

Primateology on the Pier: The 2016 joint meeting of the International Primatological Society and the American Society of Primatologists

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1 | INTRODUCTION

The 2016 Joint Congress of the International Primatological Society (IPS) and American Society of Primatologists (ASP) was held at Navy Pier in Chicago August 21–27, the home of deep-dish pizza, the “Willis” Tower (Sears, to native Chicagoans), and Wednesday night fireworks over Lake Michigan. After an opening reception at the Lincoln Park Zoo, the meeting was kicked off by Jane Goodall’s inspiring keynote address. Dr. Goodall, winner of the 2016 IPS Lifetime Achievement Award, described her experiences during her long-term studies at Gombe National Park, providing a fitting introduction to a conference that highlighted many of her talking points: the maturation of primatology as a field, the application of rigorous and cutting-edge techniques to questions old and new, and the need for integrative conservation and public engagement. On subsequent mornings, opening remarks were followed by talks from ASP Distinguished Primatologist Dr. Frans de Waal, IPS President Dr. Tetsuro Matsuzawa, and ASP Early Career Award Winner Dr. Katie Hinde.

This year’s conference included over 1,000 talks and posters spanning diverse species and topics. The presentations were beautifully accented by art exhibitions, including primate paintings by Vietnamese artist Dao Van Hoang (Figure 1, <http://www.daovanhoang.com/>) and American artist Charity Oetgen (<http://artbycharity.com/>), as well as field- and pocket-guide art by Stephen Nash (Figure 2) and a display of antique prints from the collection of Jean Baulu (Figure 3). These displays delighted conference-goers throughout the week.

2 | PRIMATE GENETICS

This conference showcased numerous advances in the use of genetics to study formerly intractable questions of primate evolution, ecology, and behavior.

The Primate Evolutionary History and Comparative Genomics symposium, chaired by Wilson Sayres (Arizona State), Krützen (Zurich), and Marques-Bonet (Pompeu Fabra), was notable for presentations of genomic analyses of selection, speciation, and population diversification. Two studies combined genome-scale population analyses with tests for selection to understand adaptive processes and the role of

ecology in driving diversification despite gene flow. Gonder (Drexel) and colleagues reported differing genes under selection in *Pan troglodytes ellioti* as compared to *P.t. troglodytes* suggesting that subspecies-specific ecotones may drive diversification. Similarly, Krützen and coworkers found different classes of genes, such as energy metabolism, under selection in *P. pygmaeus* versus *P. abelii* (e.g., nervous system, neuromodulation), which suggests adaptive processes that may have led to geographic variation between species. Schierup (Aarhus) and colleagues identified signatures of selective sweeps across great ape X chromosomes in regions that contribute to reproductive barriers between species. Genomic conflict resulting in differential transmission of sex chromosomes may have contributed to speciation by causing X and Y chromosomes to evolve in different directions.

Chiou’s (Washington University) statement, that “Noninvasive population genomics is a reality” supported a repeated theme. Multiple presentations highlighted methods for population-level genomic analyses from fecal samples, which are often problematic because they contain limited and poor quality DNA. These methods represent a step forward in enabling studies of population genetics and movement patterns of endangered or difficult-to-study species. Chiou and Bergey’s FecalSeq approach uses CpG methylation capture to enrich fecal samples for host DNA. CpG methylation is prevalent in the vertebrate genome but uncommon in fecal bacteria. Enrichment allows fast, cheap capture of long strands of host DNA from this historically challenging sample type. Snyder-Mackler (Duke) and colleagues described a technique and software for genome-wide sequencing and pedigree analysis from similarly low-quality samples. With this method, a single high-quality DNA sample can be used to create RNA probes to analyze low-quality samples. This approach allows up to 40-fold DNA enrichment and pedigree assignment with 81% success.

The intersection of behavior and genetics, especially sensory ecology, was a major focus. Jacobs (George Washington) and colleagues described three newly discovered opsin alleles in *Indri indri*. This finding may indicate convergent optical adaptations with haplorhines for diurnal rainforest conditions. Haplorhines, but not other lemurs, often have more than two opsin alleles. Many presenters identified patterns of olfactory receptor variation: Hoover (Alaska) and colleagues analyzed selection on modern and ancient human olfactory receptors; Garrett



FIGURE 1 “Balance.” Copyright Van Hoang Dao, used with permission. [Color figure can be viewed at wileyonlinelibrary.com]

(Calgary) and associates examined their variation in connection with the shift to agriculture. Niimura (Tokyo) and colleagues connected these patterns to trade-offs between vision and olfaction. In an amusing presentation on adaptations to alternative sources of dietary calories, Gochman (Dartmouth) and Dominy tested ethanol preferences in aye-ayes and slow lorises, both of which share with humans a mutation in the alcohol dehydrogenase gene. The observed preference for high

ethanol concentrations suggests that this mutation may facilitate metabolism of calorie-rich alcohol.

3 | SOCIOECOLOGY AND SOCIOEVOLUTION

Several presentations addressed long-standing hypotheses on socioecology and social system evolution using empirical evidence and novel modeling approaches. The evolution of social relationships and their effect on group-living primates have historically been fundamental to primate studies. Port (Gottingen) and colleagues presented results from a flexible agent-based model suggesting that evolution of female philopatry could be more strongly influenced by communal resource defense than protection from predators. However, Eppley (Hamburg) and associates demonstrated that predation risk shapes the behavior of southern bamboo lemurs (*Haplemur meridionalis*), which avoid nocturnal predators by altering their activity patterns. Effective communal resource defense, like many group-oriented behaviors, relies on existing social relationships. Sterck (Utrecht) and coworkers developed an agent-based model based on behavioral parameters from wild macaque populations, which demonstrated that memory of social experiences can enforce differentiated social relationships.

Parasite infection has been a long-hypothesized cost of group living with the potential to influence social evolution. Despite widespread acceptance, empirical support for this hypothesis is lacking. Müller (Georg August) and coworkers reported that energetic costs which increase with age are associated with subclinical parasite infections in Barbary macaque (*Macaca sylvanus*) hosts. MacIntosh (Kyoto) and coworkers presented the first study linking parasite infection to individual reproductive success in primates. They found that parasites had a greater impact on the reproductive success of female Japanese macaques (*M. fuscata*) than did age, rank, or prior breeding success. They also found a relationship between social network position and parasite



FIGURE 2 Aye-aye, *Daubentonia madagascariensis*. Copyright Stephen Nash, used with permission. [Color figure can be viewed at wileyonlinelibrary.com]

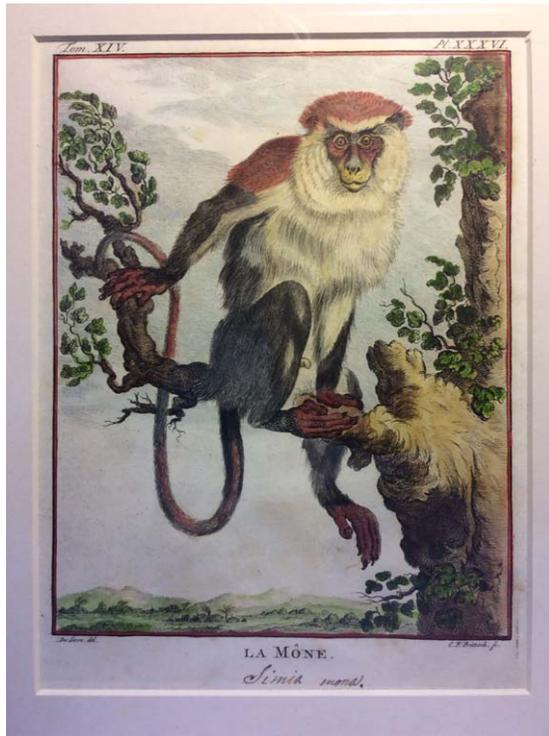


FIGURE 3 La Mône, drawn by J. De Sève, engraved by C. F. Fritzsh, published ca. 1777. From the collection of Jean Baulu, used with permission. [Color figure can be viewed at wileyonlinelibrary.com]

infection, but Ross and Lehmann (Roehampton) failed to find such a pattern in forest-living baboons (*Papio anubis*), suggesting that it may not be generalized across host species.

Research on phenotypic plasticity often focuses on morphology, but rarely on behavior. A session chaired by Schaffner (Veracruzana) and Aureli (Veracruzana), directed attention to social behavior changes within and among individuals, and provided a forum for discussion of whether flexibility in these relationships is adaptive. For example, Massen (Vienna) and colleagues reported differences in rhesus (*M. mulatta*) and Barbary macaque grooming behavior depending on lactation state. Schaffner and Aureli reported different patterns of embrace in same-age versus different-aged cohorts of spider monkeys (*Ateles geoffroyi*). Tinsley Johnson (Michigan) and coworkers reported flexible grouping patterns in geladas (*Theropithecus gelada*). Small groups tended to fuse and large groups to fission, potentially encouraging mid-sized groups in which females have the highest reproductive success.

The turbulent discussion following this session reflected confusion in the literature about the meaning and appropriate focus of behavioral flexibility research. Questions raised included: Are behavioral flexibility and behavioral plasticity equivalent? Does the study of flexibility require a focus on behavioral differences across populations, within individuals, or both? Is behavioral reversibility a necessary component of flexibility?

4 | CONSERVATION, HEALTH, AND COMMUNITIES

Human activities remain a leading threat to primate conservation. A major focus of talks was reducing agricultural and hunting threats

through sustainable use of primate habitat by local communities. Cress (GRASP) and colleagues described the United Nations Environmental Program's Great Apes Survival Partnership's (GRASP) advocacy for a sustainable African palm-oil roundtable to address the increasing threat of palm oil expansion in Africa. In contrast, Setiawan (Coffee and Primate Conservation Project) and associates demonstrated the potential for local agricultural efforts to complement and contribute to conservation and research. The Swara Owa project markets coffee from agroforest sites within Javan gibbon habitat to promote sustainable agriculture while protecting gibbon habitats. Head (Arcus Foundation) and colleagues focused on another threat, wild meat, by establishing a wild-meat threat matrix. This allows the categorization of 65 potential drivers of wild-meat consumption at any given site, facilitating essential identification and comparison of the most pressing threats.

Norconk (Kent State) chaired the roundtable President's Forum on the international primate pet trade. The illegal global exotic pet trade has become a multibillion-dollar industry, boosted by social media and celebrity "selfies." The forum addressed primatologists' need to be aware of these trends, to work with national governments to develop strict laws against the trade of primates, and to help decrease demand through public outreach and education.

Mittermeier (Conservation International) and colleagues facilitated, via an open forum, the creation of the ninth installment of the biannual list of the most endangered primates. Large-scale industrial agriculture was highlighted as the greatest threat to primates, which the IUCN still designates as the second most endangered vertebrate group. The importance of primate ecotourism was emphasized, as were collaborative initiatives among primatologists, such as the new African Primatological Society. A media campaign, "The Search for Lost Primates," was mentioned to encourage primatologists to find and study poorly known or possibly extinct primates, such as Miss Waldron's red colobus. Twelve species were new to the list at this Congress, but discussion was ongoing about specific subspecies. A shocking addition was the ring-tailed lemur of Madagascar. Several species were retained on the list, including the Hainan gibbon of Asia, perhaps the most endangered primate in the world based on its dwindling population of less than 30 individuals.

Several talks emphasized the risks of parasite transmission in human-influenced landscapes. Frias (Kyoto) and coworkers, in a phylogenetic analysis of the parasite *Strongyloides*, found that six primate species in a fragmented landscape in Malaysian Borneo shared similar parasite haplotypes. Klailova (WWF) and associates discussed efforts, such as an employee health program and routine animal and carcass sampling, to monitor and combat human-wild primate disease transmission in the Congo basin. "Best Practice Guidelines for Health Monitoring and Disease Control in Great Ape Populations" were discussed at an IUCN roundtable, led by Gilardi (University of California, Davis), with the goal of identifying and soliciting ideas for overcoming barriers to their application.

The capture of wild primates is an important component of research and conservation. Cunningham (NYU College of Dentistry), Unwin (Chester Zoo), and Setchell (Durham) chaired a roundtable

discussion about capture safety. They emphasized the current lack of sharing of data collected during captures and suggested that researchers biobank samples collected during capture for future projects. Recording details from the capture process could further aid in designing safer protocols. An open discussion followed on developing a database of this information and creating an international board for reviewing capture protocols.

A workshop organized by Clanin (Primate Education Network) and McGuire (Conservation Fusion) emphasized the value of establishing realistic, specific educational objectives and, through presentations from Brazilian, Indonesian, Congolese, and Malagasy projects, underlined the importance of creativity and idea-sharing in primate conservation education. In addition, Razafindramanana (GERP Madagascar) and associates described successful efforts to protect greater bamboo lemurs (*Prolemur simus*) by educating communities in southeastern Madagascar about local populations of these lemurs. Rabenahy (Centre ValBio) and coworkers outlined the success of a primate and conservation study-abroad program based in Ranomafana, Madagascar, which is aimed at changing the attitudes and outlook of American undergraduate students. It would be useful to emphasize presentations showing both the successes and pitfalls of education efforts in range countries at future Congresses.

5 | LONG-TERM RESEARCH

As Jane Goodall demonstrated in her keynote address, long-term research sites and projects are invaluable to the study of complex, long-lived species such as primates. The prevalence of long-term chimpanzee research was underscored by the sold-out symposium, *Chimpanzees in Context*, which preceded the Congress.

Studies on chimpanzees at long-term field sites remained a focus during the conference. Pusey (Duke) and colleagues, using 50 years of behavioral data from Gombe National Park, found that female chimpanzee rank was positively associated with infant survival and access to prime foraging locations. Hansen (Lincoln Park Zoo) coupled previously recorded relatedness data from chimpanzee populations at Ngogo in Kibale National Park with new social observations, finding that unrelated females readily formed bonds with each other, but that bond strength depended on parity. Sandel (Michigan) reported that male social bonds in the same population were formed during adolescence.

Researchers are finding clever ways to leverage the value of long-term sites even further. A common thread was using public interest to generate data. For example, Pinteá (Jane Goodall Institute) and coworkers presented a habitat-suitability model, accurate over a 12-year period, for chimpanzee subspecies in western Sub-Saharan Africa. This model combined satellite imagery with crowd-sourced and long-term data from the Ape Populations, Environments and Surveys (A.P.E.S.) database. Arandjelovic (Max Planck) and associates, together with the Pan African Programme, used a citizen science platform, *Chimp&See* (<http://chimpansee.org/>) to allow online participants to catalogue and

tag over 500,000 camera-trap videos of chimpanzees and conspecifics to over 90% accuracy. This provides a valuable and cost-effective means of quickly analyzing results and public outreach.

Examples of long-term research on other primates were highlighted by the Fifty Years of Sifakas symposium. Kappeler and Fichtel (German Primate Center) and Lawler (James Madison) and colleagues presented analyses of the survival of Verreaux's sifakas, using long-term resource and climatic variation. Kappeler reported that offspring born to subordinate females in smaller groups and those born during years of reduced rainfall were least likely to survive to one year old. Lawler showed that offspring born to older mothers were more likely to survive to adulthood. Drawing on data from several long-term sites, Lewis (University of Texas at Austin) and colleagues presented a comparative analysis across sifaka species, which showed that male reproductive strategies are influenced by contest competition. Louis (Omaha's Henry Doorly Zoo) and associates found that a population of diademed sifakas reintroduced to Analamazaotra Reserve a decade earlier was growing because of both births and immigrants. The population's increased genetic diversity provides evidence of long-term benefits of reintroduction and translocation efforts to conservation.

6 | CONCLUSION

The diverse topics covered by this conference demonstrate the range of current primatology and the ways in which primatologists are connecting with both the general public and the wider biological research community. The "Talking Primates," roundtable chaired by Frye (Clemson) encouraged primatologists to develop skills for communicating their work to individuals outside of the academic community. Making use of popular social media outlets, Schmitt (Boston University) gave numerous entertaining examples (see #fieldworkfail) of how carefully crafting one's social media presence can allow researchers to connect their research to thousands of people. Hinde (Harvard) suggested that primatologists take the time to develop trusting and personal relationships with members of the media, warning that what investigators say and what is written about their work can echo throughout the Internet. Communication of our work is an integral part of the society of researchers and an ever-important opportunity for connecting the public to the organisms, topics, and conservation values to which we devote our careers. The IPS business meeting highlighted the next IPS congress, which will be held in 2018 at the UN Compound in Nairobi, Kenya.

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