogita Karpate² and Ajith Kumar¹

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The lion-tailed macaque (LTMs) is an endangered primate living in rainforests of the Western Ghats in southern India. They are endemic habitat specialists with fruits and seeds forming more than 80% of diet. People living adjacent to LTM-inhabited forests extract non-timber forest produce (NTFP), either for subsistence or as an additional source of income. Studies have found an overlap of up to 27% in LTM food and NTFP extracted in certain regions. Often unregulated, NTFP extraction can lead to overharvesting or destructive harvesting practices, which in turn can have unprecedented ecological consequences and impact LTM viability. Knowledge of what drives households to extract NTFP, particularly for commercial purposes, can inform regulations that serve both conservation and livelihood goals.

In the present study, we looked at the drivers of, and spatial variation in the prevalence of NTFP extraction in rainforests habitats of LTMs across their range in Kerala and Karnataka. We used a semi-structured questionnaire interviewing 641 households residing alongside LTM-habitat, recording NTFP species harvested, the method and purpose—commercial or subsistence—of extraction, as well as household characteristics. Based on the degree of reported involvement in NTFP extraction, we categorized households into four: no NTFP collection by the household ($n = 248$ of households), collection of basic resources (such as of fuelwood and leaf litter; $n = 56$), collection for domestic purposes ($n = 162$), and for commercial collection ($n = 175$).

Using an ordinal regression, we show that NTFP collection varied across landscapes, while tribal communities, or households obtaining an income from daily wages or agriculture, were more likely to extract NTFP. Households residing close to forests, for longer durations were also more likely to extract NTFP. We estimated that the probability of a household not being involved in NTFP collection was 0.38 (95% CI = 0.31–0.46), and in extraction of basic resource is 0.08 (0.04–0.13). The probability of households extracting NTFP for domestic purposes was 0.25 (0.19–0.32), and for commercial extraction was 0.27 (0.20–0.34). LTM foods such as fruits of *Artocarpus heterophyllus*, *Garcinia gummi-gutta*, and *Mangifera indica*, were collected. NTFP extraction, while widely prevalent, can have negative impacts on LTM viability, which varies across their range. Understanding such variation, and the overlap in NTFP and LTM diet can provide a better understanding of potential impacts of NTFP extraction on LTMs, which in turn, can inform management of this endangered species and its habitat.

Chimpanzee behavioural reactions to cues of death

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I studied primate thanatology using experimental approaches on chimpanzees at Kumamoto Sanctuary. Chimpanzees are intelligent and social animals and they demonstrate various complex reactions to the deaths of conspecifics, including curiosity and emotional distress. One particularly interesting reaction is prolonged dead-infant carrying, because it is energetically costly for the mothers to keep transporting their infant corpses, and would be evolutionarily disadvantageous because of potential disease transmission. In addition, chimpanzees reportedly do not seem bothered by the stench of advanced decay emanating from the corpses, which is contrary to how humans and other animals behave around such smells.

I used putrescine, a pungent odor released from the decay of bodies, to test how they detect and respond behaviourally to such chemical cues of death. I also paired this with a visual cue of death to see if they are able to associate them. Results show that chimpanzees appear to avoid putrescine, but they may not associate it with death. This study contributes data about primate sense of smell, which has been limited in research so far. It also has implications about interpreting dead-infant carrying behaviour.

The Ways of Well-being and the Self: A Cultural Psychological Approach

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Can happiness be fully individualized? In psychology, happiness and well-being are often defined as internal feelings or states of satisfaction and positive emotions. As such, research on well-being has tended to focus on individual positive emotions and life satisfaction. Recently, however, psychological researchers have also begun to examine the effects of group-level functions (e.g., nation-level economic status) on happiness. From a cultural psychological perspective, cultural values have a strong effect on how people understand/pursue happiness. This talk will give an overview of individual and collective happiness from a cultural psychological point of view. Following which, it will explore the possibilities and importance of studying collective happiness at not only national levels but also at smaller community levels, such as regional areas and workplaces. Accordingly, this talk will introduce the Happiness Indices for Communities (HICS) project, a large community-area sampling study (N = 7000), which examines the relationship between social capital and happiness in Japanese communities. Using HICS, we found that towns and villages each possess unique properties that may contribute to their happiness (both at the community level and individual level), that are based on the collective socio-economic activities (e.g., farming, fishing) specific to each rural/urban region. Future directions for happiness research will be discussed, including methodological and theoretical areas, to encompass directions in policy-making and interdisciplinary approaches.

Monkeys in the Middle: Navigating the Costs and Benefits of Social Centrality

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We live in an increasingly connected world, yet our connections bind us just as they have bound all social animals throughout evolutionary history. Sharing information, cooperating to achieve mutual goals, or simply aggregating for safety may be the glue that holds society together, but the current global pandemic of COVID-19 reminds us that there are limits to social connectedness, and situations that demand change to moderate it. How to stay connected while staying safe has become the defining question of our time, but evolution has been dealing with this question for millions upon millions of years. In this talk, we examine the opposing evolutionary forces that may give rise to the social networks into which animals are embedded. Social networks hold an important place in sociological and scientific inquiry because they determine how things like information or agents of disease spread through a population. We review some literature on transmission processes in animal societies, introduce studies linking social networks to both positive and negative outcomes, and discuss a model of social evolution that integrates the costs and benefits of socialization with respect to feedback loops between individual social decisions and network topology. How social animals navigate the costs and benefits of living in groups is a decades-old question in evolutionary biology. The answer, however, must depend on the structure of the society within which an animal lives. In this regard, social network analysis offers a powerful perspective, with real-world application in areas like captive animal management and wildlife conservation.

Tourist Expectation and Satisfaction in Mountain Gorilla Tourism in Bwindi Impenetrable National Park, Uganda

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For sustainable wildlife tourism, it is often required to maintain a high level of tourist satisfaction while minimizing negative effects on wildlife and their natural habitats. A better understanding of tourist expectations and satisfaction is essential to develop efficient and adaptive tourism management that maintains a balance between tourism and conservation. Endangered mountain gorillas (*Gorilla beringei beringei*) are well-known flagship species for the economic success of tourism, and tourism has played an extremely important role in their conservation. Many studies have focused on the social and economic impacts of mountain gorilla tourism on the local community. However, few studies have investigated tourism activity or tourists, more specifically, tourist expectation and satisfaction, although their conservation is highly dependent on the tourism industry as with other great ape conservation.

To better understand tourist expectations and satisfaction, the fieldwork was conducted from December 2019 to February 2020 in Bwindi Impenetrable National Park, Uganda. The data were collected through a questionnaire survey with tourists (N = 303), qualitative interviews with 24 tourist groups and 21 park rangers, and direct observation. Respondents of the questionnaire survey were asked to rate 21 items at 5-point Likert scale based on their expectation and satisfaction respectively. Overall satisfaction and royalty were measured at 10-point Likert scale. During interviews, tourist interviewees were asked to describe their memorable moments during gorilla tracking and ranger interviewees were asked to describe their successful and unsuccessful experiences with tourists.

Tourists had high expectations, especially in conservation-related and observation-related items. There were large variances of expectation and satisfaction in the easiness of tracking and travel costs including gorilla permit. There were small gaps between expectation and satisfaction in the sense of crowdedness and observation manner. Overall, the perceived level of satisfaction was high and ceiling effects were detected in most items including overall satisfaction and royalty (recommendation). Bayesian ordered logistic regression analysis revealed that younger tourists tend to be more willing to re-visit the park, while the place of origin and gender did not have clear effects. Tourists interviewees described various memorable moments. Qualitative data analysis identified five main factors that may affect tourist satisfaction: walking in the natural habitats on their foot, the first sighting of gorillas, seeing silverback gorillas, seeing mothers and infants, and close proximity with gorillas. The interview with rangers revealed that some tourists and situations were very difficult to handle, although they were perceived to be a relatively rarer case.

This study provides some practical implications for both tourism management and conservation. Overall tourism performance was very high but still, some areas need to be improved or be maintained. The detailed explanations related to conservation would be key to the tourism-conservation balance.

Differences and Similarities in insect feeding behavior of three species of forest guenons in the Kalinzu Forest Reserve

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It is important to understand animal feeding behavior. Insects are resources of high quality for primates, and most primates include insects in their diet. Insects are highly seasonal resources, but little is known about the seasonality of insect feeding behavior. We conducted one-year field research in the Kalinzu Forest Reserve in southwestern Uganda. From October 2018 to September 2019, we observed the three groups of forest guenons; blue monkeys (*Cercopithecus mitis*), red-tailed monkeys (*Cercopithecus ascanius*), and L'hoest's monkeys (*Allochrocebus lhoesti*). We collected 777, 718, and 642 fecal samples from the three species, respectively. Observation time reached 274, 295, and 286 hours, respectively. We divided the observations into 3-month periods for our analysis. During the whole study period, the three species spent 33.2 %, 42.2 %, and 27.5 % of their feeding time on insects, respectively. While blue monkeys spent much shorter from October to December (17.1 %) than their annual average, red-tailed monkeys did not show significant seasonality in this index. L'hoest's monkeys also spent shorter on insect foraging from October to December (19.6 %) than their annual average, but they instead slightly increased time spent feeding on mushrooms in this period (23.1 %). Regard to strata use for insectivory, while red-tailed and L'hoest's monkeys did not show significant seasonality, blue monkeys changed height where they captured insects by period. Though all the species often searched leaves for insects throughout the year, they basically showed vertical segregation for insectivory. In sum, while blue and L'hoest's monkeys changed their insect feeding behavior during our study, red-tailed monkeys did not change a lot. These patterns can affect the seasonal variation in their prey repertoires.

Here, AT also report what he did as a PWS student these five years.

Herding in feral horses

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Coordinated behavior with multiple conspecifics has attracted many researchers for long time. Recent studies are reaching to reveal the principals of behavioral rules which shape collective motions in animals. In harem groups of horses, males exhibit a behavior that causes them to chase females back to the groups, which is called as herding. Previous research has shown that this behavior can be divided into male to female and female to female interactions. However, the actual function of this behavior by males is unclear. In the current study, we used drones and deep learning to analyze herding in wild horses. We found that the group shrinks in half cases and expands in others after herding, and that shrinkage and expansion can be clearly predicted by the size of the initial area. Analysis of the behavior of males revealed that whether they shrank or expanded could not be predicted from their behavior. This suggests that while herding may have a function in holding the herd together, they may also serve other purposes.

Diet of forest elephants by fecal analysis at Moukalaba, Gabon : effects of season and body size

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Elephants are polygamic herbivores and they have large sexual dimorphism. In such herbivores, it has been proposed that they have intraspecific variations in feeding patterns according to body size. However, in case of elephants, few studies have focused on dietary changes in relation to differences in body size with growth. Compared to savanna elephants, less has been known about food choices of the forest elephant (*Loxodonta cyclotis*). Thus, the objective of this study is to clarify their diet by fecal analysis and to see if there are any dietary differences according to season and dung size (a possible proxy for body size). I conducted fieldwork in and around Moukalaba-Doudou National Park, Gabon three times: from September 2018 to February 2019, from June to September 2019 and from November 2019 to March 2020. I measured diameters of several boluses from each fecal pile on site and one bolus was brought back to the research station to analyze feeding contents. After washing and drying, food remains in feces were divided into six categories: dicotyledonous leaves; wooden materials; fruits; monocotyledonous leaves (without Marantaceae) including fine fibers; Marantaceous leaves; and piths. I examined seasonal variation and effect of body size in the relative volume of each food categories in fecal samples, except for Marantaceous leaves and piths. The relative volume of each food categories was logit-transformed and linear mixed models were constructed. I conducted model selection using Akaike information criterion. I analyzed 191 fecal samples and the mean dung diameter was 11.1 cm (SD = 2.1). The relative volume of dicotyledonous leaves was higher during the dry fruit-scarce season and lower during the rainy fruit-increase season. The relative volumes of wooden materials did not show seasonal variation. However, it increased as body size increased, while the relative volume of monocotyledonous leaves decreased as body size increased. The relative volume of monocotyledonous leaves was higher during the rainy fruit-increase season. These results suggest that small young individuals have the tendency to eat wooden materials less frequently and eat monocotyledonous leaves more frequently than large aged individuals in Moukalaba. This inference is probably made because the savanna in Moukalaba is annually burned by human at the beginning of rainy season and monocotyledonous shoots there may be easier for younger elephants to digest.

An exploration of multiplex grooming network in a free-ranging group of Japanese macaques at Awajishima

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Among non-human primates, social grooming plays significant roles in their social lives, such as bond formation between individuals. Studies on primate grooming have focused exclusively on dyadic grooming, and almost no attention have been paid to polyadic grooming, in which three or more individuals simultaneously participate in a single grooming interaction. Consequently, little is known about whether polyadic grooming has some specific functions or characteristics compared with dyadic grooming. In this study, I performed multiplex social network analysis, in which interactions between multiple types of social networks can be analyzed, to explore what roles polyadic grooming could play in a free-ranging group of Japanese macaques. Here I focused on a specific form of polyadic grooming in which two or more individuals give groom to one individual (e.g. $A \rightarrow C \leftarrow B$), because almost all polyadic grooming occurred in this form in my subject group. I defined the relationship of the individuals giving grooming together to the same individuals as “co-grooming”. I constructed a multiplex network involving three layers, one based on dyadic grooming, another polyadic grooming ($A \rightarrow C$ and $B \rightarrow C$ in the above example), and the other co-grooming ($A - B$ in the above example). I found that polyadic grooming layer contains different information from dyadic grooming, extending grooming network of the individual which can be constructed by only dyadic grooming. I also found a high similarity between polyadic and co-grooming layers, suggesting the existence of social network specific to polyadic grooming interactions. This study suggests that polyadic grooming is not a mere extension of dyadic grooming, but might have some specific functions different from dyadic grooming.

Indianapolis Zoo's upcoming chimpanzee exhibit will promote authentic behavior through innovative design.

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The history of chimpanzees being kept in zoos predates modern scientific efforts to study them in the field. Consequently, zoos have historically housed and managed chimpanzee populations in ways that bear little resemblance to the lives of their wild counterparts. Group sizes are typically a small fraction of the size of wild groups, climbing opportunities are limited, vegetation is sparse, a single yard and indoor building is often the norm, and there are few opportunities to rely on intelligence to forage for food. Chimpanzees can live in these environments because they are adaptable creatures, but they cannot thrive in them. To counter this trend, The Indianapolis Zoo is designing a new exhibit that will promote authentic chimpanzee behavior through innovative and naturalistic habitat design, group composition, and activity provision. The design process is being informed by scientific discoveries about wild chimpanzee communities with an emphasis on social behavior, tool-use, and intelligence. The new exhibit will house up to thirty chimpanzees in a setting consisting of multiple buildings and enclosures connected by hundreds of meters of elevated travel corridors. An array of automated feeding machines, tool-use stations, and other electronic enrichments will incentivize frequent travel and foraging bouts, while the spread-out nature of the exhibit will make possible a naturalistic fission-fusion group dynamic.

Cognitive responses to infants in apes: Comparative cognitive studies

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Infants of mammalian species cannot survive without other individuals, especially their mothers. Infant caring is a tremendous investment for humans, whose infant is immature and offspring needs care for a long period. Previous studies have shown that humans have an attentional bias and are attracted to infant, especially infant faces, and such preference motivate humans to care infants. Although infant care is essential behavior, the cognitive mechanism of it has been rarely considered from the evolutionary perspectives. For considering about human evolution, it is critical to compare human and non-human primates, who are the closest relatives to us to reveal what is human specific and what is not. I explored how apes recognize infant from various points of view. First, we investigated ape's spontaneous visual attention to infants by eye-tracking. I found that chimpanzees but not bonobos have a visual preference to infants of conspecifics. The results show that infantile coloration in chimpanzees plays an important role for their preference. Second, I studied the relative contribution of facial shape and color to differentiate adult and infant by using morphed face stimuli in chimpanzees. The results indicate that chimpanzees use facial color cues much more than facial shape cues to categorize facial age. Third, I tested spatial representation of facial age in chimpanzees by conducting a matching-to-sample task in order to know whether they extract conceptual age category from faces. There is no evidence of it, but I found robust evidence of the superior processing of adult faces than of infant faces in adult chimpanzees, which is also reported in humans. At last I'd like to report our two ongoing studies. One is our attempt to reveal the effect of oxytocin administration on visual attention to infants in chimpanzees. Another one is a study which investigating the potential function of infantile face color as masking facial identity in chimpanzees. These studies suggested that some cognitive response toward infant stimuli were shared between humans and non-human primates. At the same times, we need to consider species specific visual cues of infants and the sensitivity for them in each species.

Comparing Social Style in Zoo-housed Macaques by Open Lab Style Experiment

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The genus *Macaca* consists of many species, and it has a wide geographical distribution with diverse habitats and ecologies. Because of these characteristics, many comparative studies involving *Macaca* species have been conducted. Regarding their social life, previous studies have focused on social organization, mating systems, and social structures. Authors have categorized *Macaca* species into four grades based on their social style. According to this 4-grade scale, grade 1 includes the most despotic species, and grade 4 includes the least despotic species.

In this study, a portable touch monitor was introduced to zoo-housed macaques at Japan Monkey Centre and compared their social style under an experimental setting. Participants include six *Macaca* species, rhesus macaque (*Macaca mulatta*), Japanese macaque (*Macaca fuscata*), southern pig-tailed macaque (*Macaca nemestrina*), Tibetan macaque (*Macaca thibetana*), bonnet macaque (*Macaca radiata*), and toque macaque (*Macaca sinica*). The study started with a habituation phase, then moved to a touch monitor task phase with the tasks gradually becoming more difficult.

The experimenter counted the number of individuals who ‘approach’ the apparatus (touched or stayed in front of the monitor) and measured ‘approach’ time. There are differences among species both in the number of individuals and approach time. Moreover, these differences fit the grades presented in previous studies. Thus, this study revealed that macaques’ social style can be duplicated under the experimental setting with zoo-housed captive groups. In addition, we, researchers and the zoo, can give the opportunity for zoo visitors to observe zoo-housed macaques in a new way, and to learn about their social styles through the open lab style experiment.

I will also report the effects of COVID-19 pandemic on this study: participants’ performance and our outreach activity. From April to July 2020, we stopped the experiment. After resuming, main participants were replaced in some groups. This seems to reflect the change of power balance in the group. About the outreach activity, we open an online guidance page instead of not doing a direct oral guidance. We seek effective methods for providing an environmental education in this pandemic era.

Chimpanzees use video as a representation of next-door situation to locate hidden food

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Obtaining information not only through direct experience but also by means of representational objects, such as video images, is considered as an indicator of the presence of the thinking on situations other than the current situation that happens right in front of oneself. It is known that human children start to use video as a source of real-world information around 4-year-old, which is the same period as they start to use language that represents distant objects/events. However, it is not clear whether this representational competence with video need the acquisition of human language as a prerequisite. To address this, I tested whether chimpanzees (*Pan troglodytes*) could integrate video information of the next-door situation into real-world use when they actually arrived at the next-door room. Specifically, chimpanzees first watched the video of food-hiding to either of the two containers, and then moved to the next-door and made their choice of the real container with hidden food. Also, conditions controlled for distance in time (while moving) and space (between two rooms) that potentially increased the difficulty of the task was conducted subsequently. Two out of five chimpanzees who successfully located the hidden food based on the video information of the next-door situation, also passed both conditions controlled for temporal delay and spatial dissociation. In contrast, the other three individuals who could not passed the task, failed in the control condition in spatial dissociation as well. These findings suggest that some chimpanzees have the ability to make links between the video and its referent that located next-door to it. Spatial dissociation between the video and its referent, instead of the ability to think out of the current situation, may obscure representational competence with video.

Outgroup threat promotes ingroup tolerance despite increased stress in chimpanzees

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Outgroup threat has been identified as an important driver of ingroup cohesion in humans, but the evolutionary origin of such a relationship is unclear. Chimpanzees (*pan troglodytes*) in the wild are notably aggressive towards outgroup members but coordinate complex behaviors with many individuals in group hunting and border patrols. One hypothesis claims that these behaviors evolve alongside one another, where outgroup threat selects for ingroup cohesion and group coordination. To test this hypothesis, 5 groups of chimpanzees (N = 29) were observed after hearing either pant hoots of unfamiliar wild chimpanzees or control crow vocalizations both in their typical daily environment and in a context of induced feeding competition. We observed a behavioral pattern that was consistent both with increased stress and vigilance (self-directed behaviors increased, play decreased, rest decreased) and increased ingroup cohesion (interindividual proximity decreased, aggression over food decreased, and play during feeding competition increased). These results support the hypothesis that outgroup threat elicits ingroup tolerance in chimpanzees. This suggests that in chimpanzees, like humans, competition between groups fosters group cohesion.

Molecular evolution of chemosensory receptor genes in the egg-laying mammals: echidna and platypus

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Three chemosensory receptor gene families, *TAS2R*, *OR*, and *VIR*, were determined in the egg-laying mammals (monotremes), echidnas and platypuses, using whole-genome sequencing data (Zhou et al. *Nature* in press). There were only a few bitter taste receptor genes (*TAS2R*) in both species. Since they mainly eat invertebrates, they may not require much bitter taste sense. The platypus has 262 vomeronasal receptor genes (*VIRs*), which are the largest number among any mammals, whereas the echidna has only 28. In contrast, the number of olfactory receptor genes (*ORs*) was higher in echidnas (693) than in platypus (299). This may be related to the fact that a main olfactory bulb is more developed in echidnas, whereas the platypus has a more developed accessory olfactory bulb. Future vertebrate-wide comparative genomic analysis, as well as gene expression and function analysis, will provide important clues to the chemosensory systems of the primitive mammal.

Genetic diversity of the endangered Japanese golden eagle

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Genetic diversity is crucial for conserving endangered species, to avoid consequences of inbreeding and genetic drift (e.g. genetic abnormalities, infertility, high disease risk, etc.). The Japanese golden eagle (*Aquila chrysaetos japonica*; abbr. JGE) is an endangered subspecies, with an estimated population of 500 individuals and rapidly declining reproductive success. Past conservation genetic research has focused mostly on the northern Japanese population to assess genetic diversity and population viability using neutral genetic markers, but the situation in other areas of Japan as well as the genetic diversity at functional loci were understudied. Here, we analyzed two regions in the mitochondrial DNA (mtDNA), 19 microsatellite loci, and the *DRB* exon 2 region of the major histocompatibility complex (MHC; related to immunity, mate choice – a candidate for functional genetic diversity), using wild and captive samples from across Japan to fill these knowledge gaps. We compared the results with the genetic diversities of the Scottish and mainland European populations as well as other raptor species. Genetic diversity at mtDNA loci (haplotype diversity, $h = 0.623$), microsatellite (observed heterozygosity, $H_o = 0.599$), and variation in the fitness related MHC *DRB* exon 2 region (mean number alleles per wild individual = 3.71) in the JGE were similar or high compared to other subspecies, indicating that genetic diversity is maintained. However, the microsatellite allelic richness was low in the JGE compared to other subspecies ($Ar = 3.51$ in JGE, $Ar = 3.72$ in Scotland, $Ar = 5.85$ in mainland Europe). High heterozygosity and but low allelic richness in the JGE could mean that rare alleles are being lost by genetic drift – likely a result of rapid population decline – suggesting the possibility of an early population bottleneck. Moreover, genetic structure analyses by microsatellites and mtDNA revealed that the Japanese population consists of one gene pool, so this proposed bottleneck could be affecting the entire Japanese gene pool. From these results, we propose the following suggestions for JGEs: (1) maintenance of gene flow between local populations to prevent inbreeding and further loss of rare alleles (e.g. identification and ecological maintenance of important dispersal routes), (2) increase the number of captive breeding pairs to maintain current levels of genetic diversity in captivity, and (3) start reintroducing captive individuals into wild populations.

Genetic diversity of the Malayan tapir's captive population in Japan

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The Malayan tapir (or Asian tapir; *Tapirus indicus Desmarest*) is the only Asian member of the Tapiridae family in the order Perissodactyla. The species is native to Peninsular Malaysia, southern Thailand and Myanmar, and Sumatra of Indonesia. It is listed in CITES Appendix I and IUCN Red List (“endangered”) with a population estimation of not more than 2,500 individuals worldwide. Japan as one of the countries with a captive breeding programme of the Malayan tapir has for decades maintained a captive tapir population in the zoos and a breeding center. Genetic research of the Malayan tapir has been limited, in part due to a lack of genetic markers for this species. Here we used the assembled whole genome sequences of the Malayan tapir in the NCBI databases for the development of a novel set of 31 microsatellite markers, and subsequently used them for the genetic diversity analysis. We screened the markers in 20 individuals (using genomic DNA extracted from whole blood and hair samples) from six Japanese zoos and a breeding center, and after genotyping we successfully developed 28 polymorphic microsatellite markers (mean $N_a = 3.789$, mean $H_o = 0.422$, mean $H_e = 0.487$, $F = 0.120$). We also included seven cross-amplification microsatellite markers that were originally developed in the other tapir species for the analysis. After removing loci with missing genotype data, principal coordinate analysis using 20 novel and seven cross-amplification markers revealed that individuals in the same zoo tended to be more closely related—an observation that aligned with the prevalence of kinships among the samples (grandparent-parent-offspring). When comparison of the genetic diversity was made between the Japanese and the Malaysian populations with the seven cross-amplification markers, the Japanese population was found to have maintained a genetic diversity ($H_o = 0.388$) higher than either the captive ($H_o = 0.329$) and wild population ($H_o = 0.301$) in Malaysia, presumably due to the inclusion and breeding of individuals of diverse origins (i.e. native ranges as well as collections in other countries) compare to a single origin in the Malaysian population (i.e. Peninsular Malaysia). However, the positive fixation index in both wild population in Malaysia ($F = 0.163$) and captive population in Japan ($F = 0.018$) suggested a possibility inbreeding in the populations, with the effect more profound in the wild Malaysian population. Finally, discriminant analysis of principal components did not find distinct genetic groups among the samples, and AMOVA test on F_{st} did not support population differentiation between the populations ($p > 0.05$) based on the seven microsatellite markers. Future analysis with a larger set of markers may reveal more information about the genetic diversity of the population studied.

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Functional divergence of species-specific MC1R variants in seven endemic Macaca species in Sulawesi island

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Sulawesi macaques are seven endemic species that have rapidly diverged from the common ancestor in Sulawesi island. They live allopatrically and commonly have dark coat color, with color brightness and color pattern diversified between species. MC1R plays a key role in regulating synthesis of the dark eumelanin and the red/yellow pheomelanin in mammals. Firstly, we investigated nucleotide sequences of MC1R gene from 11 individuals each for five species, *M. nigra*, *M. nigrescens*, *M. hecki*, *M. tonkeana* and *M. maura*, 3 individuals for *M. ochreata* and 2 individuals for *M. brunnescens*. Fixed variants of MC1R were found existed in each species, but *M. ochreata* and *M. brunnescens* shared the specific variant. MC1R sequence in *M. nigra* and *M. maura* are the most genetically distant from the common ancestor, *M. nemestrina*. To understand the molecular characteristic of each fixed variant, we tested the functional property of agonist α -MSH binding activity and basal activity of MC1R in culturing HEK293T cell by using cAMP assay. So far, we found that fixed variants are responsible for the functional difference of production of intracellular cAMP in response to α -MSH. Basal cAMP levels were markedly lower in all seven species compared with *M. nemestrina*. However, there is not direct relationship between coat darkness and MC1R function. Our results so far suggested that fixation of MC1R occurred among Sulawesi macaques, and MC1R variants evolved into different functional characteristic among species.

THE FAST FOOD EFFECT: COSTS OF BEING A GENERALIST IN A HUMAN-DOMINATED LANDSCAPE

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Agricultural expansion in Southeast Asia has converted most natural landscapes into mosaics of forest interspersed with plantations, dominated by the presence of generalist species that benefit from resource predictability. Dietary shifts, however, can result in metabolic alterations and the exposure of new parasites that can impact animal's fitness and the chances of survival for populations. Our study focuses on the Asian water monitor lizard (*Varanus salvator*), one of the largest predators in Asian wetlands, as a model species to understand the health effects of living in a human-dominated landscape. We evaluated the influence of diet diversity on the physiological responses of lizards and the impact on parasite community composition, showing that (1) rodent-dominated diets are associated with high levels of metabolites akin to a *fast food*-based diet driven by the high availability of a reduced food choice that does not represent the wide requirements of a full diet, and (2) lizards feeding on diverse diets host more diverse parasite communities with overall lower parasite prevalences. We suggest that human-dominated landscapes can pose a negative effect on generalist species, and we address the potential impacts to more vulnerable species coexisting in the same landscape.

Chimpanzees' (*Pan troglodytes*) inter-temporal choices when post-reward delay is present/absent

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Animals sometimes make a choice between two options which differ in favorability and temporal delay to acquisition. In laboratory inter-temporal choice task, animals are presented with two choice alternatives, namely a smaller amount of food reward that becomes available sooner vs. a larger amount of food reward that becomes available later. Animals who choose the latter, later-larger reward, are often regarded as self-controlled, in that they may overcome the temptation of the sooner-smaller reward to maximize the reward. To equate the length of an experimental trial, researchers usually adjust the post-reward delays or inter-trial intervals so that animals have to wait for the next trial for longer after choosing the sooner-smaller rewards than after later-larger rewards and vice versa. However, animals may have difficulty in learning this feature of inter-temporal choice task, posing a kind of credit assignment problem. A previous study suggested that chimpanzees exhibit a prominent self-control in an inter-temporal choice task. However, it is unclear whether chimpanzees incorporate the post-reward delays in their inter-temporal decision making. To address this, we conducted two touch-panel experiments with four chimpanzees. First, the post-reward delays made the trial length equal whichever options chimpanzees chose so that choosing the later-larger rewards was optimal to maximize the rate of rewards. In this task, chimpanzees mostly preferred the later-larger rewards. Next, the post-reward delays were eliminated, and delays to reward were controlled so that choosing the sooner-smaller rewards became optimal to maximize the rate of reward. Two chimpanzees switched their preference to the sooner-smaller rewards while others persisted in choosing the later-larger rewards. This suggests that at least some chimpanzees may have learned the association between their choice and the different length of post-reward delays, based on which they attempted to maximize the reward rate. Despite of some limitations in methodology, this finding may shed light on chimpanzees' learning capacities to solve credit assignment problem and the importance of animals' information-processing capacities in inter-temporal choice task in general.

Seed-eating primate still have advantage in forest fragment? Comparison with a non-seed-eating primate

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In Manaus, the largest city in the Amazon, a significant number of primates live in forest fragments. Understanding how the behavioral ecology of primates changes in the anthropogenically altered environment is important for the future conservation and wildlife management of this region. Sakis (genus *Pithecia*) are Amazonian primates known as seed-eating species. The benefits of seed-eating habits are expected to be less susceptible to seasonal changes because of consistent availability of seeds compared to ripe fruits (Palminteri et al. 2012). In this study, we examined whether sakis exhibit the diet stability because of the seed-eating habits even in an forest fragment, compared to squirrel monkeys which do not eat seeds.

We studied two groups of golden-faced saki (*Pithecia chrysocephala*) and a group of common squirrel monkey (*Saimiri sciureus*) in a 26-ha forest fragment in Manaus, Brazil. From March 2019 to February 2020 (12 months), we conducted full-day observation of each group for 3-5 days per month and recorded their behavior and foods by scan sampling method. The total observation time was 1373 hours (saki group A: 480 hours; saki group B: 451 hours; and squirrel monkey: 441 hours).

As we expected, saki showed less variation in annual diet composition than squirrel monkeys, and the proportion of fruit feeding (including seeds and pulp) in sakis' diet was less susceptible to fruits availability than that of squirrel monkeys. However, this result was not because they ate seeds, but because they ate pulp of palm fruits called Inaja (*Attalea maripa*) throughout the year. Although Inaja is said to be a main fruit resource for squirrel monkeys in other sites (Stone 2007), squirrel monkeys in our study site never ate Inaja whereas saki ate it for more than 30% of their fruit feeding time.

It is possible that the sakis ate Inaja at an immature stage, earlier than the timing squirrel monkey can eat. Our results suggest that sakis' morphological or behavioral (and possibly physiological) adaptation as seed-eater is advantageous allowing them wider and flexible diet choice than other primates in the environment where the absolute number of fruiting trees relative to the monkey population size is low.

Studying the acute stress response of the monkeys at Koshima

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Frequent stress is known to cause immune dysregulation, impair cognitive abilities, and increase self-injurious behavior among other harmful effects in a broad range of primate species. Despite this importance, methodological tools in quantifying short-term or *acute* stress in non-human primates still remains a challenge for regular use in monitoring stress in *real-time*, which may allow for more efficient health management of captive and wild populations. Japanese macaques (*Macaca fuscata*) are closely interconnected with human activities such as held in captivity for zoos and research facilities, provisioned at monkey parks, and naturally inhabit areas near local human populations. Thus, this species is ideal for developing non-invasive tools that can allow us to monitor their acute stress in a wide range of environmental conditions. In a previous study, we found that salivary alpha-amylase, a digestive enzyme correlated with sympathetic nervous system activity, responds quickly to stress in captive Japanese macaques. The goal of the present study was to expand non-invasive saliva collection in a semi wild group of Japanese macaques inhabiting the island of Koshima located in Miyazaki prefecture, in order to monitor salivary stress hormones within minutes from observed behavior. We used saliva collection devices – or *rope swabs* – made from sterilized 100% cotton rope and added attractants to entice monkeys for chewing. Habituation to chewing on rope swabs began with individuals who were predictably found on the periphery of the study group in order to reduce the likelihood of dominant group members monopolizing on saliva collection. This later facilitated focal sampling from specific individuals with little to no disturbance from other group members. From December 2019 to March 2020, we made 177 attempts at saliva collection and in total 121 samples were successfully collected. Focal individuals were monitored by continuous behavioral sampling and saliva was collected after behaviors such as grooming, foraging, and conspecific aggression. Samples will undergo enzyme immunoassay to determine concentration levels of salivary cortisol and salivary alpha-amylase, which will help us quantify to what extent focal individuals experienced stress and perhaps help us understand the proximate causes of behavior in relation to stress. This research is important because it contributes to stress monitoring in a field environment by non-invasively using saliva as a novel method for determining acute changes in physiological stress in an endemic and protected population of non-human primate.

Evaluation of the food provisioning efficiency to three sympatric primate species in a forest fragment, Manaus, Brazil

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In Manaus, the largest city in the Amazon, a significant number of primates live in forest fragments due to urban sprawl. The campus of National Institute for Amazonian Research (Instituto Nacional de Pesquisas da Amazônia; INPA) is one of such forest fragments where inhabit four primate species, pied-tamarins (*Saguinus bicolor*), common squirrel monkeys (*Saimiri sciureus*), golden-faced sakis (*Pithecia chrysocephala*) and owl monkeys (*Aotus cf. nigriceps*). Staffs of this forest have provisioned for the primates. Among the four species, pied-tamarins are of the highest conservation priority because their distribution is quite limited and their populations are declining owing to urban expansion. The aim of this study is to evaluate efficiency of the provisioning in the purpose to maintain this forest as a suitable habitat for pied-tamarins.

From April 2019 to March 2020, we collected video data of feeding behavior at six provisioning tables by camera traps. The same amounts of foods (cut banana, papayas, and pineapples) were placed on each provisioning table at 7 am, and removed at 4 pm. When an animal came to provisioning tables, the camera began to record 1-minute video. We counted the maximum number of individuals for each species at every single video. For three primate species, we also counted the number of food pieces taken away from each provisioning table by them.

In the sampling efforts of 37 days (1~5 days per month), squirrel monkeys and sakis came to the provisioning tables every day, and tamarins came on 36 days. Besides the primates, we recorded 10 bird species, green iguana, and rodent species. Primate species accounted for 48.4% of all the food consuming. Among them, 68.6% of foods were taken by squirrel monkeys and only 1% were taken by tamarins. The average number of food pieces taken away per individual primate were 14.4 for squirrel monkeys, 14.4 for sakis and 3.7 for tamarins. Rainfall was negatively correlated with food removal by sakis and tamarins, but not correlated with that by squirrel monkeys.

Our results suggest that the provisioning is contributing for squirrel monkeys and sakis rather than tamarins. It may negatively work for pied-tamarin conservation by accelerating the interspecies competition in this forest fragment.

Different groups also synchronize in multi-level society

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Synchrony is essential to the lives of group-living organisms to maintain their cohesiveness. Animals synchronize their activity (e.g. whether to be active or inactive), timing, movement, and various other behaviors. Such collective properties of groups have been found in almost every animal species studied, from human to the simplest multicellular organism (Placozoa). However, it is still largely unknown how synchronization functions in a multi-level society, a social structure with stratified social organization. As for the first step of the study, we aim to verify whether synchronization of activity occurred in a multilevel society of feral horses. We hypothesized that horses also synchronize across units (core groups), but it is less influential compared to the synchronization within units. To verify the hypothesis, we made four models: 1) independent model: horses do not synchronize with anyone, 2) anonymous mimetism model: horses synchronize their behavior with anyone in any unit, 3) intra-unit affiliative mimetism model: synchronization only occurs within units and 4) intra- and inter-unit affiliative mimetism model: horses synchronize across and within units, but internal synchronization is stronger. We simulated these models for 100 times each, and compared to the empirical data obtained from drone observations. As a result, the model 4 coincided the most among others. The result suggested the synchronization occurred in inter-unit level.

Rotational exhibit and scent communication in captive snow leopards (*Panthera uncia*)

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Sense of smell is an important tool for animals to gather various information. The snow leopard (*Panthera uncia*) is one such species utilizing scent to communicate with conspecifics and/or other species. They are known to have several marking behaviors such as spraying and scraping, and it is often observed in the wild that different individuals visit the same marking spot.

In Japan, most captive snow leopards are solely housed except in the breeding season. If each individual has its own enclosure, there will be little information about other individuals in the enclosure. On the other hand, if different individuals take turns using the same enclosure, they have a chance to communicate with each other through the scent marking. Scent signals decrease by time therefore it is expected that according to the rotation frequency, the average quantity of information from other individuals in the enclosure increase. Thus, we hypothesized the number of searching behaviors and marking increase according to the rotation frequency.

The behavior of 10 captive snow leopards was continuously recorded at four zoos in Japan (513 hours, 59 days). We found the rotation frequency had a significant effect on frequency or the total amount of time of both marking (spraying and scraping) and searching behavior (sniffing and flehmen) using GLMM. In addition, we investigated their behavioral changes at Sapporo Maruyama zoo depending on which individual was last housed in the enclosure. As a result, the number of marking and searching behavior increased at the enclosure used by the other individual the day before than at the enclosure used by him/herself.

This preliminary result suggested that the rotational exhibit promoted their inter-individual communication and the rotation frequency could affect the quantity of communication-related behavior. Further experimental studies on the relationship between the rotation frequency and their behavior will clarify their scent communication and can be expected to contribute to the improvement of their captive management.

Synchronized urination in captive chimpanzees: possible effects of social closeness

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Behavioral synchronization, including phenomena such as contagious yawning and facial mimicry, has gained increased scientific attention in relation to empathy, and is reported to be influenced by social closeness. This study examined the possibility of synchronized urination in captive chimpanzees (*Pan troglodytes*). To our knowledge, no previous study has examined such a phenomenon in primates. We hypothesized that the stronger the social bonds between individuals, the greater the frequency of synchronized urinations. We observed 4 groups of captive chimpanzees (N=20 in total) for a cumulative 193 hours at Kumamoto Sanctuary. We recorded all urinations with a resolution of 1 second as well as grooming interactions and social proximity at 2-minute intervals. We found a negative correlation between grooming frequency and the interval between urinations, i.e. pairs who groomed more frequently were more likely to urinate in short intervals from one another. This result suggests synchronized urination in captive chimpanzees and the influence of social bonds on urinary behaviors.

Group Size Estimation of Finless porpoises by Aerial Videos

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Finless porpoises (*Neophocaena asiaeorientalis sunameri*) are distributed throughout the shallow (usually <50 m deep) coastal waters of Japan. Their group size has been reported to be 1.97 individuals in previous research, yet aggregations of more than 100 individuals have been observed. A recent study revealed that a bird's-eye observation technique using a drone may generate new considerations on finless porpoise behavior and sociality, as finless porpoises have no dorsal fins, which reduces their visibility for surface observations. We planned a drone study for estimating more accurate group size through direct observations. At the Misumi West Port, Ariake Sound, Japan, settled finless porpoises are well recognized among local people. We conducted an observational study for collecting day-long behavioral data at Misumi West Port by drones. We collected data for 22 days from November 2019 to March 2020. As a result, overall mean group size was 3.2 individuals, and the number of aggregation varied over time of day. We will continue the observations throughout the year for analyzing seasonal variations on group size.

Size-assortative pairing and mating in an Amazonian fish, the sailfin tetra *Crenuchus spilurus*

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In the absence of constraints, preference for larger mates is expected to evolve, as larger individuals are typical of higher potential fitness. Large females are often more fecund and carry larger eggs (which result in higher number and better quality of offspring), whereas large males usually have more conspicuous ornaments and are better at defending resources. However, intrasexual competition can constrain the access to larger partners, especially when opportunities for mate takeover abound. Here we investigate the relationship between individual's size and mate choice in relation to one's own size and their respective mate's size using the sailfin tetra *Crenuchus spilurus*, a sexually dimorphic Amazonian fish species. We show that ornaments of larger males are exponentially more conspicuous, and larger females are more fecund and carry larger eggs. However, contrary to expectation, neither males nor females associated for longer with the larger of two offered potential mates. Instead, individuals of both genders chose opposite-sex individuals of similar sizes to themselves. Additionally, similar-sized pairs were more likely to spawn than couples with higher size asymmetries. Grounded on field observations, we propose that prudent choice should be particularly important in this system, since courtship is long (often taking several days), which offers opportunities for mate takeover. Intrasexual competition, however, cannot readily explain female choice for similar-sized males. We thus suggest that such preference might be best explained by avoidance of filial cannibalism.

Do macho horses have all the mojo? Examining testosterone concentrations in feral stallions

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Horse groups with single and multiple stallions occur simultaneously throughout the world in different feral horses' populations. However, little is known on why such groups with more than one male exist, considering that stallions naturally fight to monopolize the females. Testosterone is often linked to aggressive and dominant behavior in males, which provides a mechanism for reproductive competition. In view of that, we explore testosterone concentrations as a factor differentiating males of multi-stallion groups from single-stallion and bachelor groups. We observed feral horses, more specifically the Garrano horses that live in Northern Portugal, and examined the relationship between fecal testosterone levels, group type (single-stallion, multi-stallion or bachelor group), number of females in the group and dominance rank, during the breeding season. Preliminary results showed that males in multi-stallion groups had higher testosterone concentrations than single and bachelor males. Subordinate males averaged higher than their dominant counterparts in multi-stallion groups and males in single-stallion groups, while the number of females in the group didn't seem to have much effect.

The Operant Conditioning of Short-tailed Pit Vipers (*Gloydius brevicaudus*) Based on Different Infrared Shapes

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Operant conditioning is commonly utilized in the study of animal behavior and cognition, yet only few studies reported operant conditioning in snakes. Snakes in Crotalinae possess a pair of facial pits, which are highly sensitive thermal receptors. However, little is known about whether snakes can perceive structural images through this organ. In my Master's thesis, short-tailed pit vipers (*Gloydius brevicaudus*) underwent operant conditioning in the Y-maze. Different infrared shapes were displayed in the two arms of the maze with various aversive stimuli and reward stimuli applied. Thus, snakes were trained to associate the assigned infrared shapes with the aims of escaping from the aversive stimuli or acquiring the food reward. When aversive stimuli were applied, the intensity of the stimuli displayed a significant impact on the behavioral responses, indicating that the natural responses (instant instinct) of snakes in these aversive contexts were not suitable for training. When food rewards were applied, snakes displayed dramatic decline of feeding motivation in the posterior period of the experiment, causing the experiment hard to continue. In sum, the results showed that short-tailed pit vipers only displayed limited learning abilities, and failed to prove whether they are capable of infrared shape recognition. We suggest that operant conditioning of snakes should conform to their natural behaviors in corresponding contexts. Further enlarging the sample size should help to pick out individuals with better learning abilities and lower threshold.

Keywords: Facial pit, *Gloydius brevicaudus*, Operant conditioning, Shape recognition, Y-maze

Zoo acts as a “melting pot” of spider monkeys

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Spider monkeys (*Ateles* sp.) are one of platyrrhine monkeys ranging from Mexico to the north of Bolivia. They are currently classified in 7 species. Those species have morphologically distinct traits in terms of pelage color and its patterning. In Japan, there are approximately 150 individuals in ~30 zoos. Japanese zoos have traditionally adopted the three species classification, a morphological classification used before the current 7 species classification, and so their genetic backgrounds have been uncertain. We analyzed their mitochondrial and nuclear microsatellite DNA to identify species of captive spider monkeys reared in Japan. Our genetic data and the breeding records suggests presence of many hybrids. Furthermore, there may be some hybrids between species that would never encounter in the wild. Our findings are new insight into *Ateles* speciation process and the possibility of captive animals contributing to understanding ecology and evolution of wild animals.

Comparative research about the illusion "brightness contrast" in primates and cetaceans

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Cognitive ability is a product of evolution and is shaped by both phylogenetic and environmental factors. In order to examine how cognitive abilities have been evolved, many studies have been conducted to compare human cognitive ability with other non-human species. On the other hand, the study comparing with species adapted to the underwater environment isn't sufficient. Cetaceans (dolphins and whales) are one of the mammals that have been highly adapted to the underwater environment. For many years, it has been suggested that cetaceans rely on auditory and their visual is no more than the supplemental ability. However, it is becoming clear that cetaceans can use the information obtained visually to improve their lives through observations in the wild and experiments in captivity.

My aim is to conduct comparative researches about visual cognitive abilities between primates and cetaceans. For this purpose, I'm planning to develop a new research method which enables us to conduct similar experiments for both primates and cetaceans.

In current research, I focus on their ability to perceive brightness and contrast. Contrast means "difference of brightness between object and background" and is regarded as one of the important factors for visually object recognition. I aim to conduct similar experiments about the illusion "Brightness contrast" for several species and to make comparisons. Currently, I'm conducting experiments for chimpanzees (*Pan troglodytes*) in Primate Research Institute and killer whales (*Orcinus orca*) in Port of Nagoya Public Aquarium. In the future, I'm planning to conduct this experiment also for humans (*Homo sapiens*) and other cetaceans.

The Survival Story of O-Rae: A Report of Indo-Pacific Bottlenose Dolphin without a Tail in the Wild.

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The dolphin without a tail in the wild was first discovered swimming by himself on June 22, 2019, by a dolphin watching company expected to die soon. However, it was found a month later on July 30 in Daejung. On the re-encounter, the individual was named O-Ree, aka 'a long time,' and to understand the body condition, the photogrammetric measurement for body condition was measured alongside the effort to observe feeding behavior, social behaviors, habitat use, identify physical and acoustic markers. He was identified through dorsal fin markers and signature whistles and as a juvenile male. The focal follow continued until the end of 2019, November 05, in the next field season of 2020 from April to August. The aerial imagery via UAV was used for perpendicular width measurements for a comparative study of body condition. He maintained a similar body condition until the end of 2019. When re-discovered in 2020, the body condition decreased but not significantly. During the recent observation, the individual also exhibited improved swimming ability and group cohesion compared to 2019. This case is an example of a dolphins' physical ability to adapt to survive the wild ocean without the tail. Long-term research might allow researchers to understand the effect of changed swimming styles and the cost of living without a tail, increasing our understanding of dolphins' physical capacities. This case study also highlights the urgent need for marine protected area and policed protection act for the Indo-Pacific bottlenose dolphin population in Jeju Island.

Aggressive interactions and spacing pattern among Male Bonobos in Wamba, Luo Scientific Reserve, Democratic Republic of the Congo

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Bonobos (*Pan paniscus*) and Chimpanzees (*Pan troglodytes*) are known for the large difference in male aggressions. While male chimpanzees frequently show severe aggressive behaviors in various context, aggression among male bonobos are much less intense. They are also different from each other in terms of their grouping patterns. Although both two species have fission-fusion societies in common, the stabilities of their temporary parties are largely different. Chimpanzees form parties which vary in size and members while Bonobos form large and stable parties which include most of party members. It is possible that each of those two species has different behavior patterns to avoid conflicts. In this study, we focused on intragroup aggression among male bonobos in their gregarious society.

From July 2019 to January 2020, I conducted field observations on 11 male bonobos in E1 group at Wamba, Luo Scientific Reserve, Democratic Republic of the Congo. Among 86 cases of observed aggressive interactions among males, more than half of those interactions were expressed toward two particular individuals. Those males often showed provocative behaviors toward higher-ranked males and more than one third of all aggressive interactions occurred just after those provocations. None of observed aggressive interactions between males included physical attack. The frequencies that focal individuals rest in the proximity of other males largely varied among individuals, though the correlation between those frequencies and dominance ranks of males were not confirmed.

These results suggest that middle or lower ranked males might to show provocative behaviors to attempt to gain higher status and those provocations often cause aggressive interactions among males. Also, those males might be able to show provocations frequently because aggression among males has the low risk of injuries.

Geographic factors and inter-island connection correlates to mandibular morphological divergence of insular macaques over Sunda Shelf

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Attempts to correlate the high non-human primate diversity over Southeast Asia and its geographical factors often faced some complex biogeography-related parameters to assess due to its natural set of the region that was constructed as the combination between mainland and scattered islands with varied degree of geographic position, geological feature, and insularity. In this study, we evaluated three geographical factors (latitude, land size, and regional group) employed on mandible of Southeast Asian macaque species (except Sulawesi macaque) to test which factor that impacted the most on the morphological variation and divergence. Tests of the regional group gave highly impact on the divergence, while land size contributed to the proportion of mandibular shape variation among each land size class. The model visualized based on regional group clusters has resulted some interregional connections. The connection among regional clusters were predicted due to the scenario of palaeoclimate, palaeoecology, and dispersal history over Sunda Shelf during Quaternary. The tests and models provide a prerequisite for and an alternative to the mandibular morphological divergence on primates which often simply categorized into the classification of biomechanics and dietary habits.

Keywords: macaque, mandible, morphology, Sunda Shelf, island

The change of bitter sensitivity to PTC in each of individuals and the relationship between TAS2R38 polymorphism and food preference

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Introduction. Human have the innate ability to perceive thousands of compounds as bitter, and 25 taste 2 receptors (TAS2Rs) have been known as the bitter taste receptors. TAS2R38 is the bitter receptor having polymorphisms and it is said that this gene is one of the responsible genes for interindividual difference of bitter perception. It is identified that one of the agonist of TAS2R38 is PTC and the polymorphisms should influence the preference to Brassicaceae vegetables. Besides, some studies reported genotypes of TAS2R38 may have relations to smoking and alcohol intake. In many studies, the taste tests for dividing participants' bitter sensitivity into 3 groups (supertasters, medium tasters, and non-tasters) was done only once. In this study, I focus on the changes of taste sense in each of the individuals.

Methods. The participants were the students in PRI, and had the taste test using PTC test papers performed once a week, for 2 months. I collected DNA samples from oral swab samples to identify their genotypes of TAS2R38 by real-time PCR. Also the data of the participants' age, sex, the change of their physical condition, and preference of vegetables and drinks were collected by the questionnaire.

Results. The TAS2R38 genotype of 3 participants was PAV/PAV and that of other 3 participants was PAV/AVI. The change of the sense of the bitterness of PTC was showed in all of them. The PAV/PAV carriers tend to perceive PTC bitterness stronger than the PAV/AVI carriers consist with the previous studies. There was no correlation of their physical condition with the change of the results of taste tests. Interestingly, the participants having PAV/AVI tend to have change of their physical condition in one week. Also, the bitter sensitivity to some of Brassicaceae vegetables including glucosinolate are associated to TAS2R38 genotype. Because the structure of glucosinolate is similar to that of PTC, preference of the Brassicaceae vegetables could be connected to the sense of bitterness. On the other hand, there was no association between food preference and the intake.

Discussion. The change of the bitter sensitivity to PTC suggests that the classification of taste sensitivity by only once taste test may be uncertain result. The PAV/AVI participates tend to have change of their physical condition and this can be because the food preference and intake are different based on the bitter sense or because of the TAS2R38 expressing in other organs. The discordance between the food preference and the intake may be influenced by their environmental factors such like their healthcare and the degree of difficulty to get the vegetables. Based on this preliminary data, I am going to continue to perform the taste test and questionnaire with more participants. Because similar polymorphisms of TAS2R38 was observed in other primate species, such as macaques and chimpanzees, it will help to know the better way to feed them or their health conditons.

Grooming to a dead monkey in Japanese macaques & Effects of infant handling on behaviors and development of infant/juvenile Japanese macaques

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Reports for reactions to dead bodies by nonhuman animals are essential to know their recognition of death. In nonhuman primates, reactions to dead infants have sometimes been observed. However, reports for reactions to dead adults by conspecifics are relatively scarce, and most of them have reported dead bodies with injuries and/or decomposition. In this presentation, we report grooming behaviors by a Japanese macaque to a dead body that did not have any injuries and have not started to decompose. In Arashiyama Monkey Park in Kyoto, on July 20, 2020, one old female (29 years old) found dead without any injuries or worms. The monkey was estimated to have died on the morning of the same day. From the discovery at 12:50 to 16:35, one female (6 years old) groomed the dead body 4 times (totally 27m 18s). The groomer was not kin for the dead monkey and no grooming interaction was observed between this pair before the death. Other monkeys rarely approached the dead body, and only the groomer touched the corpse. We report detailed information about this observation and discuss possible reasons why the groomer groomed the dead monkey.

Among primates, individuals other than mothers sometimes handle infants. This behavior is called “infant handling.” Many studies have tried to investigate the functional benefits and costs of infant handling. However, most of them were interested in benefits and costs for mothers and handlers, and do not focus on effects of infant handling on infants’ behaviors and development. Most of infant handling is usually affiliative, so it is often regarded as care behaviors, but it may be possible that infant handling is one of stressors for infants, disturbs infants’ initiative behaviors, and thus prevents infants’ social development. These tendencies may be more apparent in species which show relatively less infant handling, but there is no research about the effects on infants’ behaviors in these species. In this research, we try to study the effects of infant handling on behaviors and social development of 0 and 1 year old individuals in free-ranging Japanese macaques, which show infant handling less frequently than most other primate species. We talk about the research plan and progress.

Relationship between Personality traits and gene polymorphisms in two dog breeds (Miniature Dachshund and Toy Poodles)

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Personality is influenced by genetic effects as well as the environment in which they grew. Genetic polymorphisms have been reported in several animal species, including dogs, that have been suggested to be associated with personality. Dogs have lived with humans since ancient times and even today they enrich our lives not only as working dogs but also as companions. Humans have created various breeds of dogs by selecting not only for their size, hair and shape but also for their behavioral characteristics. As a result, genetic polymorphisms and differences in personality among dog breeds are significant as well as individual differences.

In this study, we plan to examine the relationship of personality and genotypes in dogs. We targeted two breeds, Miniature Dachshunds and Toy Poodles, because they are popular breeds and large sample sizes are obtained compared to other breeds.

Questionnaire survey was conducted on 169 Miniature Dachshunds and 257 Toy Poodles. We found 7 factors named human-directed sociability, dog-directed aggression, dog-directed sociability, activity, nervousness, impulsiveness and dominance. Then we checked the polymorphism of candidate genes for personality-related genes in these breeds. We found polymorphism in 2 regions of androgen receptor gene, 2 regions of dopamine receptor gene, serotonin receptor gene and 2 regions of oxytocin receptor gene in the preliminary survey. In the future, we are planning to analyze the relationships between SNPs and behaviors in addition to candidate genes.

Primate and Parasite communities in Sabah: the biodiversity-disease relationship across a Bornean landscape

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Within a context of mass defaunation and habitat loss throughout the world, the ongoing COVID-19 pandemic, a zoonosis, reminds us how impactful infectious disease can be to a host, as well as other potential host(s) it might be transmitted to. Especially so, biodiversity hotspots like tropical and equatorial ecosystems happen to combine a broad range of potential sympatric hosts, intense human influence, as well as an as-diverse range of infectious agents, which make them identified emerging zoonoses hotspots. But infectious agents – called parasites for their reliance on one or multiple hosts' resources – as components of these transitioning ecosystems are impacted not only by such human influences, but also by changes in their host(s) ecology and demography, making the relation between host diversity and disease risk a topic of debate for two decades. In my PhD project, I wish to investigate the biodiversity-disease relationship through the study of non-human primate communities in Sabah and their gastro-intestinal parasites. Host-wise, I plan to record demographical and geographical data on non-human primates found in the Kinabatangan and the Klias peninsula regions, as well as implement the use of invertebrate DNA to assess primate and general vertebrate diversity. Parasite-wise, I intent to collect fecal samples to quantify their importance in local host populations and the degree of parasite sharing across groups and species – i.e. which parasite is generalist or specialist – as well as environmental samples to investigate how their environmental stages are impacted by landscape features. Combining data on host communities and their parasites, across landscapes of Borneo showing a gradient of biodiversity and human influence, I want to assess how host diversity and disease risk co-vary, and what consequences current ecosystem transition trends could have on local non-human primate and human populations. I present in this poster the current state of the method to be used, and describe current and future directions of my project.

Interest Shown in Infants by Non-mother Individuals in Yakushima Japanese Macaques (*Macaca fuscata yakui*): Changes in the first 8 weeks after birth

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Infant Japanese macaques interact not only with their mother but also with other group members even at the early stage of their life. Infants are interested in, approach and contact with non-mother individuals; Non-mother individuals also show an interest in, approach and handle infants, although non-maternal interest in infants is rarely reported in Japanese macaques. In this presentation, we cover the latter one—Interest shown in infants by non-mother individuals. With focal-sampled data of social interactions of 8 1~8-week-old infants in our study group, we traced how patterns of the interested behaviors change during the first 8 weeks after each infant is born. What we found is that infants tend to be frequently positively handled by their sisters and to be positively or negatively handled by adult females without their infant for 1~4 weeks after birth; they tend to constantly receive care of their sisters and to get attention not only of adult females without their infant but also of them with their infant for 5~8 weeks after birth.

Social bonds between female horses and the influence on the offspring's social development

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Offsprings of group-living animals are largely influenced by their mothers in various social aspects, from dominance rank to social partner choice. In a horse group, female horses form and maintain social bonds with other female members; they have preferred partners for allogrooming and stay in close proximity. It has been reported that foals tend to preferentially associate with another foal whose mother is the "best friend" of their own mothers. The behavioral patterns with regard to this, however, are little studied in feral horse groups living in less managed, natural social settings. With free-roaming Misaki horses in Japan and Jeju horses in Korea, I plan to examine how social bonds of mares affect the development of social relationships between their foals by using social network analysis. The two study sites will also be compared, considering the differences in social environments such as group compositions and stability. Investigating the mare's influences on the social development patterns of foals could exhibit the importance of early social settings involving mother's social life, which might affect the future group formation.

Preliminary Results of RNA-Seq Meta-Analysis Comparing Grasscutter Tissue Expression to Other Rodents

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Grasscutters (*Thryonomys swinderianus*) are large rodents found throughout Sub-Saharan Africa that are currently being domesticated as meat animals. Determining which genes are differentially expressed between grasscutters and other domesticated rodents could identify candidate genes for selective breeding. However, no differential gene expression (DGE) studies have been published for grasscutters. For this study RNA was extracted from 11 tissues from a male grasscutter and then sequenced. The reads were then aligned to the grasscutter genome. The same was done for guinea pigs (the closest domesticated species) and mice (the most heavily annotated rodent) using RNA-Seq data from studies that sequenced the same tissues and the species' respective genomes. DESeq2, a software package to test for differential expression, was used to find grasscutter genes that were significantly up or downregulated compared to the other two species. Here we present the preliminary results of comparing grasscutter gene expression in the frontal cortex to guinea pig and mouse expression.

Progress report of the visual discrimination of materials in chimpanzees and humans

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Animals including humans live surrounded by a lot of objects made of various materials. Without touching them, we can effortlessly perceive what materials they made of and tell what feature they have. This ability helps us to judge the quality of the objects and make a behavioral decision. A lot of studies found that humans are extremely good at visual discrimination of materials. In non-human primates, very few studies were conducted, but one of them found capuchin monkeys can correctly categorize some specific materials. In the current study, we address material discrimination in chimpanzees, one of the most evolutionally closest species to us. In previous studies, non-human participants were required to categorize stimuli of materials as they learned in the training phase. However, in this study, we examined how they naturally categorize stimuli without any training. We used 24 images of objects (6 materials * 4 images) as stimuli and participants were required to address the simple matching-to-sample tasks of all pairs of images. Although we have not finished collecting all data, our preliminary results showed the performances got lower when participants had to choose the correct image from the same material category than from different categories. That suggests they might group stimuli based on the categories of materials they naturally have. Also, we will conduct the evaluation study in humans. Human participants are required to evaluate the same 24 images from some viewpoints, shape, glossiness, or roughness. We will compare the results of these two studies to find whether chimpanzees have categories of materials as humans and what kinds of visual information they use for discrimination of materials.