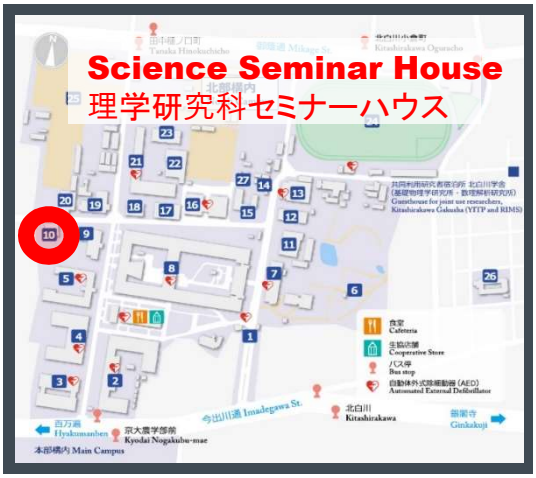
LEADING GRADUATE PROGRAM IN
Primatology and Wildlife Science
KYOTO UNIVERSITY JAPAN

The 13th International Symposium on Primatology and Wildlife Science

2020 Feb 29th (Sat.) – Mar 2nd (Mon.) ※



Kyoto University 京都大学
North Campus 北部構内
Science Seminar House 理学研究科セミナーハウス

※第 13 回 PWS 国際シンポジウムはコロナ禍の影響で会場での開催が中止となりました。
しかし、本要旨集に掲載された研究成果は、口頭・ポスターともに正式な発表業績として認定します。

※The 13th International Symposium on PWS at the venue has been canceled due to the COVID-19 outbreak. However, we will approve both oral and poster presentations in this Abstract as the official research presentation at the Symposium.

The 13th International Symposium on Primatology and Wildlife Science

PROGRAM

Day 1 February 29th (Sat)

Time		(min)	Title	Speaker	Affiliation
12:00-13:00	Registration				
13:00-13:15		(15)	Opening Remarks	Gen'ichi Idani	PWS Program Acting Coordinator
	Recent advances in bonobo studies				Chair: Takeshi Furuichi
13:15 | 15:10	O-01	(20)	Tool use in New Caledonian and Hawaiian crows	Takeshi Furuichi	Primate Research Institute, Kyoto University
	O-02	(15)	Do females disperse at the onset of puberty? Hormonal and behavioral correlates of natal emigration in female bonobos at Wamba	Kazuya Toda	Primate Research Institute, Kyoto University
	O-03	(20)	Grooming and sexual partner selections by wild bonobos during inter-group associations at Wamba, DR Congo	Nahoko Tokuyama	Department of Evolutionary Studies of Biosystems, The Graduate University for Advanced Studiesy
	O-04	(15)	Comparisons of between-group differentiation in male kinship between bonobos and chimpanzees	Shintaro Ishizuka	Primate Research Institute, Kyoto University
	O-05	(15)	Aggression and Provocative Behaviors among Male Bonobos in Wamba, Luo Scientific Reserve, Democratic Republic of the Congo	Shohei Shibata	Primate Research Institute, Kyoto University
	O-06	(30)	Aggression and tolerance - the role of bonobos in reconstructing human evolution	Martin Surbeck	Harvard University
		(15)	<Coffee Break & Air refresh>		
		(5)	<Group Photo>		
	PWS new endeavor				Chair: Shiro Kohshima
15:30 | 16:15	O-07	(15)	untitled	Isamu Tatsuno	mont-bell Co., Ltd.
	O-08	(30)	Interactions between Human and Animals in the Process of Environmental Adaptability around Central Eurasian Highland	Takuya Soma	Wildlife Research Center, Kyoto University
	Genetics: tastes to personality				Chair: Hiroo Imai
16:15 | 17:10	O-09	(15)	Evolutionary and phylogeographic views on Melanocortin 1 receptor (MC1R) in Sulawesi macaques	Xiaochan Yan	Primate Research Institute, Kyoto University
	O-10	(20)	Characteristics of the bitter taste receptor TAS2R38 in colobines	Kanthi Widayati	Department of Biology, Bogor Agricultural University
	O-11	(20)	Personality Structure in Bottlenose Dolphins	Alexander Weiss	The University of Edinburgh
17:10-18:30			Poster session/ PWS exam		

Day 2 March 1st (Sun)

Time		(min)	Title	Speaker	Affiliation
	Cognition and Emotion in non-human primates				Chair: Ikuma Adachi
9:00 | 10:15	O-12	(30)	Designing a digital forest for zoo-housed chimpanzees	Chris Martin	Life Sciences Department, Indianapolis Zoo
	O-13	(15)	Comparing Social Style in Zoo-housed Macaques by Open Lab Style Experiment	Akiho Muramatsu	Institute for Advanced Study, Kyoto University
	O-14	(15)	Video—real world referent matching in chimpanzees	Shenwen Xu	Primate Research Institute, Kyoto University
	O-15	(15)	The relative contributions of facial shape and color in chimpanzee's age categorization	Yuri Kawaguchi	Primate Research Institute, Kyoto University
		(15)	<Coffee Break & Air refresh>		
	Cognition and Emotion in non-human primates				Chair: Yuko Hattori
10:30 | 11:35	O-16	(15)	Facial Expressions of Acute Pain in Japanese Macaques: development of an assessment tool	Vanessa Gris	Primate Research Institute, Kyoto University
	O-17	(15)	Chimpanzees (Pan troglodytes) look at snakes upon hearing alarm calls	Yutaro Sato	Wildlife Research Center, Kyoto University
	O-18	(20)	Body Perception in Chimpanzees: A Comparative-Cognitive Study	Jie Gao	Primate Research Institute, Kyoto University
	O-19	(15)	Evolutionary Thanatology: An Introduction and an Invitation	James Anderson	Graduate School of Letters, Kyoto University
11:35–13:00		(85)	<Lunch Break>		
	Horse session				Chair: Monamie Ringhofer
13:00 | 14:30	O-20	(30)	Horses and donkeys: different species, different social systems, different management?	Sarah R. B. King	Natural Resource Ecology Laboratory, Colorado State University
	O-21	(15)	The group formation and the relationships with nomads of Mongolian domestic horses	Monamie Ringhofer	Institute for Advanced Study, Kyoto University
	O-22	(15)	In search of a new field site for the study of horses: The Pottoka Reserve population in Piornal, Spain	Renata Medonca	Institute for Advanced Study, Kyoto University
	O-23	(15)	Synchronization of behavior in a multilevel social group	Tamao Maeda	Wildlife Research Center, Kyoto University
	O-24	(15)	Do macho horses have all the mojo? Examining testosterone concentrations in feral stallions	Pandora Pinto	Wildlife Research Center, Kyoto University
		(15)	<Coffee Break & Air refresh>		
	Behaviors of captive animals				Chair: Satoshi Hirata
14:45 | 15:45	O-25	(15)	Outgroup threat elicits ingroup tolerance in captive chimpanzees	James Brooks	Wildlife Research Center, Kyoto University
	O-26	(15)	Preliminary study on synchronized urination in captive chimpanzees	Ena Onishi	Wildlife Research Center, Kyoto University
	O-27	(15)	Do chimpanzees' sleeping patterns change with age? Looking back a decade	Kristin Havercamp	Wildlife Research Center, Kyoto University
	O-28	(15)	Plant intake and hair evacuation in snow leopards (Panthera uncia)	Hiroto Yoshimura	Wildlife Research Center, Kyoto University
	Behaviors of wild animals				Chair: Andrew MacIntosh
15:45 | 17:25	O-29	(15)	Group Size Estimation of Finless porpoises by Aerial Videos	Tomoe Torii	Wildlife Research Center, Kyoto University
	O-30	(15)	Differences in seasonality of insect feeding behavior among three species of forest guenons	Akito Toge	Primate Research Institute, Kyoto University
	O-31	(20)	Tree cover loss across the greater Nimba landscape: perspectives for balancing conservation and sustainable development	Maegan Fitzgerald	Wildlife Research Center, Kyoto University
	O-32	(20)	Fluctuations in population density in Bornean orangutans related to fruit availability in the Danum Valley, Sabah, Malaysia: A 15-year record including mast fruiting that occurred in 2019	Tomoko Kanamori	Wildlife Research Center, Kyoto University
	O-33	(30)	Meet the Mbudha community! A newly discovered population of chimpanzees in Ituri, DRCongo	Anne Laudisoit	PREDICT Country Liaison, EcoHealth Alliance
17:25-18:30			Poster session/ PWS exam		

Day 3　March 2nd (Mon)

Time		(min)	Title	Speaker	Affiliation
Genetic & Hormone session					Chair: Miho Murayama
9:00–10:35	O-34	(30)	Wildlife DNA Forensics	Rob Ogden	Royal (Dick) School of Veterinary Studies and the Roslin Institute
	O-35	(20)	Conservation Physiology in Snow leopards: Zoos and the Wild	Kozue Kinoshita	Wildlife Research Center, Kyoto University
	O-36	(15)	Genetic Diversity and Population Structure in the Yaeyama flying fox	Yuto Taki	Wildlife Research Center, Kyoto University
	O-37	(15)	Genetic monitoring of the Japanese golden eagle using microsatellite loci	Annegret M. Naito	Wildlife Research Center, Kyoto University
	O-38	(15)	Genetic analysis uncovers the diversity of endangered Mountain Hawk-eagle	Yu Sato	Wildlife Research Center, Kyoto University
		(15)	<Coffee Break>		
Messages to future					Chair: Gen'ichi Idani
10:50 | 11:30	O-39	(20)	< The Planet and Humans at a Crossroads > ~ SDGs for Survival ~	Masahiko Horie	Special Assistant to the Foreign Minister of Japan
	O-40	(20)	Seven years in PWS: A summary of the endeavor from 2013 to 2020	Tetsuro Matsuzawa	Institute for Advanced Study, Kyoto University
11:30-11:40		(10)	<Presentation-award ceremony>		
11:40-11:55		(15)	Closing remarks	Gen'ichi Idani	PWS Program Acting Coordinator

Poster Session

P-01	Susumu Tomiya	Morphological Diversity and Evolution of Deciduous Teeth in Primates
P-02	Mikuho Yokoyama	Visual discrimination of materials in chimpanzees
P-03	Boyun Lee	Evolution and ontogeny of primate sociality: an infant-centric perspective
P-04	Roseanne Smith	The differences in response to enrichment of Pan troglodytes at Tacugama Chimpanzee Sanctuary, Sierra Leone- a comparison between ages and sexes
P-05	Lira Yu	When do we humans start to produce joint drumming? A developmental study in 18- to 42-month-old children
P-06	Eiko Oda	Study of the histological and physiological basis of sexual behavior and its evolution in primates
P-07	Marie Sigaud	WHY ANIMAL CAFES ARE BAD NEWS FOR WILDLIFE? Welfare concerns and problematic origins of wildlife species displayed in Japanese animal cafés
P-08	Elio de Almeida Borghezan	Size-assortative pairing and mating in an Amazonian fish, the sailfin tetra *Crenuchus spilurus*
P-09	Yurika Garcia	Effect of habitat disturbance on gastrointestinal parasites of Yakushima deer
P-10	Toshiki Minami	Effect of allomothering on infant's sociality of free-ranging Japanese macaques (*Macaca fuscata*) at Arashiyama, Kyoto
P-11	Huiyuan Qi	Epigenetic estimation of age in snow leopard with the use of fecal samples from captive individuals in Japanese zoos
P-12	Naruki Morimura	Developing a fixed-wing drone for chimpanzee conservation
P-13	Ayumu Santa	Comparison of visual abilities to perceive brightness/contrast between killer whales (*Orcinus orca*) and chimpanzees (*Pan troglodytes*)
P-14	Hanling Yeow	Chimpanzee Reactions to Death Stimuli
P-15	Yoshiyuki Tabuse	Diversification of a cultural behavior in Japanese macaques (*Macaca fuscata yakui*)
P-16	Nelson Broche Jr.	Studying the acute stress response of the monkeys at Koshima
P-17	Koki Yoshimura	The possibility of self-domestication in captive red foxes
P-18	Qi Luan Lim	Genetic Diversity of the Malayan Tapir
P-19	Nobuko Nakazawa	Daily photo-capture pattern of leopards (*Panthera pardus*) and their prey species in Mahale Mountains National Park, Tanzania.

P-20	Raquel Costa	The impact of ecotourism on the behaviour of mountain gorillas in Bwindi Impenetrable National Park, Uganda
P-21	Kenneth Keuk	Ecological networks of Parasites and Primates: modelling host-parasiteenvironment systems at different scales
P-22	Mi Yeon Kim	The Survival Story of O-Ree: A Report of Indo-Pacific Bottlenose Dolphin without a Tail in the Wild.
P-23	Yeong-ju Lee	Influence of the Group Stability on the Post-conflict Affiliation in the Horse Society
P-24	Sakiho Ochi	Investigation of Association Pattern in Free-ranging Horses (*Equus Caballus*)
P-25	Rena Numabe	Establishment of the strain of mPR gene knockout zebrafish
P-26	Sota Inoue	Collective departure in feral horses
P-27	Chika Zemmoto	Phylogeography of Japanese rock louse and my feature theme

Do females disperse at the onset of puberty? Hormonal and behavioral correlates of natal emigration in female bonobos at Wamba

Kazuya Toda[1], Keiko Mouri[1], Heungjin Ryu[1,2], Testuya Sakamaki[1,3], Nohoko Tokuyama[4], Keiko Shimizu[5], Chie Hashimoto[1] and Takeshi Furuichi[1]

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Colleagues' Department, University Name, City, State (if applicable), Country

Insert your abstract from here. Abstract should be within ONE-page. Please do not change the font type, font size, or other formatting options. The paper title is in 14 pt Bold font. Author name is in 11 pt Regular font. Author affiliation is in 10 pt Italic. E-mail address is in 9 pt Courier Regular font. The entire document should be in Times New Roman or Times font. The font size of the main text (paragraph) should be 12pt. You do not insert any figure and table.

Dispersal from the natal group can be an important pubertal event of an individual's life history for the avoidance of local resource competition and inbreeding. The patterns and timings of dispersal can be variable among and even within species. Females of the *Pan* species transfer from the natal group into another group before they give birth to their first infants, but female bonobos disperse at a younger age (6–8 y) than female chimpanzees (11–13 y). Such age difference can be considered to be based on different dispersal costs for each species; social characteristics of bonobos might lower the developmental threshold of immigration into an unfamiliar group compared to those of chimpanzees. However, it has been poorly understood about proximate mechanisms underlying the young emigration of female bonobos. We investigated hormonal and behavioral changes associated with puberty to determine a maturational stage at the dispersal moment in wild female bonobos. We assayed sex steroid metabolites of estrone conjugates (E_1C) and pregnanediol glucuronide (PdG) from urines sampled in female bonobos at Wamba. We also observed their copulatory interactions with mature males. As a result, urinary E_1C levels and copulation rates increased from prior to dispersal while ovulation signals implied by a sustained rise of urinary PdG levels were not detected until at least one year later after the emigration. Further, median E1C levels and copulation rates increased prior to emigration and then reached upper maxes in a post-emigration period. Our results suggest that female bonobos may transfer out of their natal group at the early stage of puberty that follicular development is likely to fail to reach the ovulatory stage. Further, the prolonged period between natal emigration and sexual maturation might benefit them to postpone risking high energetic costs for first reproduction until they are established into the new group (Strier and Ziegler 2000) or allocate more time to seek a better group where they will settle down.

Grooming and sexual partner selections by wild bonobos during inter-group associations at Wamba, DR Congo

Nahoko Tokuyama[1*], Tetsuya Sakamaki[2], Kazuya Toda[2] and Takeshi Furuichi[2]
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Although xenophobia and ingroup altruism are widespread in the animal kingdom, inter-group affiliation and cooperation tend to be considered as human unique. In bonobos, which is one of the most evolutionary closest living animals to human, individuals of different groups occasionally associate with each other and interact affiliatively, though whether they preferentially interact with out-group individuals or not is unknown. We investigated their grooming and sexual partner selections when out-group individuals were available. We conducted party following on a group of bonobos (PE) at Wamba, DR Congo, for 3129 hours between 2012 and 2019. During the observations, PE individuals associated with bonobos of three neighboring groups for 904 hours. We calculated the expected numbers of out-group individuals that each PE individual groom, copulate, and perform genito-genital rubbing (a socio-sexual behavior between females) in an hour and compared them with the observed numbers. Females preferentially selected out-group females as grooming and genito-genital rubbing (a socio-sexual behavior between females) partners. We did not find evidence that males actively selected out-group females and males as grooming partners, while they preferentially copulated with out-group females. Bonobos, especially females, put effort into interacting with out-group females for the limited period of time that they are associated, suggesting that inter-group social bonding could provide benefits.

Comparisons of between-group differentiation in male kinship between bonobos and chimpanzees

Shintaro Ishizuka[1,2], Hiroyuki Takemoto[1], Tetsuya Sakamaki[1,3], Nahoko Tokuyama[1,2,4], Kazuya Toda[1,2], Chie Hashimoto[1], and Takeshi Furuichi[1]

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Patterns of kinship among individuals in different groups have been rarely examined in animals. Two closest living relatives of humans, bonobos and chimpanzees share many characteristics of social systems including male philopatry, whereas one major difference between the two species is the nature of intergroup relationship. Intergroup relationship is basically antagonistic and males sometimes kill individuals of other groups in chimpanzees, whereas it is much more moderate in bonobos and copulations between individuals of different groups are often observed during intergroup encounters. Such behavioural differences may facilitate more frequent between-group male gene flow and greater between-group differentiation in male kinship in bonobos than in chimpanzees. Here we compared differences between average relatedness among males within groups and that among males of neighbouring groups, and between-group male genetic distance between bonobos and chimpanzees. Contrary to expectation, the differences between average relatedness among males within groups and that among males of neighbouring groups were significantly greater in bonobos than in chimpanzees. There were no significant differences in autosomal and Y-chromosomal between-group male genetic distance between the two species. Our results showed that intergroup male kinship is similarly or more differentiated in bonobos than in chimpanzees.

Aggression and Provocative Behaviors among Male Bonobos in Wamba, Luo Scientific Reserve, Democratic Republic of the Congo

Shohei Shibata[1*], Chie Hashimoto[1], Takeshi Furuichi[1]
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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. I observed 86 cases of aggressive interactions among males and more than half of those interactions were expressed toward two particular individuals. Those two individuals 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.

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.

Aggression and tolerance - the role of bonobos in reconstructing human evolution

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I study the influence of competition and cooperation on the structure and dynamics of social groups. By combining insights from behavioral ecology and endocrinology I explore mechanisms of male mate competition in bonobos and how they might be linked to proposed species characteristics such as peacefulness and female dominance. These initial studies have led to my current interest in different forms of social relationships between and within the sexes, their underlying hormonal mechanisms, and their effects on reproductive success. For example, studying intersexual relationships in bonobos offers a potential model for understanding the precursors of male-female relationships in human societies, an unresolved problem at this stage. Furthermore, in the case of mother-son bonds, their effects on male reproductive success suggest an interesting new mechanism and alternative hypothesis to the question of how post-reproductive lifespan evolved in ape-like ancestors. I am convinced we can infer more about processes and selective pressures in our evolutionary past by comparing chimpanzees and bonobos rather than studying either of these taxa on their own. In collaboration with other Pan field sites I compare findings on male cooperation, male reproductive skew, and association patterns in both species.

Interactions between Human and Animals in the Process of Environmental Adaptability around Central Eurasian Highland

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There are various "rules" between humans and animal interactions among local people living in the mountains and grasslands of Central Eurasia. In particular, nomadic animal herders have accumulated the vast knowledge for how to live together the five livestock (sheep, goats, cows, horses, and camels) in their traditional livelihood. In addition, there is also traditional ecological knowledge (T.E.K.) to forecasting weather, which is used as survival skills from climatic disaster "*dzud*". In the past, wildlife hunting, such as horse riding eagle falconry by taming a large golden eagle, and hunting of herbivores, supported their lives. For sharing pastures and animal resources in their living spheres, what kind of contact, harmony, life exchange... have been made between human and animals across Central Eurasian, in order to adapt to the harsh environment? In my research, I am exploring environmental adaptation and unique strategies of human and animals regarding as "the survivor of wild land", through fieldworks based on the convergence of different knowledge and disciplines such as geography, ecological anthropology and animal ecology.

Evolutionary and phylogeographic views on Melanocortin 1 receptor (*MC1R*) in Sulawesi macaques

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Seven macaque species, known as the Sulawesi macaques, rapidly diverged from the common ancestor in Sulawesi island within 0.35 million years. They live allopatrically and distribute from south to north on the island. Distinguishing from the other macaques, other than lion-tail macaque, Sulawesi macaques commonly have dark coat color, with color brightness and color pattern diversified within the seven species. It is interesting that *M. maura* in the southwest has the most primitive characteristics (brownish), and *M. nigra* living in the most northern, is the most specialized (dark). MC1R plays a key role in regulating synthesis of the dark eumelanin and the red/yellow pheomelanin in mammals. We investigated nucleotide sequences of the *MC1R* in all seven species. Fixed variants of MC1R were found existed in each species, but *M. ochreata* and *M. brunescens* shared the specific variant. *MC1R* sequence in *M. nigra* and *M. maura* are the most genetically distant from the common ancestor, *M. nemestrina*. Fixed variants of *MC1R* (melanocortin-1 receptor) might account for differentiation on coat color in Sulawesi macaques. To understand the molecular basis of dark coat color evolution in Sulawesi macaques, we tested the functional property of agonist α-MSH binding activity of fixed variants in each species. So far, we found that the MC1R variants exhibited variation in agonist binding ability and basal activity. However, it is still necessary to study other mechanisms for regulating MC1R activity, such as antagonist ASIP binding. Our results so far suggested that fixation of MC1R occurred among Sulawesi macaques, and MC1R variants evolved into different functional characteristic among species.

Characteristics of the bitter taste receptor TAS2R38 in colobines

Laurentia Henrieta Permita Sari Purba[1], Kanthi Arum Widayati[1,*], Nami Suzuki-Hashido[2,3], Akihiro Itoigawa[3,4], Takashi Hayakawa[5,6,7], Sarah Nila[1], Berry Juliandi[1], Bambang Suryobroto[1], Hiroo Imai[4]

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Bitter taste perception, which is mediated by bitter taste receptors TAS2Rs, enables the detection of potentially toxic molecules and thus evokes avoidance behavior in vertebrates. One of the best-studied TAS2R is TAS2R38, which recognizes Phenylthiocarbamide (PTC). PTC perception and TAS2R38 receptors vary across primate species, and this variation may be related to variation in dietary preferences. In this study, we performed genetic analyses, functional assays with mutant proteins, and behavioral analyses to evaluate the general characteristics of TAS2R38 in colobines. We found that PTC sensitivity is lower in TAS2R38s in Colobines than in TAS2R38s of omnivorous macaques. Two amino acids shared between Asian and African colobines were responsible for low sensitivity to PTC, suggesting that the last common ancestor of extant colobines had this phenotype. We also detected amino acid differences between TAS2R38s in Asian and African colobines, indicating that they evolved independently after the separation of these groups.

Keywords: bitter taste, TAS2R38 receptor, colobine, PTC sensitivity, molecular evolution

Personality Structure in Bottlenose Dolphins

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Despite being adapted to an entirely aquatic lifestyle and last sharing a common ancestor with primates some 95 million years ago, bottlenose dolphins (*Tursiops truncatus*) have received popular and scientific notoriety given their striking similarities with primates in terms of their behavioral and cognitive traits. Because these similarities may be reflected in the personality structures of these species, we examined personality structure in 134 bottlenose dolphins. Personality was measured in 49 dolphins using a 44-item questionnaire and in 85 dolphins using a more recent version of the questionnaire that included 5 additional items. Parallel analysis and an inspection of the scree plot revealed four personality dimensions: assertiveness, openness, sociability, and calmness. The first three dimensions resembled personality dimensions found in nonhuman primates and in numerous other species, whereas calmness, which incorporated traits such as easy-going, predictable, and friendly, was unique to dolphins. Similarities between dolphins and other species are consistent with the view that similar personality dimensions are found in species facing similar selection pressures, but that some of these pressures (e.g., those related to group structure, terrestrial lifestyles, visual perception, morphology, and social learning or tool use) may not be as important for the evolution of specific personality dimensions in primates.

Designing a digital forest for zoo-housed chimpanzees

Christopher Flynn Martin[1]
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Chimpanzees in the wild regularly face a variety of challenges related to finding food, navigating through dense forests, attracting mates, guarding resources, and patrolling territories. Overcoming these challenges requires a repertoire of cognitive and physical skills and strategies, the success or failure of which can have short-term consequences on health and well-being, as well as long-term impacts on fitness from an evolutionary perspective. For chimpanzees in zoos, these challenges are often greatly reduced or altogether eliminated, and as a result the need for relying on species-typical behavior and cognitive processes is diminished. To remedy this trend, there is growing interest among zoo professionals to design functionally naturalistic exhibit features that elicit the same mental and physical processes that are routinely relied upon by wild animals. Toward this end, the Indianapolis Zoo is designing a new chimpanzee exhibit that will employ a "digital forest" consisting of several large enclosures connected to each other by a network of corridors. Multiple touchscreen stations and button-operated feeding devices will be spread around the enclosures and corridors to encourage natural foraging and exploration behaviors. Moreover, by varying the difficulty of the tasks running on the touchscreens and the timing of their availability, the chimpanzees will be compelled to make choices between staying and exploiting a specific station or travelling to a different one for potentially greater food rewards. This kind of *exploitation versus exploration* game theoretic scenario, often referred to as the "multi-armed bandit problem", is a challenge routinely faced by animals foraging for food in the wild, and the new digital forest exhibit will seek to recreate it in a zoo-setting.

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, we introduced a portable touch monitor to zoo-housed macaques at Japan Monkey Centre and compared their social style under an experimental setting. Our 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.

We counted the number of individuals who 'approach' the apparatus (touched or stayed in front of the monitor) and measured 'approach' time. We found 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 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.

Video—real world referent matching in chimpanzees

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Videos provide a referential image of the real world. Due to its ease of manipulation and control, numerous studies with nonhuman animals reported a variety of video-induced responses. However, it is not clear how animals perceive and utilize video information, which is necessary for a valid interpretation of their reactions toward video. To address this, we explored the extent of understanding of the representing function of video in five chimpanzees (*Pan troglodytes*). Specifically, we presented food-hiding to one of two containers, and then examined whether chimpanzees can locate the baited food. We compared the performance in Video Condition (test: observe food-hiding through a life-sized real-time video) to their performance in Real Condition (control: observe food-hiding directly). In Study 1, we first confirmed whether they can pass the test. On average, chimpanzees succeeded in Video Condition, although the performance was poorer than in Real Condition. In Study 2, followed the same procedure, we investigated what feature cues (i.e. color: green/red, shape: rectangle/cup) and spatial cues (i.e. relative location: left/right) chimpanzees use in processing video information. We found that spatial cues in videos were least used for their choice, as its performance dropped, compared to color cues. In Study 3, in order to further explore chimpanzees' understanding of video that depict things remote in space and time, we extended spatial and temporal distance between food-hiding demonstration and container choice test by conducting them in different space. Two chimpanzees passed the test in Video Condition. They were the same individuals who succeeded in Real Condition. These findings provide evidence of chimpanzees' ability to make links between the video content and its referent. They not solely can extract and utilize the information of local features of the object, but some chimpanzees may also integrate the information of absolute location of the event.

The relative contributions of facial shape and color in chimpanzee's age categorization

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Primates differently behave toward infants and mature individuals; They are usually tolerant of infants and provide them with care and protection. Given this, primates seem to differentiate adults and infants. Although age is judged from various physical appearance, among all, face provides rich information. Our previous study suggested that chimpanzees have a visual preference for infants and allocate greater attention to infantile facial coloration. However, it remains unclear from which facial features they judge age. In this study, we used a matching-to-sample task, where chimpanzees were trained to discriminate adult and infant average faces. Our statistical image analysis showed that infant and adult faces significantly differed both in shape (e.g. bigger eyes and curved supraorbital torus) and color dimensions (e.g. bright skin color). To investigate the relative contribution of facial shape and color in age judgements, we tested how their responses transfer to a series of morphed faces that systematically differed in facial shape and color. As a result, we found that both facial shape and color contributed to age judgements, but the relative contribution of facial color was much greater than that of facial shape. Our results suggested that chimpanzees use unique infantile color as a cue to differentiate adult and infant faces. Their facial skin color may function as age signal in chimpanzees.

Facial Expressions of Acute Pain in Japanese Macaques: development of an assessment tool

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Changes in facial expression provide a potential way to assess emotion in mammals in both the wild and laboratory setting. Quite apart from an ethical imperative, in a research context it is also important to know that animals are not suffering in order to gather valid data. Here we describe a method to assess pain in Japanese macaques (*Macaca fuscata*) by observing and quantifying changes in facial expressions using a morphometric approach. Facial images were captured from adult healthy female macaques (n=8) undergoing laparotomy. Video recording was performed with the macaques undisturbed in their cages at least one day before and 1 day after surgery, prior to rescue analgesia. Screenshots from the pre- and post-surgical periods were taken from the videos and selected for analysis on the basis of their appropriate facial orientation to the camera. ImageJ was then used to annotate the face pictures with 42 landmarks related to specific points selected for their relationship to key areas affected by the facial musculature. The images were then compared at the level of individual subject before being pooled (total: 76 images “no pain”; 52 “pain”, sample size varied between subjects). There were consistent changes in the faces of macaques which suggest that pain is associated with tightening of the muzzle, as has been described in other species. Apparent raising of the hairline probably due to piloerection was observed. We also plan to use the data for implementation of a presence-of-pain classification system using artificial neural networks. This work potentially offers a complement for existing ways to train others in the evaluation of pain and welfare in captive primates, using data generated as part of their use in other research procedures.

Chimpanzees (*Pan troglodytes*) look at snakes upon hearing alarm calls

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For some species of animals, especially primates and birds, vocal signals such as alarm or food-associated calls may indicate external events to receiver animals. Previous studies have suggested that receivers do not simply react to the acoustic features of each call, but they have associations between the call and items putatively indicated by the call. Yet, the cognitive mechanisms underlying receiver behaviors are still poorly understood. Therefore, we examined whether chimpanzees (*Pan troglodytes*) spontaneously associate alarm and food-associated calls with snakes and foods, respectively. Specifically, we used an audio-visual cross-modal preferential looking experiment, in which chimpanzees were presented with images of snake and fruit side-by-side on a monitor while hearing either chimpanzee alarm calls or food grunts. We measured their looking behavior to the images using an infrared eye-tracker. Chimpanzees looked at snakes longer when hearing alarm calls compared to when hearing food grunts, indicating that chimpanzees spontaneously associate alarm calls and images of snakes. Since chimpanzee vocalizations are less context-dependent compared with those in other species such as vervet monkeys, contextual cues such as signaler behaviors may also be important for receivers to identify the cause of others' calls. Yet, our results suggest that chimpanzees recall relevant memories upon hearing alarm calls even in the absence of other contextual cues. Alternatively but relatedly, attention bias to snakes may have been simply caused by negative affective responses upon hearing alarm calls, independent of memories for relevant items. To address this possibility, future studies would examine whether other evocative vocalizations such as screams also bias chimpanzee attention to snakes.

Body Perception in Chimpanzees: A Comparative-Cognitive Study

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Bodies are important for many species, because they are direct agents for animals to explore and to interact with the environment, and they provide significant social cues. Humans use configural processing for body perception, and they have knowledge about typical body structures and compositions. However, it is not clear whether these special properties of body perception are unique to humans or not. This study aims to shed light on the evolution of body perception by examining chimpanzees, humans' closest relatives, focusing on configural body processing and body knowledge.

We conducted matching-to-sample tasks on touch screens in 7 chimpanzees, using stimuli of upright and inverted pictures. They showed better performance in recognizing upright chimpanzee bodies than inverted ones. This inversion effect was not shown for houses, suggesting that chimpanzees use a special way to process bodies, i.e., configural processing, which is different from the way they process other objects.

We further examined the properties of their configural body processing. First, we examined the function of local elements of bodies, using body stimuli with missing or blurred parts. The results showed that the face and body contour are important for the configural processing. Second, we examined the effect of body structure changes. The inversion effect was gone when the body part arrangement was scrambled, and it remained for bodies with abnormal proportions. This suggests that their configural body processing is sensitive to body part alignment, but not to body proportions.

Next, we focused on the origin of the configural processing: expertise. We tested the inversion effect using stimuli of humans in chimpanzee, who were experts with humans. We also tested the inversion effect with human participants, who were chimpanzee experts, using chimpanzee stimuli. While humans showed the inversion effect to chimpanzee bodies, chimpanzees showed limited inversion effect to human stimuli.

We then further investigated the role of expertise. We found that for other species, chimpanzees showed the inversion effect to those having quadrupedal postures, suggesting the role of embodied expertise; they also showed the inversion effect to human stimuli with daily postures, suggesting the role of visual expertise. We also tested 33 pre-school children to examine the development of configural processing. The results indicated that their configural body processing is stable at the pre-school stage, and they could generalize it to other species with visual expertise, too.

Finally, we examined chimpanzees' understanding of the location and morphology of body parts through eye-tracking experiments. They were presented with chimpanzee bodies with their arms or legs misplaced or replaced by other body parts. They looked at the strange parts longer than the corresponding normal parts of the control stimuli. This suggests that chimpanzees have the knowledge about their body compositions.

We found that chimpanzees have similar, albeit weaker in certain aspects, properties of body perception compared to humans. This suggests that the special way to perceive bodies may have had appeared in the common ancestor of humans and chimpanzees, and it may have had served significantly for species' fitness and adaptation.

Evolutionary Thanatology: An Introduction and an Invitation

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Stated simply, thanatology is the study of death and dying. Human thanatology encompasses a wide range of topics, and scientific disciplines and sub-disciplines including medicine, biology, epidemiology, gerontology, forensics, economics, disaster management, anthropology, sociology, psychology, archaeology. Of course, philosophers, theologians, historians, and indeed the public at large are also fascinated by death…. Comparative evolutionary thanatology widens the scope to include the scientific study of death-related phenomena in other animal species. Topics include the degree of understanding of death (in comparison to our own), responses to death from behavioural and emotional perspectives, and the impacts of death upon demographics, social relationships, socio-ecological responses etc. The understanding of death appears inseparable from sensitivity to various cues or markers of death, illness and injury, topics of interest to several researchers that are likely to be at this meeting. To foster greater cross-disciplinary communication and possible collaboration, each year I organize a 1-day "Kyoto Workshop on Evolutionary Thanatology," which brings together researchers and students from Japan and further afield to share their interests, ideas, questions, and research on thanatological issues. The broad aim is to work towards a coherent evolutionary framework for addressing both the generalities and the specificities that we see in how the dead impact upon the living. We consider death-related phenomena in nonhuman animals, and prehistoric and modern humans. In this presentation I will briefly announce the 4th Workshop, which will take place on March 13th.

Horses and donkeys: different species, different social systems, different management?

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The ancestors of horses and donkeys diverged phylogenetically 5 million years ago yet there has been little research on how these species differ today. The two species are thought to have developed different social systems due to different habitat use by their ancestors: horses inhabiting relatively mesic habitats have a female defense polygyny social system where group composition remains stable over months to years; whereas asses in arid habitat have a resource defense social system, with no long-term associations between individuals. Despite domestication of both species 5,000 years ago horses and donkeys are considered to have retained these social systems when living in a feral state, however scant research conducted on feral donkeys has resulted in differing reports. We explored how evolutionary history, habitat, and management has affected the social behavior and demography of two feral horse and two feral donkey populations in the western United States. Observations were conducted at two feral horse populations in western Utah, a feral donkey population in the Sonoran Desert of Arizona, and one in the high desert of Utah from 2016 to 2019, using the same methods on both species. Animals were identified at the individual level with radio marks, and observed at least monthly throughout the year to gather data on group composition. Observations on social behavior were conducted March to September annually. Our data enables us to highlight differences between populations in terms of reproduction, time budgets, social behavior, and social structure. We found that while feral horses have a birth pulse in early summer and tend to produce foals every 12 months, feral donkeys give birth year-round and have a longer inter-birth interval. Feral horses and donkeys have different time budgets, and feral donkeys have more affiliative and agonistic interactions than horses. There was also a difference in behavior between the two feral donkey populations. Horses exhibited female-defense polygyny, living in relatively stable groups of adult females and one male. We found little evidence of resource defense polygyny in feral donkeys, with males exhibiting a variety of strategies; fission-fusion dynamics similar to other non-harem forming equids was seen. Our results show that donkeys are flexible in terms of their social structure, which may be influenced by habitat. This is likely to be an evolutionary adaptation to stochastic resource availability in arid environments, but may also allow them to persist in other areas. Differences in social networks between horses and donkeys have implications for how these animals are managed in a feral state and wider applications for the conservation of threatened equid species.

The group formation and the relationships with nomads of Mongolian domestic horses

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Mongolian nomads have managed many horses based on traditional knowledge, however so far no animal behavioral studies have focused on their domestic horses. In this talk, I will report about the Mongolian domestic horses and their relationship with nomads based on one month Mongolian trip last year. I will also discuss the formation of their groups in comparison with existing studies on feral horses, as a step toward revealing the behavioral ecology of Mongolian domestic horses. I found that Mongolian domestic horses were bred in natural environments, taking advantage of their original habits and were in healthy physical and mental condition. If their behavioral ecology and their relationship with nomads become clearer in the future, it will provide an important point of view in examining the complexity and flexibility of horses' society and in improving the welfare of horses.

In search of a new field site for the study of horses: The Pottoka Reserve population in Piornal, Spain

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Our team has been conducting behavioral research on a population of garranos, an ancestral endemic horse breed of northern Portugal since 2016. With the aim of broadening our current research project, we decided to visit a feral population of pottokas, endemic to the Basque Country, in Piornal, Spain, in the scope of the project being developed among the Universities of Kyoto, Sorbonne (France) and Coimbra (Portugal). The main goals of this first survey consisted on estimating the actual population size, characterizing the social structure of this population and evaluating the possibility of establishing a long-term study site in Piornal. During our observation period we were able to identify 49 horses including 10 foals. Considering previous research and our observations we estimated the population to be around 70 individuals. The average band size was 2.7 individuals, much lower than what is reported for other horse populations. The social system consisted of typical harem groups, however the community was characterized by a loose relationship among individuals, such as extra harem copulation, mare-foal groups without stallion, and solitary young horses from a very early age. These might be due to the absence of natural predators such as wolves and low resources availability. Studying horse populations subjected to different ecological factors and predation pressures is the key to understand horse's behavioral plasticity. Thus, the Piornal population seem to be a good candidate for future comparative studies alongside our project in Serra d'Arga.

Synchronization of behavior in a multilevel social group

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Animals in a same group often synchronize their activity to keep the group cohesion. This behavioral synchronization is reported in different behaviours, such as resting and departure, in many taxonomic groups of animals. A various model has been created and examined to predict the mechanism underlying this phenomenon. Multilevel society is a social structure with nested level of social organizations where stable unit groups gather and form a large group, and thought to represent one of the most complex society in animals. The synchronization in multilevel society has never been reported as long as we know. This study aims to investigate the most plausible scenario to explain dynamic changes of the number of resting individuals in a multilevel society of feral horse. We (1) independent; individuals decide their activity independently, (2) anonymous; the probability of starting resting/moving depends on the number of individuals in a herd (aggregation of units) already performing this behavior, whatever their identities (3) mimetism within units; the synchronization only occurs within each units, but not across them, and (4) selective mimetism; synchronization occurs in both within and across units, but individuals are more strongly affected by the status of individuals in a same unit. We compared changes in the numbers of resting/moving individuals and the distribution of synchronization rate of the observed data and the simulated data. The result supported the selective mimetism hypothesis, suggesting that horses are synchronizing their activity not only with same unit members but also individuals belonging to other units.

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. In this presentation, we will also discuss the relationship between testosterone levels of stallions and their reproductive and social behaviors.

Outgroup threat elicits ingroup tolerance in captive 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 unknown. Chimpanzees in the wild are notably aggressive towards outgroup members but coordinate complex behaviours with many individuals in group hunting and border patrols. Recent hypotheses have claimed that these behaviours may 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 for 30 minutes after hearing either pant hoots of unfamiliar wild chimpanzees or control crow vocalizations, after which they were then given bundles of semi-monopolizable food and observed for another 30 minutes. We predicted that individuals would be more stressed in the outgroup condition, but that this would not translate into ingroup aggression, and instead that individuals would be more tolerant over food. Although habituation to playback sounds was fast, we found that self-grooming was higher in the outgroup condition than control condition across trials, and that in the first trial aggression over food was significantly lower in the outgroup condition than in the control condition. These results support our hypothesis that outgroup threat enables ingroup tolerance in chimpanzees despite higher stress levels. This suggests that competition between groups may select for group-level cohesion, in particular in situations involving limited resources.

Preliminary study on synchronized urination in captive chimpanzees

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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.

Do chimpanzees' sleeping patterns change with age? Looking back a decade

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Primates, like many other animals, spend more than half of their lifetime sleeping and resting, yet this behavior is almost completely unstudied compared to daytime activities. In their natural habitats it might be difficult or impossible to directly observe nocturnal activities, but in captivity where we are able to closely monitor both day and night activity the opportunity exists to record, study and thus better understand individual and/or group sleeping behavior and patterns. Sleep shows negative changes (i.e. decreasing quality) with advancing age in humans. It is understandably unknown if a similar pattern exists in our closest evolutionary relatives and thus whether this is a phylogenetically conserved pattern or a relatively recent change that developed with modern day lifestyles. We are investigating whether similar sleep-wake cycle changes that occur with increased age in humans also occur among captive chimpanzees living at Kumamoto Sanctuary (KS). Morimura et al. (2012) published sleep data gathered in 2008 on male chimpanzees living in Building 1 at KS; twelve of those individuals are still alive and have continued to live in the same conditions since 11 years ago. I spent around four months at KS recording these chimpanzees' nocturnal activity using a custom built apparatus and infrared night vision cameras which I installed and maintained on a daily basis above each individual's indoor night enclosure. I have collected 123 recorded nights as of May 2019 and we require only 72 of these to partly replicate Morimura et al. (2012)'s study. The goals of our project are to 1) present a longitudinal investigation of chimpanzee sleeping patterns from middle to old age, 2) contribute to our understanding of captive chimpanzee sleep, as very little is known in general, and 3) improve the welfare of captive chimpanzees by examining their sleeping postures and quality, which has already led to care staff providing additional bedding materials.

Plant intake and hair evacuation in snow leopards (*Panthera uncia*)

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Felids play significant roles as apex predator in various ecosystems. Despite many reports mentioning plant containment in scat of felids, the reason why strict carnivores eat plants has been unknown. It is strongly believed that the plant intake helps them excreting hair balls. However, no scientific work has confirmed the effect of plant intake on hair evacuation. In this study, the relationship between plant intake and hair evacuation was investigated using 11 captive snow leopards. Behaviour observation and scat analysis were conducted to evaluate the frequency of plant eating and vomiting, and the amount of hair and plant in scat. We found the frequency of vomiting was much less than plant eating. Therefore, it was suggested that snow leopards did not eat plant only to vomit. The effects of plant intake on hair evacuation in scats was quantitatively evaluated as well. We found neither of the time of plant eating nor the amount of plant contained in scat showed significant relationship with the amount of hair. Therefore, we showed plant intake does not affect hair evacuation against the common assumption. These indicate that there will be another reason for snow leopards to eat plants. Our findings should be an important clue to understanding driving forces to make strict carnivores eat plants.

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 14 days from November 2019 to February 2020. As a result, overall mean group size was estimated as 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.

Differences in seasonality of insect feeding behavior among three species of forest guenons

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It is important to understand seasonal variation in animals' diet. Insects are resources of high quality for primates, and most primates include insects in their diet. Insects are highly seasonal resources, but it is little known about the seasonality of insect feeding behavior. To reveal those of forest guenons, we conducted a one-year field study from October 2018 to September 2019 in Kalinzu Forest Reserve, Uganda. We followed adult females of blue monkeys (Cercopithecus mitis), red-tailed monkeys (C. ascanius), and L'hoest's monkeys (Allochrocebus lhoesti). Observation time reached 274, 295, and 286 hours, respectively. As a result, red-tailed monkeys spent over 40% of their feeding time on insects in any season. On the other hand, blue monkeys and L'hoest's monkeys showed seasonal differences in time spent feeding on insects, which ranged 17.1% – 42.3% and 19.6% – 32.4%, respectively. Regarding strata use for insectivory, while red-tailed monkeys and L'hoest's monkeys did not show significant seasonality, blue monkeys changed height where they captured insects by season. Though all the species often searched leaves for insects through the year, they used significantly different forest strata in any season. In sum, while blue monkeys and L'hoest's monkeys changed their insect feeding behavior by season, red-tailed monkeys did not change a lot. These behavioral patterns can affect seasonal repertoires of their prey insects. We will test this hypothesis by fecal DNA metabarcoding soon.

Tree cover loss across the greater Nimba landscape: perspectives for balancing conservation and sustainable development

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Historically, the Upper Guinean Forest stretched across west Africa, but this once contiguous, dense canopy forest is now a highly fragmented ecosystem. The Forestière region of southeastern Guinea contains some of the last remaining patches of Upper Guinean Forest in the country. Within this region, the Nimba mountains are one such remnant patch of this forest ecosystem and are habitat for a variety of endemic and threatened flora and fauna, including the Critically Endangered Western chimpanzee (*Pan troglodytes verus*). The Nimba mountains are also rich in natural resources such as iron ore and provides essential ecosystem services for a rapidly growing human population. The ability to reconcile sustainable development with biodiversity conservation requires knowledge of not only the current situation in the region, but of its history and how this landscape has changed over time. This presentation will give an overview of historic (2001 to 2018) tree cover loss across the greater Nimba landscape and its implications for both wildlife and humans.

Fluctuations in population density in Bornean orangutans related to fruit availability in the Danum Valley, Sabah, Malaysia: A 15-year record including mast fruiting that occurred in 2019

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We have conducted a research of a relationship between fruit availability and population density of Bornean orangutans (*Pongo pygmaeus morio*) since 2004 in the Danum Valley Conservation Area in Sabah, Malaysia. In Southeast Asian Dipterocarp forest where orangutans inhabit, a phenomenon in which many tree species blossom and fruit altogether known as mast fruiting once every 2–10 years. In Danum Valley, large-scale mast fruiting was observed in 2005, 2010 and 2019. We report how orangutans have responded to these three mast fruiting.

We conducted marked nest census and fallen fruit census to estimate orangutan density and fruit availability every month from June 2015 to December 2019, using 9 transects of 16 km in total length. As a result of all census, the average of orangutan density was 1.2 individual/km^2 ± SE0.8 (n=86), and it changed between 0.3 to 4.4 individual/km^2.The density showed a significant positive correlation with the fruit availability (Spearman, $R = 0.3$, $P < 0.01$, n = 86). It increased during mast fruiting, in contrast, it decreased when fruit availability was low. The three large-scale mast fruiting temporarily increased to 4.4 individual/km^2 in 2005, 2.7 individual/km^2 in 2010, and 2.1 individual/km^2 in 2019.

Our results suggest that orangutan density in a particular area, particularly dipterocarp forest areas, can change markedly during mast fruiting, probably because many orangutans migrated to the study area from neighboring areas during the mast fruiting period and seeking a place with more fruits. We believe that such movement is necessary for orangutans to survive in a dipterocarp forest with long periods of low fruit availability.

Meet the Mbudha community!
A newly discovered population of chimpanzees in Ituri, DRCongo

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In 2015, an isolated population of *Pan troglodytes schweinfurthii* Giglioli, 1872 was accidentally identified in a relict altitude forest fragment along the Lake Albert escarpment in the Djugu territory, Ituri Province, DR Congo. Between March and May 2017, four missions were organized to explore the area. The first two missions were dedicated to describing the site, meeting and training local guides and placing camera traps. We also carried out informal and structured interviews in order to guide the search for signs, tracks and nests of chimpanzees, and to understand the local beliefs linked to primates in general. The third mission aimed to map the three RAFALE main fragments, quantify the density of nests (SCNC) and functional diversity (mammals) along 6 line transects (1.1-1.4km). Besides land-use, habitat description, and systematic botanical inventory, the level of human activities was also recorded on each transect.An exceptionally high primate density was observed (9 species) of which a group of 17 chimpanzees with 3 unweaned juveniles could be identified on a single video footage. Funeral rites and rodent consumption were also observed. To estimate the size of this isolated eastern chimpanzee population, we recorded perpendicular distances and additional nests off transects were described to document the nesting habits of the local chimpanzee population. However due to the topography (average slope of 14-20%), altitude, and influence of the neighbouring lake, the vegetation cover and composition is highly variable and patchy from the river valleys to the top of the escarpment. This creates a mosaic of suitable and unsuitable areas for nest building within the already reduced ±20km² (forest loss of 2.4 to 12.4% between 2010-2015 in the different fragments studied) of remaining fragmented forests. Those particular circumstances are discussed in the light of the computed chimpanzee population density 4.34 to 5.62/km² (depending on the model used) and face recognition on footages.

Wildlife DNA Forensics

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The illegal wildlife trade is having a devastating effect on the status of many endangered species, including some of our most charismatic large animals and plants. Tackling the trade has become an area of global concern and concerted international efforts are underway to address the issue, involving support for alternative livelihoods in source countries, law enforcement and the supply chain, and demand reduction for wildlife products in end-user countries. Law enforcement is a complex issue, requiring investigations at many different scales, from local bushmeat poachers through to international organized criminals. As with any other crime, investigators are using forensic science to detect and prosecute offenders.

The use of molecular genetic analysis to identify human evidence has revolutionised forensic science and is now an established tool in law enforcement. The analysis and identification of wildlife DNA is used to address questions of species identity, captive breeding and geographic origin, as well as individualization across multiple species. The resulting evidence is used to provide intelligence concerning trade routes as well as prosecute individuals involved in wildlife trafficking.

This presentation will introduce the field of wildlife DNA forensics, explain the key scientific questions involved, from phylogenetics to familial relatedness, and how the transition to genomics is providing increasing powers of detection. It will also take a look at how forensic science capacity is being developed for wildlife law enforcement in Africa and Southeast Asia, and how new laboratories are contributing to wildlife law enforcement and its role in biodiversity conservation.

Conservation Physiology in Snow leopards: Zoos and the Wild

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An animal is connected to the external environment (e.g., social and habitat environment) via its brain, and hormones play an important role as transmitter substances. In other words, hormones are secreted to adjust the internal environment in response to changes in the external environment. Therefore, hormones can help elucidate the invisible physiological state of animals and the effect of their surrounding environment. Stress response is one of these invisible physiological states. Recently, stress has become the focus of several studies in conservation biology.

To date, I have monitored stress level (cortisol) and reproductive state (estrogen, progesterone, and testosterone levels) by using more than 3,000 fecal samples of captive snow leopards (*Panthera uncia*). From the comparative results of fecal sex steroid hormones and cortisol concentrations among various housing conditions, I could confirm that the measurement of fecal hormone concentration serves as a useful tool in estimating the physiological state of snow leopards. Recently, I have tried applying this fecal hormone analysis method to wild animals for estimating the conditions of their external environment. However, unlike in captive conditions, there are some obstacles in the monitoring of fecal hormones in wild because scats have been exposed to UV and ambient temperature. Therefore, to overcome these obstacles, I estimated time-series variations in fecal hormones of captive snow leopards after UV exposure in the laboratory. Then, I established a new hand-shaking method to extract hormones from scats in the field sites (it is called a “field-friendly method”). In this presentation, I will propose studies on the endocrinology of captive snow leopards and discuss the possibility of the application of hormonal analysis to wild animal populations.

Genetic Diversity and Population Structure in the Yaeyama flying fox

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There are 122 mammal species in Japan, and 37 of them are bats. Especially, the species of genus *Pteropus* have big body size and the ability to fly hundreds of kilometers and have important roles in pollination and seed dispersal. The Ryukyu flying fox (*Pteropus dasymallus*) is one of the *Pteropus* species in Japan, distributed in the Ryukyu archipelago, Taiwan, and possibly the Philippines, and is divided into 5 subspecies. Although they are listed as VU (vulnerable) in IUCN Red List, few genetic analyses have been conducted for their conservation. The purpose of this study is to evaluate genetic diversity and investigate the genetic structure of Yaeyama flying fox, one of the subspecies of the Ryukyu flying fox. We conducted mtDNA haplotype analysis and microsatellite analysis with the 18 markers we developed.

mtDNA analysis was conducted with the samples collected in 8 islands (Miyako, Ishigaki, Kohama, Kuroshima, Hateruma, Taketomi, Iriomote, Yonaguni) We identified 39 haplotypes in 526bp of the control region of 142 samples. 14 haplotypes were shared between some islands, and haplotype network for the 8 islands did not show any clear genetic structure. However, haplotype diversity was higher in Ishigaki and Iriomote compared to other islands, and some haplotypes were only found in particular islands, so there might be some genetic structure which could not be revealed by mtDNA analysis.

Therefore, we also conducted microsatellite analysis with 155 samples collected in 6 islands (Miyako, Ishigaki, Kohama, Taketomi, Iriomote, Yonaguni). As a result of genetic diversity analysis, PCoA, STRUCTURE, and calculation of *Fst*, Yonaguni (the west end of the distribution area) population showed clear genetic differentiation from other populations, low genetic diversity, and a high inbreeding level. Ishigaki, Kohama, Taketomi, and Iriomote (the center of the distribution area) populations had gene flow between them and high genetic diversity. Miyako (the east end of the distribution area) population showed slight genetic differentiation and had the middle level of genetic diversity. Gene flow between Ishigaki and Miyako through islands between them might be preventing inbreeding of Miyako population.

We revealed genetic diversity, and genetic differentiation and gene flow between islands of Yaeyama flying fox for the first time. These results will be useful for setting of conservation units and conservation of populations in each island based on genetic structure.

Genetic monitoring of the Japanese golden eagle using microsatellite loci

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The Japanese golden eagle (*Aquila chrysaetos japonica*) is an endangered subspecies, with around 500 individuals remaining in the wild. Habitat loss and poor forestry practices are thought to be the main causes for population decline. To mitigate further risks of extinction, it is crucial to monitor genetic diversity, as small population sizes lead to inbreeding depression and subsequent consequences like genetic abnormalities, higher risk of disease, reduced adaptability to changing environments. Previous research using 16 microsatellite markers found that genetic diversity is maintained in both wild and captive Japanese golden eagles. Using an improved set of 19 markers (i.e. fewer deviations from Hardy-Weinberg Equilibrium, more alleles – average *Na* = 4.816), we reanalyzed wild and captive birds to build onto past data. Both wild and captive populations had moderate levels of heterozygosity (*He* = 0.579, 0.566 and *Ho* = 0.587, 0.614, respectively) and low levels of inbreeding (*F* = -0.009, -0.067, respectively), indicating that the Japanese population may not yet be experiencing a severe decline in genetic diversity. Moreover, the ability of the markers to distinguish individuals from one another is very robust (*PID-sib* = 3.6E-06 in wild, 5.0E-06 in captive individuals). Hence, using the same microsatellite data, we are also assigning genetic profiles to each individual to monitor turnover, dispersal of chicks, and parentage. At the moment, we have identified at four different nests sites in Iwate prefecture, that the same family line has been using the same site over multiple years (a maximum of 15 years in one case). In short, this data provides information about the basic ecology of golden eagles, as well as genetic indicators for conservation management.

Genetic analysis uncovers the diversity of endangered Mountain Hawk-eagle

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The Mountain Hawk-eagle (*Nisaetus nipalensis*) is one of the apex predator species in Japanese forests. This species has been specified as endangered (EN) by Ministry of the Environment Japan. The population size is estimated to be around 1,800 birds in Japan, and decrease in breeding success has been a concern. On the other hand, it is also reported that the breeding success rate has not decreased in recent years – the success is affected by the amount of snow in breeding season, bountiful harvest of Japanese beech (*Fagus crenata*) as food of prey animals and breeding success of the previous year (Tago et al., 2015*).

Revealing the genetic diversity and population structure of endangered species is essential for understanding the current breeding situation and considering effective conservation strategies. Here we will report the results of our genetic analysis for the population of Mountain Hawk-eagle in Shiga prefecture based on two regions of mtDNA (control region and pseudo-control region) to reveal the maternal linages, and nine microsatellite loci on nuclear DNA to reveal genetic diversity, inbreeding, and population structure.

*Tago K., Suzuki Y., Shirai A., Yamagishi S. 2015. The breeding success of Mountain Hawk-Eagle in relation to environmental factors. Jpn J Ornithol 64:195–206. (In Japanese with English abstract)
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< The Planet and Humans at a Crossroads >
~ SDGs for Survival ~

Ambassador Masahiko HORIE
Special Assistant to the Foreign Minister of Japan
Councillor of International Union for Conservation of Nature

The loss of Nature and Biodiversity accelerates at an unprecedented rate mainly because of human activities for economic development. In parallel economic activities has generated global warming and the naming “Climate Change” escalates to “Climate Crisis” or even to “Climate Emergency”. The Planet and Humans are at a crossroads.

Ambassador HORIE lectures on current situations of nature and biodiversity under climate emergency and explains efforts to cope with the situation and SDGs in order to hand over a healthy planet to our future generations.

Seven years in PWS: A summary of the endeavor from 2013 to 2020

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This aims to introduce the past 7-years activity of PWS. PWS stands for Kyoto University Leading Graduate Program in Primatology and Wildlife Science. PWS started in October 1st, 2013. Thus it gets into the 7th year in 2020. PWS is one of the five Leading graduate programs established in Kyoto University. The program aimed to raise the young scientists who dedicate their lives for the welfare, conservation, and social outreach of the endangered large animals. There are 62 professors and 31 students at the moment. It means that the professor-students ratio is about 2:1. The current PWS has 31 students: 13 foreigners vs 18 Japanese, 10 males vs 20 females. In short, 40 % of the students is foreigners. Male-female ratio is 1:2. Among 20 students of L3-L5 corresponding to the doctoral students, 14 students (70%) gets the JSPS scholarship (DC1 Or DC2) or MEXT scholarship. This means that 70 % of the students is financially independent in terms of living expense. In addition to the students of Biology major, PWS offered the special seats to the other graduate schools: There were actually 3 students from ASAFAS. In the first 2 years of the course PWS students have been requested to take the 8 practice courses. In our naming, 1) Inter-laboratories, 2) Kohishima, 3) Yakushima, 4) Genome analysis, 5) Zoo and museum in Japan Monkey Centre (JMC), 6) Comparative Cognitive Science or Animal Welfare, 7) Myoko-highland Sasagamine, and 8) Self-designed fieldwork or laboratory work. The students have been encouraged to take the two kinds of seminars, one is Buddha seminars in Japanese and another is Asura seminars in English. The students were encouraged to become multi-lingual by mastering at least two foreign languages. We held the monthly face-to-face meetings for students both in Inuyama and Kyoto. PWS took JMC as the place for real practice and social outreach: for example, the Japanese magazine titled "Monkey" from JMC was edited in the collaboration of PWS. We have many foreign collaborators and organization. PWS has already sent 18 graduates to the world. The 1st year group of 5 students turned to become two professors in USA, two PDs of JSPS, and one working as a conservationist in Borneo. The average years to get PhD in the doctoral course was 4.2 years among 18 students. Thanks to PWS, the number of foreign graduate students dramatically increased in the Biological Science Branch of the Graduate School of Science. The PWS practice courses were adopted to be the formal ones in the formal curriculum of the graduate school. PWS has established the unique monitoring system of each student that allows to record the day-by-day activity in the past and the future as well. We keep holding the International Symposium of PWS twice a year. The first one was held in March 2014 and the current one is PWS-13th . We have 50+ PWS students in the history. Thank you very much for your collaboration to promote the new endeavor. *I was very happy to touch the future.* Please visit the home page of PWS for further information: http://www.wildlife-science.org/

Morphological Diversity and Evolution of Deciduous Teeth in Primates

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In most mammals, teeth are critical to efficient acquisition and processing of food items, and the diversity of their forms reflect dietary adaptations as well as phylogenetic relationships. As such, comparative studies of mammalian dental morphology have contributed significantly to evolutionary biology. Yet, much of what is known about dental morphological evolution concerns the permanent (i.e., adult) dentition, and primates are no exception. We posit that quantifying the degree of morphological integration between deciduous and permanent teeth is an important step toward better understanding the evolution of diet and associated traits. Thus, we aim to: (1) systematically document and describe the morphological diversity of deciduous (i.e., milk) teeth in primates; and (2) quantitatively analyze the morphological relationships between the deciduous teeth and their functional counterparts in the permanent dentition.

We tested for correlation of tooth sizes and, separately, of tooth shapes between the two generations of teeth, and within a phylogenetic comparative framework. Our preliminary analyses of data for extant strepsirrhines show that, in general, the sizes of deciduous cheek teeth and their permanent counter parts (e.g., dp3 vs. p4, dp4 vs. m1) are tightly correlated across families, as would be expected for an evolutionarily-conserved system with developmental constraint. In contrast, tooth shapes (as measured by the ratios of occlusal dimensions) are more loosely integrated between the two generations of teeth; this pattern is similar to that in carnivorans. These findings suggest common mechanisms of morphological integration and pathways to dental adaptations under developmental regulations.

Visual discrimination of materials in chimpanzees

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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 whether they are soft or hard, rough or smooth, etc. 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, they are estimated to use this ability to select fresher food, more attractive conspecifics as a partner, or decide their behavior toward known and novel objects in their daily life. However, about the discrimination of material, very few studies were conducted. For example, 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. We examine how they perceive materials and what kinds of visual information are important for the discrimination by using images of four kinds of materials, familiar to captive chimpanzees, stone, wood, water, and metal. We conducted matching-to-sample tasks for 6 chimpanzees. Participants were showed a sample stimulus and two comparison stimuli and asked to choose identically or categorically the same comparison as the sample. As a result, the accuracy rate of trials discriminating between stone and metal was significantly higher than the other materials and the response time of trials between stone and wood was significantly longer. These results suggested that there were differences of difficulties between the combinations of materials and the glossiness or roughness of each objects was important for them to judge the materials. To clarify what kinds of feature of texture is important, we plan to conduct some additional experiments. The results of these tasks will tell us what kinds of information chimpanzees use to discriminate materials.

The differences in response to enrichment of Pan troglodytes at Tacugama Chimpanzee Sanctuary, Sierra Leone- a comparison between ages and sexes

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Psychological well-being is at the forefront of research when it comes to the conditions of environments for animals in captivity. This is deemed even more important in nonhuman primates (NHP), particularly apes who belong to the Hominidae family like humans and exhibit problematic abnormal behaviour. Zookeepers design their husbandry procedures not only based on laws and guidelines but to provide their animals with a better quality of life. The response to enrichment of chimpanzees at Tacugama Chimpanzee Sanctuary in the Western Area Peninsula National Park was explored. The aim was to provide the subjects with physical and mental stimulation, thus alleviating boredom and promoting species-typical behaviours. Three social groups were studied- eight infants (three 2-year-old males and five 2-year-old females), three adults (males aged 36, 12 and 10 years) and four adolescents (one 9 year old male, two 8 year old males and one 8 year old female). They had three foraging devices introduced into their enclosures in order to reduce stereotypic behaviours. After initial behavioural observations to determine their regular activity budget, the study animals were observed interacting with the device. The final sampling period involved further behavioural observations to determine if the enrichment had any effect. It was shown that initially older individuals had a larger range of behaviours. Also, interaction with the device increases with age and usage by males is slightly higher than by females. Wilcoxon signed-rank tests determined significant differences in affiliative, asocial, agonistic, abnormal, object-directed and other behaviours. Furthermore, sex affected the behaviour of infants, age affected the behaviour of adults and both age and sex affected the adolescents' behaviour. This study can provide a framework for future research to build upon, in a deficient area of scientific literature. The expected outcomes are improvements in the areas of captive management and animal welfare.

When do we humans start to produce joint drumming? A developmental study in 18- to 42-month-old children

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We humans can sing and/or dance with others. This behavior has been considered as one of the human unique abilities. Comparative studies, however, demonstrated that this ability is not limited to humans. Chimpanzees, who are phylogenetically the closest living relatives to humans, also show a spontaneous tempo adjustment when they produce rhythmic tapping movement with another conspecific individual (Yu & Tomonaga, 2015; 2016). But still only humans can show a uniquely rapid and complete adjustment of the tapping tempo towards an interacting partner (Yu et al., 2018). In this study, we aimed to examine developmental origin of this human unique rhythmic coordination. Three age groups were targeted: 18 months of age (n = 18, mean = 18.21 months), 30 months of age (n = 18, mean = 30.17 months) and 42 months of age (n = 18, mean = 42.45 months). A joint drumming task (c.f., Kirschner & Tomasello, 2009) was introduced and all the children were induced to drum under four conditions: two speed (400, 600 ms ISI) × two partner (social, non-social) conditions. The results demonstrated that the rapid and complete tempo adjustment appears from 30-month-olds. The children of 18 months showed an incomplete tempo adjustment but they showed tempo flexibility. Additionally, in the 18-month-old children, we frequently observed other repetitive movements (i.e., head-bobbing or bouncing), pointing behavior or turn-taking-like drumming behavior. On the poster presentation, I would like to discuss about possible developmental process of the rhythmic coordination with concerning inhibitory motor control and joint attention behavior shown by the children during the joint drumming task.

WHY ANIMAL CAFES ARE BAD NEWS FOR WILDLIFE? Welfare concerns and problematic origins of wildlife species displayed in Japanese animal cafés

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Originally, Animal Cafés (ACs) offered the possibility to customers to interact with domestic animals (mostly cats and dogs) in a café context. The first AC opened in 1998 in Taiwan. Since then, the number of ACs grew across Asia including Japan, who saw its first café opening in 2004. Today, over 200 ACs exist on the archipelago by displaying not only domestic animals but also wildlife species, with the famous "Owl Cafés" where you can "pet" nocturnal birds. While there is growing concern about the pet trade considered as an important driver of illegal wildlife trade, few studies exist on these ACs, their impact on the pet trade, but also on the welfare of the wildlife displayed. Thus, we aimed at 1) investigating the extent of the phenomenon in Japan through the identification of ACs displaying wildlife and record the diversity of species ; 2) illustrating potential welfare issues with owls as examples ; and 3) questioning the origins of these species. We surveyed 71 ACs displaying at least one wild animal on their website, Facebook, Instagram or Twitter accounts. Most cafés started being active in the past 5 years, exhibiting 1522 individuals belonging to at least 180 species. The majority of individuals were owls (59%), followed by other bird species (17%), mammals (14%) reptiles/amphibians (9%) and marsupials (1%). We recorded 135 individuals belonging to 19 threatened species according to their IUCN status. Also, 70% of the individuals were CITES listed. We recorded numerous welfare issues for owls including: lack of shelter or resting area ; impediment of natural behavior such as flight ; exposure to broad light ; and presence of stress related behaviors. Our results highlight the importance of this undocumented phenomenon and its implications on animal welfare and potential far reaching consequences on illegal wildlife trade.

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. 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.

Effect of habitat disturbance on gastrointestinal parasites of Yakushima deer

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Anthropogenic disturbance in biological systems is an increasing issue for wildlife populations, largely concerning sudden environmental change. Not only does it promote disintegration of forests, the reduction of available resources, the accumulation of contaminants and the introduction of invasive species, it also can facilitate movement of infective agents, affecting the overall health of wildlife populations and raising concerns about the survival and well-being. To date, studies have found reduced reproduction, hormonal imbalances and deteriorations of immune system capacity in wildlife living in anthropogenic environments, and increased risk of parasitism and infectious disease has come to the forefront as well. This study aims to understand the impact of habitat disturbance on gastrointestinal parasites found in Yakushima deer (*Cervus nippon yakushimae*). For this, noninvasive sampling of deer feces was conducted on Yakushima island in "disturbed" (Yahazu and Ohko sites) and "undisturbed" (Hanyama and Kawahara sites) areas during two different periods. We collected a total of 96 fecal samples from November 14th, 2018 to March 13th, 2019 (N=40) and from 21st of November 2019 to 3rd of December 2019 (N=56), to assess the distribution of parasites in these areas. Samples were collected from the ground during foot-based transects from unidentified deer within approximately 24 hours of excretion. Samples were then transported to Kyoto University's Primate Research Institute and analyzed by microscopy using sugar flotation concentration technique and McMaster slide quantification. The overall prevalence of helminth and protozoan parasites was 5.21% and 20.83%, respectively. Fischer's exact tests showed that the prevalence of protozoan parasites was significantly higher in disturbed (34%) compared to undisturbed (5%) environments ($p < 0.001$), whereas helminths were equally distributed across disturbed (4%) and undisturbed (7%) environments ($p = 0.654$). Our study demonstrates altered prevalence of some gastrointestinal parasites of Yakushima deer in anthropogenically disturbed environments. However, it is still unclear how these mechanisms work at the individual or community levels, or to what extent these parasite species are influencing their hosts. Future studies aiming to understand the complexities of these systems and the real impacts that such disturbances can have on wild populations are needed.

Epigenetic estimation of age in snow leopard with the use of fecal samples from captive individuals in Japanese zoos

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Knowing an animal's age provides important ecological and conservational information. Age is tied to reproductive potential, which is essential for estimating spatiotemporal changes in population structure. The snow leopard (*Panthera uncia*), accessed as vulnerable (VU) in the IUCN red list, is an elusive apex predator inhabiting in high-altitude areas across Asia. The average of its generation length was estimated as 7.54 years in the red list, but exact information of wild individuals is almost unknown. In many species morphological observation is the main method being used in the age estimation of wild individuals, however in snow leopard there is few reliable visual indicators after their first or second year.

Age estimation based on age-induced epigenetic changes in DNA methylation has been studied on human beings, mice, dogs and several wild animal species, while there is still few of them using noninvasive samples which could be unsuitable for the application on wild endangered species or those hard to be observed, like the snow leopard. Here, we referred to the candidate marker genes from previous studies and designed primers for snow leopards to test the utility of fecal samples provided by captive individuals with a known age in Japanese zoos (70 fecal samples from 17 individuals). The methylation rate of target regions was detected with methylation-sensitive high-resolution melting (MS-HRM), a cost-effective RT-PCR like method.

Developing a fixed-wing drone for chimpanzee conservation

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Unmanned aerial vehicles (UAVs), or drones, are expected to collect ecological and behavioral data at unprecedented spatial and temporal scales across various topographic regions. A fixed-wind drones are characterized with much longer flight range and broad options in remote sensing equipment comparing with those of quadcopter types. However, fixed-wing drones has not been popular in scientific research, because of few commercial products released, much flight skills required for manipulations, and a few information available for setting-up and trouble shooting. Thus, a fixed-wing drone was developed for monitoring forests in Bossou, Guinea, in where a group of seven chimpanzees has been studied since 1976. A camera was embedded in the drone for collecting video footage and photos with various time intervals. In January 2020, a 15km-flight was conducted for making a DSM in the Green Corridor, a plantation area between Bossou and Nimba Mountains. The flight succeeded to collect 2200 photos with an energy efficiency of 288m/wh. The aerial photos yielded a high-resolution and less distorted DSM ranging 6.5-km^2. The 15-km flight implies potential flight range over 150km^2, which can cover the entire are of Nimba Mountains, a world heritage site in Guinea.

Comparison of visual abilities to perceive brightness/contrast between killer whales (*Orcinus orca*) and chimpanzees (*Pan troglodytes*)

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Cetaceans (dolphins and whales) are marine mammals that have highly adapted to the underwater environment, that is different from the terrestrial environment. Because of the characteristics of the underwater environment, cetaceans have developed excellent auditory abilities, and there have been many studies on that ability. However, many unclear are remained in their visual ability. For cetaceans that don't have color sense, it is suggested that the ability to perceive brightness and contrast play an important role in perceiving the presence of their prey and predators. Therefore, in this study, we focus on the ability to discriminate brightness and contrast of cetaceans and conduct behavioral analysis experiments on two killer whales (*Orcinus Orca*) bred at Port of Nagoya Public Aquarium. In the same time, we also conduct similar experiments with 6 chimpanzees (*Pan troglodytes*) living in Primate Research Institute of Kyoto University and compare the results between killer whales and chimpanzees. The behavioral analysis experiments involve two tasks: ①Brightness discrimination task and ②Visual illusion task "simultaneous brightness contrast" that have been confirmed in several species. This illusion is caused by the ability of our eyes and brains to enhance the difference between two adjacent brightness. We are planning to examine whether this illusion occurs in killer whales, and discuss the significance of the ability to discriminate brightness and contrast in killer whale.

Chimpanzee Reactions to Death Stimuli

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Putrescine is a substance released when dead bodies decay. It has a distinctive unpleasant odour, and is used as a chemical signal of death in animals, prompting behaviours such as burying and avoidance. In humans, it has been linked to the activation of threat mechanisms – they become more vigilant and move away faster, and subliminal exposure causes increased aggression towards outgroup members.

We are interested in the effect of this substance on chimpanzees, and how it may help us understand their comprehension of death and reactions to it. We presented putrescine along with a stuffed bird as a visual cue of death and recorded their reactions. Ammonia and water were used as the control smells. In this study, chimpanzees tended to avoid staying near the experimental cues when putrescine was present. Other behaviours such as scratching and looking time were not affected. The presence of visual cues did not appear to affect behaviour.

Diversification of a cultural behavior in Japanese macaques (*Macaca fuscata yakui*)

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Cumulative culture, or cumulative cultural evolution (CCE), is generally known as the increasing complexity and efficiency of cultural behavior and is transmitted over generations. CCE has been emphasized as the feature of human evolution. But recent non-human animal studies have suggested that non-human animals can have CCE. Japanese macaques in Yakushima (*Macaca fuscata yakui*) have a cultural behavior, that is, embracing behavior. Japanese macaques in Yakushima have some variations of Embracing behavior. The aim of this study is to verify whether embracing behavior in Yakushima meets the criteria of CCE. I conducted fieldwork for Umi-A group of Japanese macaques in Yakushima during August 2018 to October 2018 and October 2019 to December 2019. As a result, matured individuals (adult and young) used more variations of embracing behavior than immatured individuals (juvenile and infant). As far as I know, this is the first report that socially learned behavior can be diversify in one generation. In addition, variations of embracing behavior may diversify over generations. it could be suggested that embracing behavior of Japanese macaques in Yakushima show CCE.

Studying the acute stress response of the monkeys at Koshima

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There are many challenges to non-invasively studying the acute stress response of non-human primates. Hormonal sampling methods utilizing urine, feces, and hair provide a resource for studying stress related hormones and although these methods are useful, they represent several hours to days of stress hormone accumulation. Therefore, the long time lag from any given stress event can lead to difficulty in interpreting the specific causes of stress. Saliva contains many enzymes, metabolites, and proteins and is an underutilized resource in the pursuit of non-invasive research on stress in non-human primates. Furthermore, through the measurement of stress-related salivary biomarkers saliva provides a method to acutely measure stress within minutes. However, despite the utility of saliva there are few examples of its methodological collection in a semi-free-ranging population of monkeys. Here we provide a brief report from an ongoing study that is developing a non-invasive methodology for the collection of saliva from a group of semi-free-ranging Japanese macaques (*Macaca fuscata*) inhabiting Koshima Island, Miyazaki prefecture. Our ultimate goal is to measure and compare the activity of stress-related salivary biomarkers across a variety of behaviors such as grooming, conspecific aggression, and foraging.

The possibility of self-domestication in captive red foxes

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Recent researches suggest that the domestic dog (*Canis familiaris*) evolved through self-domestication without any intentional breeding by humans. Similar process is often regarded to have taken place in human evolution, where fearless and non-aggressive individuals were naturally selected. Another species in Canids, the red fox (*Vulpes vulpes*) can also be domesticated under artificial selections against fear and aggression. However, it is yet to be studied whether self-domestication can take place in this species. In this study, I will see whether degrees of tameness to humans differ in captive-born and wild-born red foxes in The North Fox Farm, Kitami, Hokkaido. About 50 foxes are kept in a large enclosure which tourists can walk through to see foxes in close vicinity. Here, foxes mate themselves without human pairing but cubs are reared by human caretakers. This farm also receives orphaned cubs rescued in the wild. I made focal follows of 13 individuals (0 to 1 year old, 8 captive-born and 5 wild-born) and recorded their behaviors focusing on how they react to humans. Preliminary results suggest that captive-born individuals made physical contacts with humans more frequently than wild-born counterparts. Utilizing these data, I will discuss how their tameness to humans is shaped.

Daily photo-capture pattern of leopards (*Panthera pardus*) and their prey species in Mahale Mountains National Park, Tanzania

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Predators are sometimes regarded as they increase encountering rate by increasing activity overlap with their staple preys. Leopards (*Panthera pardus*) have the widest distribution among wild felids, and show various activity patterns. Here, I intended to clarify photo-capture patterns of leopards and their prey species in Mahale Mountains National Park, Tanzania. Activity pattern of forest mammals in Africa are poorly known. Further, there are few reports of the daily activity pattern of some arboreal primates. To compare the activity patterns of leopards and their prey species, I deployed camera traps on the ground and on the tree. 4468 camera days of terrestrial camera traps and 286 camera days of arboreal camera traps were analyzed. Leopards were active throughout 24h period, with bimodal peaks at dawn and dusk. Blue duikers, which is the most consumed species in Mahale, was predominantly diurnal. Primates including arboreal ones showed diurnal photo-capture pattern in the terrestrial camera traps, with a relative peak at noon. However, primates showed diurnal activity with bimodal crepuscular peaks in arboreal camera traps. The overlap in photo-capture pattern between leopards and their main prey species were calculated by coefficient Δ (ranging from 0 (no overlap) to 1 (complete overlap)). Photo-capture pattern of leopards overlapped with those of blue duikers, which suggest that leopards may hunt blue duikers in the daytime when they are most detectable. Their photo-capture pattern also overlapped with arboreal photo-capture pattern of red-tailed monkeys, rather than their terrestrial photo-capture pattern. Leopards may hunt monkeys on the ground in the daytime, or hunt monkeys on trees while they are sleeping. Arboreal and diurnal primates would be most vulnerable in the crepuscular time and night, because it may be difficult for them to find their predators.

The impact of ecotourism on the behaviour of mountain gorillas in Bwindi Impenetrable National Park, Uganda

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Ecotourism plays a significant role in the conservation of mountain gorillas (*Gorilla beringei beringei*). Despite the growing number of tourists visiting mountain gorillas and an increasing number of habituated groups, very little behavioral data has been collected on the potential impacts of ecotourism on these wild populations. The present study examines how interactions with human tourists influence gorilla behaviour. We collected behavioural data (focal sampling) before, during and after tourist visits over a 11-month period (December 2017-February, 2019) one habituated group (15 individuals) in Bwindi Impenetrable National Park, Uganda. We used general linear mixed-effect models (GLMM) and social network analysis (MuxViz and Ucinet – preliminary data) to analyze the differences between gorillas` behaviour regarding: 1) presence/absence of tourists, 2) distance to tourists and 3) tourist group size. Our data showed that animals' routine is influenced by the tourists. Group social dynamics and individual behaviour (including stress related behaviours) is affected by the presence of tourists, especially when in close proximity. Gorillas will charge, avoid humans or interact with humans, when visitors approach them, violating the 7 m rule. In addition, gorillas will react more to bigger groups of tourists. We strongly advice for the Enforcement of the current rules, in special of the 7-meter rule will decrease the physical interactions, minimize the influence on the animal`s behaviour.

The Survival Story of O-Ree: 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 'long live,' 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. The individual was found only to use a small section of the Daejung habitat and was seen to feed on readily available prey items discarded from the fish farm throughout this area. He was identified through dorsal fin markers and signature whistles and as a juvenile male. The focal follow continued until the end of 2019 field season on November 05. The aerial imagery via UAV was used for perpendicular width measurements for a comparative study of body condition. He had a slender body compared to the population average body condition; however, he maintained the body condition until the last observation. This case study highlights the urgent need for marine protected area and policed protection act for the Indo-Pacific bottlenose dolphin population in Jeju Island.

Investigation of Association Pattern in Free-ranging Horses (*Equus Caballus*)

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Social bonding has been found in many species and maintaining social association, not directly related mating, is thought to have important positive consequences such as increasing competitive ability and lowered stress. Bonding is usually found between close kin. Little is known about social bonding in animals raised in artificial groups such as domestic horses (*Equus Caballus*). In this study, we aimed to investigate the social bonding pattern in free-ranging horses through proximity relationship and co-feeding which are thought to be affiliative behavior in horses. Fifty individuals separated in four groups (the numbers of individuals are; Group A: 11, Group B: 12, Group C: 12, Group D: 15) were used for observations. To observe a proximity relationship, we observed the nearest-neighbor for each individual every 15 min during day time. To observe co-feeding behavior, we piled up hay at n+0.2n (n = n.o. individuals in the group) points in grazing field where horses usually being kept, and observed co-feeding event (two or more individuals are eating hay at the same point), and agonistic behavior (aggressive behavior such as swinging their head, laying down their ears and approaching toward another individual) to create dominance hierarchy. As a result, we found that the individual which was chosen as a co-feeding partner was correlated to neither their age, sex nor social rank (created by using David's score). Also, the nearest neighbor was unrelated to their age and sex but tend to correlate to their social rank. Additionally, we found that the partner of that two affiliative behavior was different. Those results might indicate that horses develop context-dependent social bonding.

Collective departure in feral horses

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Group-living animals always need to make decision and reach a consensus. Typical example of group decision making is collective departure which has been studied for many years. When individuals move to another place for resources or decrease predation risks, each individual balances between benefit from staying there and cost for following others. In consequence, this collective departure proceeds in stages, not in a moment. The proceeding of the collective departure is composed of initiation and propagation. In a lot of previous studies, trends of social characteristics of initiators have been reported. However, mechanisms of propagation are still unclear. Especially, the importance of temporal physical distance among individuals in information propagation is vailed due to the technical difficulty. In the present study, we demonstrate the balance between physical distance and social affiliation in the decision making to follow or not in the collective departure in feral horses. However, the positive correlation between physical proximity and social affiliation have been already known in this study site and this implies facing the multicollinearity problem in classical statistical methods. To solve this, we introduced a novel statistical method using machine learning. We captured aerial videoclips of feral horses in collective departures in Serra D' Arga, Portugal and movement of each individual was automatically detected using deep learning. We found that physical proximity is more important than social affiliation and almost no specific sequential pattern in the collective departure. This result indicates that any horses are just one horse and the necessity to add the view point of physical distance in future studies focusing on this kind of events in any species.