NEWS

Primatology and Conservation in Hanoi, Vietnam

Hanoi, Vietnam was host to the 25th Congress of the International Primatological Society (IPS) from August 11th to 16th, 2014. A wide variety of research was presented at this conference, including studies focused on primate genetics, behavior, and communication. Organized around the theme "Meeting the Challenges of Conserving Primate Diversity," the conference emphasized primate species endemic to Southeast Asia.

MOLECULAR PRIMATOLOGY

One of the most interesting developments in this area on display at the conference was the use of genomic methods to address questions of phylogeny and evolutionary history. Andrew Burrell (NYU) investigated the systematics of the genus *Papio* using a RADseq dataset of over 4,000 SNPs in more than 30 baboons and found multiple differences between the nuclear tree topology and previous mitochondrial tree topologies. Jeff Rogers (Baylor) addressed the evolutionary history of rhesus macaques as inferred from whole-genome sequencing on 152 individual animals, finding that more than 1.5 million SNPs mapped to functionally important transcription factor binding sites. Despite revealing a large amount of previously uncharacterized regulatory variation, the number of SNPs in transcription factor binding sites was lower than genome-wide expectations, suggesting that negative selection is acting on these regions.

The session titled "From Conservation Genetics to Conservation Genomics, A Primate Perspective" deviated from the typical session structure, with several talks organized to include breaks for discussion of the data being presented. Lounès Chikhi (Instituto Gulbenkian de Ciência) discussed the application of genomic methods to nonmodel primate species, particularly those of high conservation priority, and addressed the incorporation of spatial structure into genetic inferences of demographic history. He demonstrated how violating the assumptions of population genetics could give false signatures of demographic events such as population bottlenecks.

Lucia Carbone (Oregon) gave an exciting report on findings from the gibbon (*Nomascus leucogenys*) genome project. The talk presented a role for gene expression-related repetitive elements in explaining unique, gibbon-specific patterns of accelerated karyotype evolution and unusual chromosomal arrangements. In addition, phylogenomic results suggested a rapid radiation consistent with geographic shifts. Scans for positive selection identified genes that may be associated with the arboreal adaptations of gibbons.

SOCIAL RELATIONSHIPS

Many of the presentations focused on the dynamics of social relationships. Predictions based on the Ecological Model of Female Social Relationships were tested in rhesus macaques by Krishna Balasubramaniam (Buffalo), who found that although group size correlated with levels of within- and between-group competition, social structure did not always conform to predictions of the model. Flavia Koch (German Primate Center) examined intergroup conflict dynamics and observed that the number of males in a sifaka group influenced the group's success; however, prior residency did not influence the outcome of the conflict.

Many researchers examined the effect of social bonds relationships, especially among males. Julia Ostner (Gottingen) showed that social bonds played an important role in the recruitment of coalition partners among male Barbary macaques, while Chris Young (Georg-August) found that males macaques with strong bonds showed lower levels of physiological stress when aggression rates were high compared to group members with weak bonds. Ana Palma (James Cook) found evidence of strong social bonds among female spider monkeys, even in the absence of kinship. Kinship also seemed to be relatively unimportant in patterning fission-fusion dynamics among ruffed lemurs, since Andrea Baden (Hunter) found that intra- and inter-sexual associations were strongly correlated with spatial overlap, not relatedness. Erica Dunayer (Buffalo) showed that reciprocal altruism, not the degree of maternal relatedness, best predicted grooming behavior among rhesus macaques.

Researchers also examined patterns of intrasexual associations. Adeelia Goffe (German Primate Center) examined social bonding among Guinea baboons, finding that while all females affiliated with at least one male, friendships with a second male, which was not permitted sexual access, were more sporadic. Cedric Girard-Buttoz (German Primate Center) found that not only do the rank and strength of social bonds influence mate guarding behavior among long-tailed macaques, but that males experience lower physiological and energetic costs than they do when guarding low-ranking nulliparous females.

Methodologically, there was an interesting talk by Monica McDonald (Washington University) that debuted a free new mobile software application, Prim8 Mobile (www.prim8software.com). This android-based operating system (with future plans for iOS) is a valuable way for primatologists to collect behavioral data electronically in wild settings using a smart phone or tablet.

MATING SYSTEMS AND REPRODUCTION

Research was also presented on primate mating systems and reproduction, including reproductive signaling. Oliver Schülke (Göttingen) found that among Assamese macaques, male group size was positively correlated with full and core home-range size, as well as female conception rates, suggesting that increased access to food and male resource defense influences female fitness and that females benefit from living with many males. Ivan Lenzi (Zürich) presented research suggesting that reproductive skew among orangutans was lower than that among other great apes, since both flanged and unflanged males are reproductively successful. However, in a similar study presented by Tomoyuki Tajima (Kyoto), only flanged males were achieving paternity.

Lending support to the graded-signal hypothesis, David Fernanzez (Drexel) characterized the ovulatory cycles of female Sanje mangabeys, observing that alpha males put the most reproductive effort toward females in conceptive cycles at the start of the "shiny phase" of their maximal sexual swelling. This phase overlapped with ovulation, suggesting that males can discriminate females of differential reproductive quality. Lucie Rigaill (Kyoto) noted that the female fertile phase in olive baboons is signaled through multiple modalities, by showing the relationships between sexual swelling size and color, copulation calls, olfactory inspections, and behavior. On the osteological side, Eva Garrett (CUNY Graduate Center) illustrated how different mating systems influence the vomeronasal organ. These differences were likely due to the reliance on different signaling modalities to interpret taxonomically relevant sexual signals.

SIGNALING AND COMMUNICATION

In addition to the research on reproductive signaling, various talks were given that concentrated on primate signaling and communication. These included presentations of research focused on the chemical, auditory, and visual sensory modalities.

Historically, relatively little attention has been paid to chemical signals in primates. However this is beginning to change; multiple presentations involved research on olfactory or gustatory signals. Michelle Klailova (Sterling) reported on a case study assessing olfactory signaling in a wild male western lowland gorilla and the relationships that exist between odor intensity and various social variables. Christine Drea (Duke) presented results on the chemical correlates of pregnancy in ring-tailed lemurs, documenting that pregnant females have unique chemical compositions of genital secretions and that these vary based on the sex of the infant. In a study assessing interactions across sensory modalities, Shoji Kawamura (Tokyo) identified correspondences between bitter taste receptor genes and sensitivity to certain bitter compounds in New World monkeys, postulating that these could have evolved in parallel with different vision phenotypes.

Primatologists have often focused research on the use of auditory signals. Zanna Clay (Neuchâtel) discussed the debate surrounding functional reference in animal signals and argued for a definition of functional reference that includes the importance of the context in which auditory signals are produced. Based on analyses of chacma baboon vocalizations, Philip Wadewitz (German Primate Center) presented methods that could be used for the objective classification of vocal repertoires. Kurt Hammerschmidt (German Primate Center) suggested that variation in primate vocalizations might be used as a reliable taxonomic tool; his results indicated that in various populations of gibbons and leaf monkeys, loud calls contain information about phylogeny. However, he found that this is not true in baboons, whose loud calls may be better explained through intrasexual selection. Florence Levrero (Saint-Etinne) presented results indicating that the vocalizations of mandrills are more acoustically similar between related individuals than between nonrelatives, and that mandrills have stronger responses to the vocalizations of kin, regardless of individual familiarity.

Participants also presented research related to visual signals. Jennifer Danzy Cramer (American Military) gave two talks on the function of vervet blue scrotal color. In the first, she demonstrated that this coloration is not related to rank or contact aggression, although it is related to displacement behaviors in some circumstances; in the second, she explored the relationship between blue color and glucocorticoids, finding a negative correlation with the shade of color and a positive correlation with color brightness.

There was also a symposium on gestural communication organized by Erica Cartmill (UCLA). In the opening presentation, Cartmill discussed the need to revisit assumptions about intentionality and gestural use among great apes, as well as the need for better definitions and methods to distinguish gesture from other modalities, facilitate comparative studies, and create a unified approach to understanding gesture acquisition.

Multiple presentations were related to species recognition. In a study assessing conspecific individual recognition, Catherine Talbot (Georgia State) reported that capuchins are better at discriminating familiar from unfamiliar conspecific faces. James Higham (NYU) presented research documenting character displacement in guenons, with results showing that guenon faces can be reliably identified by species by a machine classifier and that face patterns increase in distinctiveness with degree of sympatry across species. In a similar study, Sandra Winters (NYU) presented research in which the face regions critical for correct species recognition by a machine classifier were identified across guenon species. Rachel Jacobs (Stony Brook) evaluated a face recognition algorithm that reliably identified red-bellied lemur individuals based on their photographs.

It was exciting to see multiple talks focused on primate signaling, the sum of which bridged all main primate modalities. In future research, particular attention should be focused on integrating into primatology more advanced methods for signal analysis, which are already being used to study signaling in other taxa.

TOOL USE

One notable symposium compared stone-tool use among three primate taxa: capuchins, chimpanzees, and long-tailed macaques. Yonat Eshchar (Georgia) found that in juvenile capuchins, the development of nut-cracking behavior was facilitated by the nut-cracking activity of adults, while Dorothy Fragaszy (Georgia) described the development of nut-cracking in capuchins as starting with exploratory manipulation, progressing to percussion of nuts on anvils, to hammering a nut with a stone at around three years of age. Patricia Izar (Sao Paulo) used social network analysis to examine associations at three types of food sources — palm trees, feeding trees, and anvil sites — and found the lowest group cohesion at anvil sites. Elisabetta Visalberghi (ISTC/CNR) showed that capuchins take into account the physical properties of the hammer, anvil, and food item, as well as transport distance, when selecting stones.

Giulia Sirianni (Max Planck) found that chimpanzees also have an optimized foraging strategy, taking into account properties of the hammer, transport distance, and anvil location when choosing tools. Susana Carvalho (George Washington) showed that chimpanzees preferred using novel materials as hammers and anvils, suggesting that locally available material may be an important variable when explaining tool use, and that the transport strategies of early humans may have been misinterpreted. Cat Hobaiter (St. Andrews) presented data about gestural communication during tool use. Expanding studies to long-tailed macaques, Amanda Tan (Nanyang) presented numerous action patterns for oyster-cracking behavior, while Michael Gumert (Nayang) described the geographic distribution of nut-cracking behavior in long-tailed macaques throughout Thailand and Myanmar.

ENDOCRINOLOGY AND CONSERVATION

A methods-based symposium on "Critical Junctions in Endocrinology and Primate Conservation" was organized by Amy Cobden (Emory) and Michael Wasserman (St. Edward's) with the goal of sharing methods for disseminating research to various conservation efforts. Cobden advertised a survey that is designed to help create a unified and effective use of endocrinological data in primate conservation (available at http://bit.ly/1pFNkb3). Winnie Eckardt (Emory) showed that mountain gorilla fecal glucocorticoid metabolites are related to various anthropogenic and environmental stressors, and discussed the challenges involved in studying stress physiology in a field setting. Stacey Tecot (Arizona) also discussed stress physiology, relating stress to disturbance of the habitats of red-bellied lemurs and Milne-Edwards' sifakas. Melissa Emery-Thompson (New Mexico) described her research on energetics of wild chimpanzees; she provided methodological advice, as well as a warning about the complexity of relationships among endocrine, social, and environmental data. Similarly, Cheryl Knott (Boston) presented her research on the anthropogenic influences on orangutan health, energetic stress, and reproductive viability. She gave advice based on how her project disseminates information to local land use planning and government agencies. Jo Setchell (Durham) stressed the importance of understanding the assumptions of chosen methods, collaborating with experts in other fields, and validating endocrine methods properly. Michael Wasserman explained the prevalence of estrogenic plants in primate diets and cautioned against interpretations of endocrinological results that may be confounded by these phytoestrogens.

PRIMATE CONSERVATION

Primate conservation was a central focus of the conference. Citlalli Morelos-Juarez (Sussex) applied an agent-based modeling framework to examine how changes in hunting, logging, population size, and extent of fragmentation affect a critically endangered spider monkey. He demonstrated differences in carrying capacity between continuous and fragmented forests. Fiona Stewart (Cambridge) compared genetic capture-recapture sampling and line transects, and found that there were no significant differences between the methods' estimates. She cautioned, however, that genetic methods could overestimate numbers if a primate's home range is greater than the sampled area.

Many presentations focused on conservation genetics and genomics. Runhua Lei (Henry Doorly Zoo) sampled 19 individuals, covering all the indriids using massively parallel sequencing, averaging 11,000 genes per sample. These data indicated some historical hybridization or introgression between *Propithecus diadema* and *P. candidus*. George Perry (Pennsylvania State) gave a methods update about using DNA capture to obtain genomic data from nonmodel organisms. Unlike RAD-seq, DNA capture requires a sequencing library, which can then be used to target specific areas of the genome. Matthew Mitchell (Drexel) presented research on the genetic structure of chimpanzee subspecies in Cameroon, showing that while *Pan troglodytes ellioti* and *P. t. troglodytes* were generally split, with the former to the north and the latter to the south of the Sanaga River, there was some admixture in the ecotone near the headwaters of the river. Benoît Goossens (Cardiff) applied next-generation sequencing methods to 37 orangutan samples, finding ~37 million SNPs per individual. In addition to contributing to a better understanding of these populations, she was able to use these data to recover the different histories of male and female individuals.

There were also multiple sessions dedicated to conservation in taxa or geographic regions with high numbers of threatened species. For

example, the lemur crisis symposium underscored the ongoing threats to lemurs, 94% of which fall into the IUCN's Threatened category or above. This is the highest percentage for any mammal. Researchers in this symposium reported on community-based and/or researcher-led conservation efforts. Jonah Ratsimbazafy (Groupe d'Etude et de Recherche sur les Primates de Madagascar) announced the first World Lemur Festival, which will take place from October 25–31st this year. Many sessions were also dedicated to assessing conservation efforts in Southeast Asia, with particular focus on species endemic to the host country of Vietnam. Finally, the world's 25 most endangered primates for 2014 were chosen. Updating the list was orderly and efficient, with experts splitting up by geographic region to discuss both progress and new threats in their areas.

CONCLUSIONS

Overall, the 25th Congress of the International Primatological Society was a successful conference in which experts in primatology from around the world discussed a wide variety of new and exciting research. The 26th Congress of the International Primatological Society will be held jointly with the 39th Meeting of the American Society of Primatologists in Chicago from August 21st to 27th, 2016.

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