

MIDWEST PRIMATE INTEREST GROUP



2026

ANNUAL MEETING



MPIG

Welcome to Notre Dame!

SCHEDULE OF EVENTS

All talks will take place in room 105 of Jordan Hall of Science at the University of Notre Dame, Notre Dame, IN 46556. Posters will be presented in the hall/lobby outside Jordan 105.

Friday, October 2nd

Registration	5:00 - 5:45 pm
Welcome by MPIG President Dr. Katie Amato and Notre Dame Host, Beth Archie	5:45 - 6:00 pm
Distinguished Primatologist Award and Presentation – Dr. Toni Zeigler	6:00 - 7:00 pm
Social hour	7:00 – 8:00 pm

Saturday, October 3rd

Registration, Talk uploading, and Poster Drop-Off	8:00 - 8:30 am
Morning Podium Session I	8:30 – 10:00 am
Break	10:00 - 10:30 am
Morning Podium Session II	10:30 - 12:00 pm
Lunch	12:00 - 1:15 pm
Afternoon Podium Session III	1:15 - 3:00 pm
Poster Session	3:15-5:30 pm

Podium Sessions (8:30am – 12:00 pm, 1:15 – 3:00 pm)

Speakers, please upload your slides in Jordan 105 either on Friday evening between 5 and 5:45pm, on Saturday morning between 8:00 and 8:30, during the morning coffee break, or at the end of lunch on Saturday between 12:45 and 1:15. Notre Dame students will be in the room to help you with the upload.

8:30 - 8:45am	Opening Remarks – Katherine Amato
	Podium Session I - Moderator: Beth Archie
8:45am - 9:00am	1. Gut microbiome seasonality patterns in western savanna chimpanzees (<i>Pan troglodytes verus</i>) at Fongoli, Senegal Katie F. Gerstner^{1,2*}, Beth Erhart², Stacy Lindshield³, Jill D. Pruetz² ¹Department of Anthropology, University of Michigan, Ann Arbor, MI 48104 ²Department of Anthropology, Texas State University, San Marcos, TX 78666 ³Department of Anthropology, Purdue University, West Lafayette, IN 47907
9:00 - 9:15am	2. Heart rate responses to social interactions in captive baboons Erin S. Person¹, Catherine R. Andreadis¹, Ipek G. Kulahci¹, James Ndung'u², Daisy Kigen², Priscilla Kimiti², Kevin Mugambi Kibe², Noelle R. Laske³, Janet Mwadime², Nashon Wanjala², Herman Pontzer^{4,5}, Timothy G. Laske^{3,6}, Mercy Y. Akinyi², Elizabeth A. Archie¹ ¹Department of Biological Sciences, University of Notre Dame, Notre Dame, IN, USA 46556 ²Animal Sciences, Welfare and Ethics Directorate, Kenya Institute of Primate Research, Nairobi, Kenya ³Medtronic Inc., Mounds View, MN, USA 55112 ⁴Department of Evolutionary Anthropology, Duke University, Durham, NC, USA 27708 ⁵Duke Global Health Institute, Duke University, Durham, NC, USA 27708 ⁶Department of Surgery, University of Minnesota, Minneapolis, MN, USA 55455
9:15 - 9:30am	3. Season and social group membership shape the gut microbiome of the northern muriqui (<i>Brachyteles hypoxanthus</i>) Tommy C. Burch¹, Carla B. Possamai², Amanda Coimbra³, André F. A. dos Santos³, Mirela D'arc³, Jean P. Boubli^{1*}, Karen B. Strier^{4*}, Naiara Guimarães Sales^{1*} ¹University of Salford, School of Science, Engineering and Environment ²Muriqui Institute of Biodiversity (MIB) ³Department of Genetics, Federal University of Rio de Janeiro (UFRJ) ⁴Department of Anthropology, University of Wisconsin-Madison
9:30 - 9:45am	4. The development of affiliative relationships in immature mountain gorillas Riley N Derby^{1,*}, Aaron A Sandel¹, Martha M Robbins² ¹Department of Anthropology, The University of Texas at Austin, Austin, TX, USA 78712 ²Department of Primate Behavior and Evolution, Max Planck Institute for Evolutionary Anthropology, Leipzig, 04103, Germany

9:45 - 10:00am	5. The importance of <i>Symphonia globulifera</i> flowers to Weddell's saddleback tamarins (<i>Leontocebus weddelli</i>) Leila M. Porter^{1,*}, Yanine Rocha Zarate², Miguel Angel Puerta Sosa², Elizabeth K. Mallott³, Mitchell T. Irwin¹ ¹Department of Anthropology, Northern Illinois University, DeKalb, IL, USA, 60115 ²Proyecto Leontocebus, Estación Biológica Tahuamanu, Pando, Bolivia ³Department of Biology, Washington University in St. Louis, St. Louis, MO, USA 63130
10:00 - 10:30am	BREAK
	Podium Session II - Moderator: Emma Thrau
10:30 - 10:45am	6. The relationship between social group composition and the ontogeny of sexual and competitive behaviors in wild male mountain gorillas (<i>Gorilla beringei beringei</i>) Ella R. Brown^{1,4*}, Alliance Umwizerwa², Winnie Eckardt², Tara S. Stoinski³, Stacy Rosenbaum^{1,4} ¹Department of Anthropology, University of Michigan, Ann Arbor, MI, 48109 ²Dian Fossey Gorilla Fund, Musanze, Rwanda ³Dian Fossey Gorilla Fund, Atlanta, GA, 30315 ⁴Department of Anthropology, Northwestern University, Evanston, IL, 60208
10:45 - 11:00am	7. Fueled by fiber: Seasonal dietary fiber and gut microbiome dynamics across three lemur feeding strategies Chloé N.M. Gherardi¹, Niony Mamy Koloina Rakotoarivelo², Sarah Rajaonarivelo², Dylan Daniels³, Jean-Luc Raharison⁴, Karen E. Samonds^{1,4}, Mitchell T. Irwin^{4,5} ¹Department of Biological Sciences, Northern Illinois University, DeKalb, IL 60115, USA ²Anthropobiology and Sustainable Development, Faculty of Science, University of Antananarivo ³Department of Earth, Atmosphere, and Environment, Northern Illinois University, DeKalb, IL 60115, USA ⁴NGO SADABE, Antananarivo, Madagascar ⁵Department of Anthropology, Northern Illinois University, DeKalb, IL 60115, USA
11:00 - 11:15am	8. The nature of grief: The case of nonhuman primates Andre Goncalves^{1,2*}, Sarv Dashti² ¹Science and Research Department, Indianapolis Zoological Society, Indianapolis, IN, USA, 46222 ²Center for the Evolutionary Origins of Human Behavior, Kyoto University, Aichi, Japan, 484-8506
11:15 - 11:30am	9. Understanding social relationships in western hoolock gibbons (<i>Hoolock hoolock</i>) in the Lawachara National Park, Bangladesh Md Mehrab Hasan^{1*} and Leila M Porter² ¹ Department of Anthropology, The Ohio State University, Columbus, OH, USA, 43210 ² Department of Anthropology, Northern Illinois University, DeKalb, IL, USA, 60115

11:30 - 11:45am	10. Gut microbial richness and taxonomic abundances predict fetal loss in wild baboons Chelsea A. Southworth¹, Susan C. Alberts^{2,4}, Jenny Tung^{2,3,6-8}, Elizabeth A. Archie¹ ¹Department of Biological Sciences, University of Notre Dame, Notre Dame, IN, USA ²Department of Biology, Duke University, Durham, NC, USA ³Department of Evolutionary Anthropology, Duke University, Durham, NC, USA ⁴Population Research Institute, Duke University, Durham, NC, USA ⁵Department of Evolutionary Anthropology, Duke University, Durham, NC, USA ⁶Department of Primate Behavior and Evolution, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany ⁷Faculty of Life Sciences, Institute of Biology, Leipzig University, Leipzig, Germany ⁸Canadian Institute for Advanced Research, Toronto, ON, Canada
11:45am - 12:00pm	11. One slide worth updating: 'Sneak and rape' no longer fits what primatology knows about unflanged male orangutans (<i>Pongo</i> spp.) Alexandra E. Kralick¹ ¹Department of Anthropology and Department of Gender & Women's Studies, University of Wisconsin–Madison
12:00 - 1:15pm	LUNCH <i>Lunch is provided and will be in the large hall/lobby outside of Jordan 105.</i>
	Podium Session III - Moderators: Shehani Fernando and Chelsea Southworth
1:15 - 1:30pm	12. Socio-ecological drivers of human behavioral responses towards Himalayan langurs (<i>Semnopithecus schistaceus</i>) in human-dominated landscapes Himani Nautiyal^{1,2}, Diganta Mandal^{3,2}, Avirup Sinha^{4,2}, Suraj Dungwal², Rui Diogo¹, Anindya Sinha^{5,6,7} ¹College of Medicine, Howard University, 520 W St, NW, Washington, DC 20059, USA ²Himalayan Langur Project, Gopeshwar Mandal, Uttarakhand, India ³Department of Anthropology, PEEL, Indiana University, Bloomington, 701 E. Kirkwood Avenue, Bloomington, IN 47405-7100, USA ⁴Department of Anthropology, Valenta Lab, University of Florida, Gainesville, 330 Newell Dr, Gainesville, FL 32603, USA ⁵Animal Behaviour and Cognition Programme, National Institute of Advanced Studies, Indian Institute of Science Campus, Bangalore 560012, India ⁶Coexistence Studies Group, University of Trans-Disciplinary Health Sciences and Technology, 74/2, Jarakabande Kaval, Post: Attur via Yelahanka, Bangalore 560106, India ⁷Centre for Wildlife Studies, 37/5, Yellappa Garden, Yellappa Chetty Layout, Sivanchetti Gardens, Bangalore 560042, India
1:30 - 1:45pm	13. Effects of habitat disturbance on the gut microbiome of red colobus (<i>Ptilocolobus tephrosceles</i>) and black-and-white colobus (<i>Colobus guereza</i>) Madison R. Brown^{1,*}, Elizabeth MC Coggeshall², Michael Wasserman² ¹O'Neill School of Public and Environmental Affairs, Indiana University ²Department of Anthropology, Indiana University

1:45 - 2:00pm	14. Group-level data conceals individual variation in behavioral thermoregulation in mountain gorillas (<i>Gorilla beringei beringei</i>) McKensey Miller^{1,*}, Alexis Nsabimana², Winnie Eckardt², Tara Stoinski³, and Stacy Rosenbaum^{1,4} ¹Department of Anthropology, University of Michigan, Ann Arbor, MI, USA, 48103 ²Dian Fossey Gorilla Fund, Musanze, Rwanda ³Dian Fossey Gorilla Fund, Atlanta, GA ⁴Department of Anthropology, Northwestern University
2:00 - 2:15pm	14. How can primatologists identify mineral-driven food choices? Insights from <i>Hapalemur griseus</i> Maire O'Malley¹, Tojo Andriamaminirina², Koloina Rakotoarivelo², Marie Jeanne Razafiarivony², Jean-Luc Raharison³, Mitchell T. Irwin^{3,4} ¹Department of Anthropology, Indiana University ²Department of Anthropology and Sustainable Development, University of Antananarivo ³NGO Sadabe, Antananarivo, Madagascar; ⁴Department of Anthropology, Northern Illinois University
2:15 - 2:30pm	15. Group-level data conceals individual variation in behavioral thermoregulation in mountain gorillas (<i>Gorilla beringei beringei</i>) McKensey Miller^{1,*}, Alexis Nsabimana², Winnie Eckardt², Tara Stoinski³, and Stacy Rosenbaum^{1,4} ¹Department of Anthropology, University of Michigan, Ann Arbor, MI, USA, 48103 ²Dian Fossey Gorilla Fund, Musanze, Rwanda ³Dian Fossey Gorilla Fund, Atlanta, GA ⁴Department of Anthropology, Northwestern University
2:30 - 2:45pm	16. A multi-kingdom perspective reveals differential responses of bacterial and fungal gut communities to environmental heterogeneity in wild free-ranging long-tailed macaques (<i>Macaca fascicularis</i>) in Bali, Indonesia Shehani Fernando^{1*}, Molly Nickols¹, Molly Nosal¹, Benjamin Gombash¹, Hope Hollocher¹ ¹Department of Biological Sciences, University of Notre Dame, Notre Dame, IN, USA, 46556
2:45 - 3:00pm	17. Socializing subadults: Behavioral and photogrammetry data from adolescent male baboons Kale A. Hawks¹, Corinna A. Most^{1,2} ¹Department of Ecology, Evolution, and Organismal Biology, Iowa State University, Ames, IA, USA ²Uaso Ngiro Baboon Project, Laikipia, Kenya
3:00 - 3:15pm	BREAK
3:15 - 5:30pm	POSTER SESSION/RECEPTION <i>Feel free to set up your poster anytime on Saturday. Look for the easel with your poster's number in the large hall outside Jordan 105. Pin your poster to the board on the easel; posters can be oriented vertically or horizontally.</i>

Poster Session (3:15-5:30PM)

Set up your poster anytime on Saturday. Look for the easel with your poster's number in the large hall outside Jordan 105. Pin your poster to the board on the easel; posters can be oriented vertically or horizontally.

1. Using physical activity and heart rate to measure sleep-like behavior in wild savannah baboons

Catherine R. Andreadis¹, Erin S. Person¹, Ann N. Namunyak², Annabelle G. Beaton³, Edward Kariuki⁴, Paul Solheim⁵, Paul A. Iaizzo⁶, Herman Pontzer^{7,8}, Mercy Y. Akinyi⁹, Timotheus J. van Dam¹⁰, Timothy G. Laske^{5,11}, Jenny Tung^{7,12,13,14}, Susan C. Alberts^{7,12}, Elizabeth A. Archie¹

¹Department of Biological Sciences, University of Notre Dame, Notre Dame, IN, USA

²Amboseli Baboon Research Project, Nairobi, Kenya

³Friedman School of Nutrition Science and Policy, Tufts University, Boston, MA, USA

⁴Veterinary Services, Kenya Wildlife Service, Nairobi, Kenya

⁵Medtronic Inc., Mounds View, MN, USA

⁶Visible Heart® Laboratories, Institute for Engineering in Medicine, University of Minnesota, Minneapolis, MN, USA

⁷Department of Evolutionary Anthropology, Duke University, Durham, NC, USA

⁸Duke Global Health Institute, Duke University, Durham, NC, USA

⁹Kenya Institute for Primate Research, Nairobi, Kenya

¹⁰Smart Parks, Utrecht, The Netherlands

¹¹Department of Surgery, University of Minnesota, Minneapolis, MN, USA

¹²Department of Biology, Duke University, Durham, NC, USA

¹³Primate Behavior and Evolution, Max Planck Institute for Evolutionary Anthropology, Leipzig, Saxony, Germany

¹⁴Faculty of Life Sciences, Leipzig University, Leipzig, SN, Germany

2. Does kin selection explain food transfer in white-faced saki monkeys (*Pithecia pithecia*)?

Sophia Bixler^{1,*} & Cynthia L. Thompson¹

¹Department of Biomedical Sciences, Grand Valley State University, Allendale, MI, USA, 49401

3. Chimpanzee activity budgets based on group membership

Olivia Boehnlein¹, Olivia Vogel², Emma K. Nelson^{3,4}, Chris Martin⁴, Erica A. Cartmill^{3,5,6}

¹Center for the Integrative Study of Animal Behavior, Indiana University, Bloomington, IN 47408, USA

²Department of Biology, Butler University, Indianapolis, IN 46208, USA

³Department of Anthropology, Indiana University, Bloomington, IN 47408, USA

⁴Science and Research Department, Indianapolis Zoo, Indianapolis, IN 46222, USA

⁵Program in Cognitive Science, Indiana University, Bloomington, IN 47408, USA

⁶External Faculty, Santa Fe Institute, Santa Fe, NM, USA

4. Behavioral responses of Japanese macaques to touchscreen cognition tasks

Mars Bollnow¹, Bee Mullins¹, Priyanka Joshi¹, & Jake Funkhouser^{1,2}

¹Lester E. Fisher Center for the Study and Conservation of Apes, Lincoln Park Zoo, Chicago, IL, USA, 60614

²Department of Anthropology, Washington University in St. Louis, St. Louis, MO, 63130

5. Age-class gut microbiome development in *Semnopithecus schistaceus*

Elizabeth M.C. Coggeshall^{1,2}, Suraj Dungwal², Avirup Sinha^{2,3}, Michael Wasserman¹

¹Department of Anthropology, Indiana University, Bloomington, USA

²The Himalayan Langur Project, Uttarakhand, India

³Department of Anthropology, The University of Florida, Gainesville, USA

6. The potential of individual golden monkey (*Cercopithecus mitis kandti*) identification for research and conservation

Alexandre Gategeko¹, Winnie Eckardt², Deogratias Tuyisingize², Shannon McFarlin^{2,3}, Marcel Ngabikwiye², Stacy Rosenbaum¹, and Susan Wiper⁴

¹Department of Anthropology, Northwestern University, Evanston, IL, USA

²Dian Fossey Gorilla Fund, Rwanda.

³Department of Anthropology, George Washington University, Washington, D.C., USA

⁴Chester University, UK

7. Adiposity in the primate order: A critical review of captive and wild evidence

Isabel D.K. Hermsmeyer^{1*}, Maureen J. Devlin¹

¹Department of Anthropology, University of Michigan, Ann Arbor, MI

8. Family matters: Sex differences in sibling grooming relationships of wild juvenile olive baboons (*Papio anubis*)

Lily A Hotkewicz¹, Benjamin S Richards¹, Monica L Wakefield^{1,2}

¹Department of Sociology, Anthropology, & Philosophy, Northern Kentucky University, Highland Heights, KY, USA, 41099

²Uaso Ngiro Baboon Project, Laikipia, Kenya

9. Inbreeding and other demographic challenges faced by critically endangered diademed sifakas in the Tsinjoarivo-Ambalaomby new protected area, Madagascar

Mitchell T. Irwin^{1,2*}, Bruno Ramorasata², Andry Rahajanirina², Jean-Luc Raharison², Jean-Freddy Ranaivoarisoa³

¹ Department of Anthropology, Northern Illinois University, DeKalb, IL

² NGO Sadabe, Antananarivo, Madagascar

³ Mention Anthropobiologie et Développement Durable, Université d'Antananarivo, Madagascar

10. Dental crowding and commensalism in *Papio* spp.

Emma M. Lagan¹, Anthony Zehr², Mackie O'Hara³, Daniel E. Ehrlich⁴, Esme Beamish⁵, Larissa Swedell⁶⁻⁹, W. Scott McGraw¹

¹ Department of Anthropology, The Ohio State University, Columbus, OH, USA, 43210

² Department of Anthropology, Ball State University, Muncie, IN, USA, 47306

³ Department of Biology, Ball State University, Muncie, IN, USA, 47306

⁴ Institute for Social Research and Data Innovation, University of Minnesota, Minneapolis, MN, USA, 55455

⁵ Institute for Communities and Wildlife in Africa, University of Cape Town, Rondebosch, South Africa

⁶ Department of Anthropology, Queens College, Flushing, NY, USA, 11367

⁷ Graduate Center, City University New York, Flushing, NY, USA, 11367

⁸ New York Consortium in Evolutionary Primatology, New York, NY, USA

⁹ Department of Archaeology, University of Cape Town, Rondebosch, South Africa

11. Investigating the impact of behavior and posture on heart rate and activity in wild baboons

Mariana Medeiros de Sousa^{1,*}, Erin Person¹, Elizabeth Archie¹

¹Department of Biological Sciences, University of Notre Dame, Notre Dame, IN, USA 46556

12. Playful teasing in wild chimpanzees

Emma K. Nelson¹, Catherine Hobaiter², Gal Badihi^{2,3}, Kirsty E. Graham⁴, Jill Pruetz⁵, Erica A. Cartmill^{1,6,7}

¹Department of Anthropology, Indiana University, Bloomington, IN 47408, USA

²School of Psychology and Neuroscience, University of St Andrews, St Andrews, UK

³Cooperative Evolution Lab, German Primate Center, Gottingen, Germany

⁴Department of Psychology, Hunter College, City University of New York, NY, USA

⁵Department of Anthropology, Texas State University, San Marcos, TX, USA

⁶Program in Cognitive Science, Indiana University, Bloomington, IN 47408, USA

⁷External Faculty, Santa Fe Institute, Santa Fe, NM, USA

13. Variation in triiodothyronine concentrations across environments and social groups in wild mountain gorillas (*Gorilla beringei beringei*)

Zooey Raux¹, Stella Wurtz¹, Rose Umuhoza², Carine Uwamahoro², Ronnie Bailey-Steinitz², Winnie Eckardt², Tara Stoinski³, Stacy Rosenbaum^{1,4}, McKensey Miller¹

¹Department of Anthropology, University of Michigan, Ann Arbor, MI

²Dian Fossey Gorilla Fund, Musanze, Rwanda

³Dian Fossey Gorilla Fund, Atlanta, GA

⁴Department of Anthropology, Northwestern University, Evanston, IL

14. Patterns of stereotypic behavior in relation to environmental and social factors in zoo chimpanzees

Ava Crowe¹, Zach Reasoner¹, Emma Nelson^{2,3}, Chris Martin³, Erica Cartmill^{2,4,5}

¹Department of Animal Sciences, Purdue University, West Lafayette, IN 47906, United States

²Department of Anthropology, Indiana University, Bloomington, IN 47408, United States

³Science and Research Department, Indianapolis Zoo, Indianapolis, IN 46222, United States

⁴Program in Cognitive Science, Indiana University, Bloomington, IN 47408, United States

⁵External Faculty, Santa Fe Institute, Santa Fe, NM, United States

15. Emergence of a rare behavior: Increased male-male grooming in wild olive baboons (*Papio Anubis*)

Benjamin S Richards¹, Lily A Hotkewicz¹, Monica L Wakefield^{1,2}

¹Department of Sociology, Anthropology, & Philosophy, Northern Kentucky University, Highland Heights, KY, USA, 41099

²Uaso Ngiro Baboon Project, Laikipia, Kenya

16. What we hear and what we miss: Mapping the primate bioacoustics literature, 1977-2025

Siddharth Satishchandran^{1,*}, Avirup Sinha², Kathryn E. Seiving³

¹Department of Anthropology, University of Florida, Gainesville, FL, USA, 32603

²Department of Anthropology, University of Florida, Gainesville, FL, USA, 32603

³Department of Wildlife Ecology and Conservation, University of Florida, Gainesville, FL, USA, 32603

17. Daily activity budget of two confiscated Bengal slow loris (*Nycticebus bengalensis*) in a forest patch of Lawachara National park, Sylhet, Bangladesh

Rejoana Sultana^{1,2,*}, Rifat A. Rabbi^{2,5}, Mst S. A. Shimu^{2,5}, Shohanur Rahman^{2,5}, Marjan Maria², Md. A. Hakim², Mahedi Hasan⁵, Marcel Stawinoga², K. A. I. Nekar³, Hassan Al-Razi⁴

¹Department of Anthropology, Northern Illinois University, 1425 W. Lincoln Hwy, Dekalb, IL 60115

²Plumploris e.V., Mergelteichstraße 80, Dortmund, Germany

³School of Life Sciences, Anglia Ruskin University, East Road, Cambridge CB1 1PT, UK

⁴School of Human Sciences, University of Western Australia, 35 Stirling Highway, Perth, WA 6009, Australia

⁵Department of Zoology, Faculty of Life and Earth Science, Jagannath University, Dhaka, Bangladesh

18. Preliminary results on seasonal variation in the activity budgets of non-human primates: A meta-analysis

Ethan Tai^{1*}, Jacob B. Kraus^{1,2}

¹Department of Biology, Washington and Lee University, Lexington, VA, USA, 24450

²Institute of Eastern-Himalaya Biodiversity Research, Dali University, Dali 671003, Yunnan, China

19. Attentional biases of Japanese macaques to images of their groupmates

Alice Thompson¹, Priyanka Joshi¹, Bee Mullins¹, & Jake Funkhouser^{1,2}

¹Lester E. Fisher Center for the Study and Conservation of Apes, Lincoln Park Zoo, Chicago, IL, USA, 60614

²Department of Anthropology, Washington University in St. Louis, St. Louis, MO, 63130

20. Describing individual baboon diets through metabarcoding.

William A. Wilber^{1,*}, Gretchen Andreasen¹, Shasta Webb¹, Jenny Tung², Susan C. Alberts³, Elizabeth A. Archie¹

¹ Biological Sciences, University of Notre Dame, Notre Dame, IN, USA

² Primate Behavior and Evolution, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

³ Evolutionary Anthropology and Biology, Duke University, Durham, NC, USA

21. Variation in creatinine concentration, specific gravity, and muscle mass across captivity status and age in wild mountain gorillas (*Gorilla beringei beringei*) and captive lowland gorillas (*Gorilla gorilla gorilla*)

Stella Wurtz¹, Zooey Raux¹, McKensy Miller¹, Melissa Emery Thompson^{5,6}, Shannon McFarlin³, Winnie Eckardt², Tara Stoinski³, Stacy Rosenbaum^{1,4}, Ronnie Bailey-Steinitz²

¹Department of Anthropology, University of Michigan, Ann Arbor, MI

²Dian Fossey Gorilla Fund, Musanze, Rwanda

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⁴Department of Anthropology, Northwestern University, Evanston, IL

⁵Department of Anthropology, University of New Mexico, Albuquerque, NM

⁶Department of Evolutionary Anthropology, Duke University, Durham, NC

PODIUM ABSTRACTS

1. Gut microbiome seasonality patterns in western savanna chimpanzees (*Pan troglodytes verus*) at Fongoli, Senegal

Katie F. Gerstner^{1,2*}, Beth Erhart², Stacy Lindshield³, Jill D. Pruetz²

¹Department of Anthropology, University of Michigan, Ann Arbor, MI, 48104

²Department of Anthropology, Texas State University, San Marcos, TX 78666

³Department of Anthropology, Purdue University, West Lafayette, IN 47907

In West Africa, savanna landscapes are characterized by low annual rainfall and high ambient temperatures. Ecological changes, such as weather, can drive shifts in the presence and richness of bacteria, which can affect an individual's health, nutrition, immunity, and specifically, their gut microbiome. Previous research on nonhuman primates suggests that gut bacteria composition will naturally fluctuate seasonally, but a baseline standard for savanna chimpanzees remains unpublished. To describe how primates and nature interact in Senegalese savannas, we investigated if dry habitats pose their own exclusive microbial seasonality patterns using West African chimpanzee (*Pan troglodytes verus*) gut microbiome data extracted from fecal samples of the Fongoli chimpanzees. Samples (n = 314) collected in 2020 – 2024 were analyzed by three seasonal categories (dry, wet, and transitional), month, age, and sex. Statistical analyses (Kruskal Wallis with post hoc tests) of alpha diversity metrics (Shannon Diversity) demonstrate increased microbial richness in wet and transitional months, and strong variations between month-to-month comparisons. The results illuminate the effects of short temporal availability of resources, and stable abundance levels throughout the year. Unlike forested populations, analyses revealed no significant effects of age and sex on bacteria richness and evenness, which may reflect the spatial and grouping behavior of savanna chimpanzees at Fongoli. Ongoing analyses are further investigating gut microbial patterns with ambient temperature and humidity.

2. Heart rate responses to social interactions in captive baboons

Erin S. Person¹, Catherine R. Andreadis¹, Ipek G. Kulahci¹, James Ndung'u², Daisy Kigen², Priscilla Kimiti², Kevin Mugambi Kibe², Noelle R. Laske³, Janet Mwadime², Nashon Wanjala², Herman Pontzer^{4,5}, Timothy G. Laske^{3,6}, Mercy Y. Akinyi², Elizabeth A. Archie¹

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⁵Duke Global Health Institute, Duke University, Durham, NC, USA 27708

⁶Department of Surgery, University of Minnesota, Minneapolis, MN, USA 55455

The social environment is a major source of stress for primates and can have long-term impacts on their health and fitness. Reactivity to acute stressors may predict these health outcomes, but capturing real-time stress responses in animals can be challenging. Heart rate responds within seconds of exposure to a stressor and advances in biollogger technology have made it feasible to collect cardiac measures in primates. We piloted a system to measure heart rate responses to social stressors in nine captive female baboons (*Papio anubis* and *P. cynocephalus*) housed at the Kenya Institute for Primate Research. Each baboon received an insertable cardiac monitor (ICM), which recorded heart rate every two minutes for a period of six months in 2023. Observers recorded social behavior to identify stressors and measure each baboon's social position and connectedness. Interactions tended to occur close in time, which we termed a "cluster". As baboons experienced more agonisms in a given cluster, heart rate increased and took longer to recover to baseline. Baboons that witnessed agonistic interactions, both in their own enclosure or in a neighboring enclosure, experienced an increase in heart rate but witnessing affiliative interactions decreased heart rate. Stress reactivity to agonism was also affected by social

position; low-ranking baboons had higher heart rate responses to aggression than high-ranking baboons, while baboons with greater social connectedness had lower responses to aggression. By observing heart rate responses to natural social interactions in a captive context, we found stress buffering effects of dominance and social connectedness. As such, we provide evidence for a mechanistic link between the social environment and health outcomes in baboons.

3. Season and social group membership shape the gut microbiome of the northern muriqui (*Brachyteles hypoxanthus*)

Tommy C. Burch¹, Carla B. Possamai², Amanda Coimbra³, André F. A. dos Santos³, Mirela D'arc³, Jean P. Boubli^{1*}, Karen B. Strier^{4*}, Naiara Guimarães Sales^{1*}

¹University of Salford, School of Science, Engineering and Environment

²Muriqui Institute of Biodiversity (MIB)

³Department of Genetics, Federal University of Rio de Janeiro (UFRJ)

⁴Department of Anthropology, University of Wisconsin-Madison

The northern muriqui (*Brachyteles hypoxanthus*) is a critically endangered primate endemic to the Brazilian Atlantic Forest. The best known and one of the last remaining populations of this species inhabits the Reserva Particular do Patrimônio Natural Feliciano Miguel Abdala (RPPN-FMA). Recently, studies into the gut bacterial microbiome of primates have revealed its importance for host health and resilience, especially in seasonal environments. Here, we aimed to test how season, social group membership, and sex may shape the northern muriqui gut bacterial microbiome, using 16S rRNA sequencing through repeated cross-season fecal sampling. Long-term demographic monitoring enabled sampling from habituated, individually identifiable wild northern muriquis, a study design rarely achievable in wild primates. In 2024, 96 fecal samples were collected across wet and dry seasons from adults of four social groups at the RPPN-FMA. The northern muriqui microbiome was dominated by Bacteroidota (58.73%) and Bacillota (27.44%). Preliminary analyses revealed that season significantly influenced ($p < 0.05$) α -diversity and β -diversity, and differential abundance of 11 bacterial families, 10 of which were enriched in the dry season. Social group membership also significantly influenced α -diversity and β -diversity, with the two most spatially separated social groups having significant differences in α -diversity. Sex had little detectable effect on gut microbiome α -diversity, with only a limited effect on β -diversity. Further investigations into the diet and behavior of the muriquis will provide important context for interpreting these findings. Understanding factors shaping the gut bacterial microbiome of the northern muriqui may provide a valuable baseline for assessing how future environmental change may impact population health.

4. The development of affiliative relationships in immature mountain gorillas

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Strong affiliative relationships are central to the lives of social species. Despite extensive research on adult social relationships, comparatively little is known about how these relationships develop across immaturity. This topic is particularly important because early social experiences shape social trajectories into adulthood, notably in philopatric species where early partners may remain important later in life. Mountain gorillas, however, exhibit dispersal by both sexes and variable social structures, raising questions about how relationships develop in species where long-term availability of social partners is more flexible. We analyzed 15 years of long-term data from 44 (16 F, 28 M) immature mountain gorillas (age 6 months to 8 years) in Bwindi Impenetrable National Park, Uganda, utilizing Bayesian multilevel regression models to examine developmental changes in three affiliative behaviors: proximity (<5m), grooming given, grooming received with mothers, the alpha male, other immatures, and other adults. Mothers were the most prominent social partners during immaturity, although relationships changed

differently across behaviors: proximity strength and grooming from mother to offspring declined while grooming given from offspring to mother increased. As young gorillas grew older, other immatures increasingly became their strongest proximity partners, surpassing mothers by age 6. The alpha male maintained relatively strong proximity connections during development, but rarely emerged as the strongest partner. Relationships with other adults were consistently weak throughout immaturity. Together, these findings reveal that, despite uncertainty in which early-life partners may be available in adulthood, young gorillas selectively reorganize affiliative relationships with mothers and other immatures, with comparatively little reorganization involving the alpha male or other adult group members.

5. The importance of *Symphonia globulifera* flowers to Weddell's saddleback tamarins (*Leontocebus weddelli*)

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Weddell's saddleback tamarins are highly frugivorous during the wet season. When fruit becomes scarce in the dry season, however, they must find other food sources. To investigate which foods serve as fruit alternatives, we collected 15 days of feeding data on two groups of tamarins (7 days/group) at the Estación Biológica Tahuamanu in Bolivia during the dry season month of July 2026. Using all occurrence sampling, we recorded the location, duration, and quantity of foods consumed by individuals during feeding bouts. Additionally, we collected samples of foods and dried them in a propane oven equipped with a solar-powered fan. We found that tamarins fed on the center (stigma, style, ovaries) of flowers of *Symphonia globulifera* during 54% of all feeding bouts (n = 185), making it their most frequently consumed food. Feeding bouts on *S. globulifera* lasted 1-26 minutes and made up 71% of total feeding time. The tamarins fed on 38 individual trees of this species throughout their home ranges. Based on the samples we collected of this species, we estimate that the total wet weight of the flowers' centers was 4204 g and the dry weight was 933 g. Consequently, these flower parts account for 82% of the dry weight of all foods consumed during the study. Previous nutritional analyses have shown *S. globulifera* flowers to be high in fat and sugar, thus, the flowers of this species likely provide the tamarins with an abundant and high-quality food source during periods of fruit scarcity.

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6. The relationship between social group composition and the ontogeny of sexual and competitive behaviors in wild male mountain gorillas (*Gorilla beringei beringei*)

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Learning how to interact with adult conspecifics is an important part of sub-adulthood for primates. Aggressive and sexual behaviors are particularly important for males in male-dominated species with polygynous mating systems, for whom reproductive success largely depends on competitive ability. When these behaviors develop, however, may vary depending on the social circumstances in which a young male finds himself due to differences in risk-reward tradeoffs. Here, we use 12,500+ hours of focal behavioral data to examine the ontogeny of aggressive and sexual behaviors in wild male mountain gorillas (*Gorilla beringei beringei*; 3-18 years old) living in Volcanoes National Park, Rwanda. In addition to describing how these behaviors change with age, we assess if and how males' behavioral developmental trajectories differ depending on the type of social group (defined by the number of silverback males in the group) in which they develop. Overall, we find that aggressive behaviors displayed

and received, and sexual behaviors displayed increase in sub-adulthood, with aggressive behaviors received peaking before adulthood begins. The type of social group in which a male develops predicts the specific patterning of these increases, which provides promising evidence for socially-mediated developmental plasticity of behavior in male mountain gorillas. This plasticity may be beneficial for male gorillas as they prepare for the social landscape they are likely to experience in adulthood.

7. Fueled by fiber: Seasonal dietary fiber and gut microbiome dynamics across three lemur feeding strategies

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Fiber is an essential macronutrient as both an important source of energy and key contributor to digestive health. Dietary fiber consists of soluble and insoluble components and makes up a large part of primate diets. However, it is notoriously difficult to digest relative to other macronutrients, like carbohydrates and protein. Fiber fermentation requires the primate gastrointestinal microbiome to break down dietary fiber into short-chain fatty acids (SCFAs), an accessible source of energy for the consumer. This study aims to understand how lemur species with different dietary specializations (*Propithecus diadema*, *Hapalemur griseus*, and *Eulemur fulvus*) manage fiber in their diet and clarify how the gut microbiome of these species supports fiber digestion. Behavioral data and plant samples were collected during the resource-lean and resource-abundant seasons at Tsinjoarivo, Madagascar. Insoluble fiber of roughly 170 foods was analyzed using the neutral detergent fiber (NDF) method. Additionally, 123 fecal samples were collected to describe the gut microbiome of each of these lemur species. Shotgun metagenomic sequencing was performed to characterize the composition and functional contributions of the gut microbiome to fiber fermentation. Fiber consumption significantly varied across species, but did not significantly differ across seasons. Clear differences were found in the composition and function of the gut microbiome based on both species and season. The integration of nutritional ecology and gut microbiome research can greatly advance our understanding of primate food choices, digestive strategies, and energetics. This information can further provide insight into the adaptability of species to changes in resource availability and help to inform conservation initiatives both in the wild and in captivity.

8. The nature of grief: The case of nonhuman primates

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Understanding grief in nonhuman primates poses conceptual and empirical challenges. Unlike humans, whose grief is readily identified through affective, cognitive, and behavioral manifestations, recognizing it in other primates is complicated by differences in expression and by anthropomorphic bias. Research on primate grief has taken several approaches. Observational and ethological studies have documented grief-like responses (withdrawal, vocalizations, and alterations in social interaction) across diverse primate taxa, from great apes to cercopithecoid monkeys. Separation studies have demonstrated that disrupting attachment bonds produces depressive-like states both behaviorally and physiologically, underscoring how early social bonds shape later affective experience. Evolutionary hypotheses range from non-functional accounts through functional accounts, either cognitive or socially bound, to integrative and mechanistic models. Across these lines of evidence, we suggest that primate grief is the response to the rupture of social bonds built by a deeply conserved attachment system and its homologous nonapeptide toolkit. We propose an inclusive definition of grief as a response to the disruption of

significant social bonds, encompassing affective, cognitive, and behavioral components across primate species whether the body is present or absent. This review is, to our knowledge, the first systematic attempt to bring together the study of grief across disciplinary boundaries that have long kept its component literatures separate. Research from cultural anthropology, affective neuroscience, developmental psychology, ethology, and comparative psychology have each accumulated substantial evidence on grief, yet have rarely been in dialogue. In drawing these traditions together, we hope to have established a framework in which remaining questions can be productively asked, and a set of predictions that the coming generation of comparative thanatology may have the tools to evaluate.

9. Understanding social relationships in western hoolock gibbons (*Hoolock hoolock*) in the Lawachara National Park, Bangladesh

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Gibbons have long been considered exemplars of social and sexual monogamy; however, increasing evidence suggests that their social systems may be more flexible than traditionally assumed. To better understand the extent to which factors interact to shape social behavior we investigated social relationships, spatial behavior, and intergroup dynamics in western hoolock gibbons (*Hoolock hoolock*) in the Lawachara National Park, Bangladesh, focusing on how offspring presence and spatial context influence pair-bonding, territoriality, and aggression. We collected behavioral data using instantaneous focal sampling and GPS-based spatial data from five adult pairs across four neighboring groups over 57 full-day follows from June - September 2025. Our results revealed that parental pairs exhibited significantly higher rates of grooming, duetting, approaching, following, and aggression, suggesting stronger affiliative coordination and defensive responses than non-parental pairs. In contrast, parental pairs did not differ from non-parental pairs in spatial proximity or territorial behavior. Instead, spatial context and intergroup encounter dynamics were the primary drivers of variation in these behaviors. The gibbons' home ranges were relatively small (mean = 17.4 ha, range = 7.6–33.9 ha) and overlapped at boundaries. Groups exhibited flexible social organization, including multi-adult structures, a male-biased sex ratio, and a high proportion of adult-pair-only groups. These findings suggest that while pair bonds remain stable, gibbons can modify their social behavior in response to ecological and demographic conditions. More broadly, this study highlights the importance of integrating behavioral and spatial perspectives to understand variability in primate social systems and underscores the role of habitat fragmentation in shaping social organization, with important implications for the conservation of endangered gibbon populations.

10. Gut microbial richness and taxonomic abundances predict fetal loss in wild baboons

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In mammals, gut microbiota have marked effects on host physiology, health, and behavior. However, research linking gut microbiota to host fitness proxies (e.g., reproductive success and survival) remains rare. Such work is essential for understanding how microbial communities and their hosts co-evolved. Here, we test the relationship between gut microbiota and fetal loss—an important component of mammalian reproductive success. Working in a well-studied population of wild baboons (*Papio cynocephalus*), we measured 16S rRNA-based gut microbiota dynamics using 1,298 fecal samples from

141 female baboons across 445 pregnancies. We found that, controlling for known predictors of fetal loss in this population, reduced gut microbial richness was associated with higher likelihood of fetal loss. We also identified microbial taxa whose abundances differ with fetal loss incidence, including taxa tied to reproductive and survival outcomes in other species. We believe these are the first results to link gut microbiota to female reproductive outcomes in a wild mammal population, with relevance to the adaptive role of host-associated microbial communities.

11. One slide worth updating: 'Sneak and rape' no longer fits what primatology knows about unflanged male orangutans (*Pongo* spp.)

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Orangutans (*Pongo* spp.) show the greatest within-male variation of any primate: some adult males develop cheek flanges and throat sacs while others remain unflanged yet reproductively active. Early field researchers cast this variation as age-related morphs with opposing tactics: "subadults" who "sneak and rape" versus "adults" who "consort and combat." Decades of subsequent work dismantled that framing: males can persist as unflanged for a few years or for life, both morphs may sire offspring, and forced copulation is neither exclusive to unflanged males nor absent in flanged males. Primatology now contrasts unflanged males who "go, search, and find" with flanged males who "sit, call, and wait," a distinction grounded in long-call production rather than coercion. Yet the older language persists. To map where, I conducted a bibliometric analysis of Google Scholar publications pairing morph terms ("subadult"/"unflanged") with strategy terms ("sneak/rape"/"go-search-find"), screening 810 publications and coding 124. Within peer-reviewed primatology, "subadult" and "sneak and rape" effectively vanish after 2002. The lone post-2002 primatology instance describes a monkey, not an orangutan. Outside primatology, the framing endures, concentrated in evolutionary-psychology and human-evolution literature that naturalizes male aggression and female vulnerability. Most tellingly, a subset of publications updates the name ("subadult" to "unflanged") while retaining "sneak and rape," showing this is not mere disciplinary lag but selective uptake. I elaborate the instances in which the non-empirically supported framing remains and outline how it is used to reinforce narratives that naturalize male violence. I present these results to call attention to the human consequences that come from a terminology which lacks evidence continuing to circulate.

12. Socio-ecological drivers of human behavioral responses towards Himalayan langurs (*Semnopithecus schistaceus*) in human-dominated landscapes

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Human–wildlife coexistence in shared landscapes depends on how humans respond during direct encounters with wildlife. Habitat fragmentation across the Himalaya has increased interactions between humans and Himalayan langurs (*Semnopithecus schistaceus*), and yet the behavioral drivers shaping these responses remain poorly understood. We examined how socioecological context shapes human

responses to langurs in agro-forest landscapes of the Garhwal Himalaya, India. We analyzed 1,152 observed human–langur encounters collected over one year, categorizing responses as physical deterrence, verbal deterrence, and neutral behavior. Bayesian multinomial logistic regression was used to evaluate the effects of conservation interventions, spatial proximity, human activity, seasonality, and various demographic characteristics. The human responses recorded were strongly context-dependent. Conservation interventions were associated with lower levels of physical deterrence and a higher likelihood of neutral responses. Spatial proximity emerged as the strongest predictor of human responses, as close encounters increased physical deterrence while greater distance was associated with neutral behavior. Deterrent responses intensified during resource-protection activities and harvesting seasons, reflecting greater sensitivity to livelihood risks. Demographic patterns further structured responses, with males and children more likely to engage in physical deterrence while older adults relied more on verbal strategies. These findings show that tolerance toward wildlife is a conditional behavioral outcome, shaped by interacting ecological and social factors. Coexistence strategies should therefore explicitly account for seasonal contexts and social roles. Focusing on variation in human responses across specific encounter contexts, this study provides directly applicable guidance for reducing high-risk responses towards and promoting coexistence with wildlife in human-dominated landscapes.

13. Effects of habitat disturbance on the gut microbiome of red colobus (*Piliocolobus tephrosceles*) and black-and-white colobus (*Colobus guereza*)

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Anthropogenic habitat modification, particularly via agricultural expansion, has reshaped tropical forests through deforestation and fragmentation. For primates, these disturbances create novel environmental pressures by altering diets, reduce habitat quality, and increase contact with agricultural contaminants and humans, all of which have the potential to impact the gut microbiome. In western Uganda, endangered red colobus (*Piliocolobus tephrosceles*) and black-and-white colobus (*Colobus guereza*), a species classified as Least Concern by the IUCN, inhabit forests adjacent to or fragmented by agricultural expansion. The gut microbiome is an indicator of host condition by reflecting the balance of beneficial and potentially harmful microbes. Colobines have a specialized digestive system because of their folivorous diet, which may make them particularly sensitive to environmental disturbances that alter diet. This study examined gut microbial diversity in *P. tephrosceles* and *C. guereza* inhabiting edge, fragmented, and interior forests within Kibale National Park, Uganda. A total of 110 fecal samples were collected between May and July 2023 for 16s rRNA gene sequencing and microbial analysis. Comparing these gut microbial communities provides insight into how habitat alteration may influence the gut microbiome. Significant differences in gut microbial species richness, alpha diversity, and beta diversity were observed both between species and across habitat types. Red colobus had higher average alpha diversity, while habitat fragmentation was associated with greater differences in beta diversity in black-and-white colobus. Also, the composition of the five most abundant bacterial genera varied more extensively among habitat types in black-and-white colobus than in red colobus. These findings suggest habitat disturbance may alter the gut microbial communities in colobines, emphasizing the importance of incorporating microbial research into primate conservation.

14. Group-level data conceals individual variation in behavioral thermoregulation in mountain gorillas (*Gorilla beringei beringei*)

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Primate thermoregulation is often assessed from group-level activity scores or from individual data averaged across group members. Neither approach quantifies how much individuals differ in their

response to temperature. We compared individual and group-level activity records, along with individual variation in specific thermoregulatory behaviors, in mountain gorillas (*Gorilla beringei beringei*) in Volcanoes National Park, Rwanda, using scan data collected at five-minute intervals during focal sampling. Each scan (n=6,083, from 94 individuals in nine groups) recorded individual activity, including thermoregulatory behaviors; group activity; and temperature at the focal animal location (range=8.6–33.5 °C). Focal activity differed from group activity in 36.8% of scans. Group-level scoring underestimated socializing (7.9% of individual scans versus 0.6% of group scans) and moving (10.1% versus 3.0%). Gorillas of every age-class used heat-dissipating behaviors as temperatures rose and heat-conserving behaviors as temperatures fell (both $p < 0.001$). However, response strength varied widely across individuals. As temperatures fell, individual gorillas' odds of heat conservation behaviors increased by 3% to 25% per 1 °C decrease; as they rose, odds of heat dissipation behaviors changed by –1% to +68%. Almost all the variation was between individuals rather than between groups (85.5% for conservation, 99.7% for dissipation). Immature animals showed the strongest heat-conservation responses, yet were the least well described by group-level scoring. Juveniles and subadults were increasingly misdescribed as temperatures rose, while adults were not (age × temperature interaction $p < 0.001$). Since immature survival drives population growth, group-level monitoring is least informative where conservation stakes are highest. Detecting thermal limits in primates in a changing climate is critical for their protection and will require monitoring individual behavior.

14. How can primatologists identify mineral-driven food choices? Insights from *Hapalemur griseus*

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Primates must be choosy about what they consume to meet their daily nutrient requirements. Most food selection hypotheses emphasize macronutrients and energy. Micronutrients (minerals and vitamins) have received less attention: they do not provide energy and are consumed in considerably smaller quantities than macronutrients but are essential to metabolic processes. Some behaviors are obviously driven by mineral acquisition (e.g. salt licks, consumption of decaying wood, etc.), but these have not been universally observed across primates, raising a central question: how can primatologists identify resources selected for mineral content when it is not as evident? To address this, I propose criteria for identifying resources selected specifically for minerals based on a dataset of *Hapalemur griseus*. Behavior and plant samples were collected across two seasons and sites in Tsinjoarivo, Madagascar and 27 plant samples were tested for 11 minerals. Mineral concentrations varied significantly between plant parts and type, with non-bamboo and non-tree resources significantly higher in mineral content. *Hypochaeris* sp., *Isoglossa gracillima*, stems of non-bamboo species, and *Auricularia* sp. were determined to be consumed for minerals because they were statistically greater in mineral content than other foods consumed by *H. griseus* and sympatric lemurs, they were eaten rarely, and they predominantly fell below nutrient recommendations. The results suggest lemurs consumed select foods for minerals and may also support the nutrient balancing hypothesis, but more data are needed to draw firm conclusions in regards to the latter. This study provides guidelines for how primatologists can identify resources selected for minerals and has important implications for conservation management.

15. Group-level data conceals individual variation in behavioral thermoregulation in mountain gorillas (*Gorilla beringei beringei*)

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Primate thermoregulation is often assessed from group-level activity scores or from individual data averaged across group members. Neither approach quantifies how much individuals differ in their response to temperature. We compared individual and group-level activity records, along with individual variation in specific thermoregulatory behaviors, in mountain gorillas (*Gorilla beringei beringei*) in Volcanoes National Park, Rwanda, using scan data collected at five-minute intervals during focal sampling. Each scan (n=6,083, from 94 individuals in nine groups) recorded individual activity, including thermoregulatory behaviors; group activity; and temperature at the focal animal location (range=8.6–33.5 °C). Focal activity differed from group activity in 36.8% of scans. Group-level scoring underestimated socializing (7.9% of individual scans versus 0.6% of group scans) and moving (10.1% versus 3.0%). Gorillas of every age-class used heat-dissipating behaviors as temperatures rose and heat-conserving behaviors as temperatures fell (both $p < 0.001$). However, response strength varied widely across individuals. As temperatures fell, individual gorillas' odds of heat conservation behaviors increased by 3% to 25% per 1 °C decrease; as they rose, odds of heat dissipation behaviors changed by –1% to +68%. Almost all the variation was between individuals rather than between groups (85.5% for conservation, 99.7% for dissipation). Immature animals showed the strongest heat-conservation responses, yet were the least well described by group-level scoring. Juveniles and subadults were increasingly misdescribed as temperatures rose, while adults were not (age $\times$ temperature interaction $p < 0.001$). Since immature survival drives population growth, group-level monitoring is least informative where conservation stakes are highest. Detecting thermal limits in primates in a changing climate is critical for their protection and will require monitoring individual behavior.

16. A multi-kingdom perspective reveals differential responses of bacterial and fungal gut communities to environmental heterogeneity in wild free-ranging long-tailed macaques (*Macaca fascicularis*) in Bali, Indonesia

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Environmental heterogeneity can shape host-associated microbial communities through habitat, resource availability, and diet. We examined whether bacterial and fungal gut communities respond similarly to environmental variation in wild long-tailed macaques (*Macaca fascicularis*) inhabiting Bali, Indonesia. We analyzed fecal samples from 43 macaques across nine sites varying in tourism, forest cover, water availability, urbanization, and elevation. Environmental variables were summarized using principal component analysis, and bacterial, fungal and dietary communities were characterized using 16S and 18S rRNA gene sequencing. We assessed dietary and microbial diversity, community composition, and bacterial-fungal co-occurrence networks. The first two principal components explained 73.1% of environmental variation and defined environmental types by anthropogenic influence and habitat. Dietary composition varied significantly among environmental types (PERMANOVA $p = 0.002$), with differences particularly in crop plant and invertebrate consumption. Both bacterial and fungal community composition were significantly associated with environmental variation, but fungal communities showed stronger structuring. Environmental variation explained 7% of bacterial variation (PERMANOVA $p = 0.001$) compared with 11% of fungal variation ($R^2 = 0.110$, $p = 0.001$). Dietary composition was significantly associated with fungal composition, but not bacterial composition. Finally, bacterial-fungal co-occurrence networks differed across environmental types, with differences in connectivity and hub taxa in network structures across environments. These findings demonstrate that environmental heterogeneity is associated with changes in diet, microbial community structure, and cross-kingdom microbial associations. The stronger response of fungal communities highlights the importance of incorporating multiple microbial kingdoms when investigating how ecological variation shapes primate microbiomes.

17. Socializing subadults: Behavioral and photogrammetry data from adolescent male baboons

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This study explores the social lives of adolescent males in a troop of olive baboons (*Papio anubis*). The Uaso Ngiri Baboon Project (Laikipia, Kenya) follows a wild but fully-habituated troop where all matrilineal kin relationships are known. In this large troop of over 100 baboons with more than 10 distinct matrilineal kin relationships, we find that natal males sometimes delay dispersal for longer than reported in other populations. We use this opportunity to directly compare different ages and developmental stages of natal males, using behavioral and photogrammetry data collected on a cross-sectional sample of males aged 4-11 years old ($n=23$; average age=7.41 years) in summer 2025. Although many of these males maintain ties with their maternal kin, most grooming observed (93.6%) was with non-kin partners. We found that juvenile males give and receive grooming at low rates, and that grooming received increases as they get older/larger. Though rates of grooming given are low overall, there is a quadratic relationship between age and grooming given ($p = 0.003$): younger and older individuals have higher rates of grooming given than young subadults (~ 7 years old). Rates of grooming received were positively associated with rates of grooming given ($p = 0.03$) except for the oldest males in the sample (>9 years old), for whom rank was a positive predictor of grooming received (outperformed null model by $\Delta AIC = 6.07$). Proportion of time spent on the periphery of the troop increased with age/size (age: $p < 0.001$; size: $p = 0.004$) but did not negatively impact grooming time. This research adds to the body of work on this transitional life stage and the social strategies associated with it in baboons.

POSTER ABSTRACTS

1. Using physical activity and heart rate to measure sleep-like behavior in wild savannah baboons

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Sleep is a universal behavioral and physiological process that plays a fundamental role in animal health and fitness. Sleep outcomes are shaped by both homeostatically regulated physiological needs and environmental demands. Despite sleep's sensitivity to these internal and external cues, technological challenges have led most research on the causes and consequences of variation in sleep to occur in controlled, captive settings. However, advances in physiologger technology are allowing researchers to study sleep in ecologically and evolutionarily relevant settings. We adapted techniques from collar mounted accelerometers on olive baboons (*Papio anubis*) to infer metrics of sleep-like behavior in 15 wild adult female baboons (dominant *P. cynocephalus* ancestry admixed with *P. anubis*) living in the Amboseli ecosystem in southern Kenya. We used continuous data on activity and heart rate from Bluetooth-enabled, insertable cardiac monitors (BLE-ICMs). We have collected 3700 nights of data to date. Through application of these methods, we are able to determine various metrics of sleep-like behaviors and wakefulness for individual baboons on a nightly basis. These metrics include those related to the quantity of sleep-like behavior, including the time of nightly sleep onset, morning waking, and the duration of nightly sleep bouts. Additionally, we have been able to successfully determine periods of wakefulness during a baboon's nightly sleep bout. This combination of data on sleep-like behavior and wakefulness allows calculations of sleep quality, such as sleep efficiency and sleep fragmentation. Through further refinement of these methods, we hope to address questions that seek to understand factors that affect the homeostatic and adaptive functions of sleep in a wild system.

2. Does kin selection explain food transfer in white-faced saki monkeys (*Pithecia pithecia*)?

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Food transfer behavior occurs in about half of primate species, most commonly from mother to offspring, with transfers from fathers and siblings only rarely occurring. Under kin selection, animals should share food with close relatives to increase inclusive fitness. Since offspring become more vulnerable as they transition to independence, food transfers to kin during this time may enhance survivorship. We tested the kin selection hypothesis in wild white-faced sakis (*Pithecia pithecia*) at Brownsberg Naturepark, Suriname. Occurrence data and the extent of resistance to food transfers were collected from two multi-adult groups and a male-female pair across 17 months. Food transfers from mothers to

infants/juveniles comprised 51.5% (total N=196) of transfers across all groups, with 36.2% of transfers between siblings. Only 11.2% of transfers were from breeding males to infants/juveniles, with all successful transfers occurring in the male-female pair. The first multi-adult group did not show an association between the number of food transfers and relatedness, but mother-to-offspring transfers showed significantly less resistance. In the male-female pair, the female performed significantly more food transfers to offspring than the breeding male, but sexes did not differ in extent of resistance. Transfers in the first multi-adult group showed no significant association between offspring age and resistance, whereas the male-female pair had more resistance to food transfers as offspring aged. The second multi-adult group rarely transferred food. Offspring age and mother-to-offspring sharing play key roles in white-faced saki food transfers, although food transfer patterns varied between groups with differing social organizations. Our tests provide partial support for the kin selection hypothesis, highlighting the importance of these relationships for inclusive fitness.

3. Chimpanzee activity budgets based on group membership

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Chimpanzees (*Pan troglodytes*) are a highly intelligent and complex species. With intricate fission-fusion social structures, individuals have diverse relationships and display different behaviors towards various group members. The Indianapolis Zoo currently houses 20 chimpanzees divided into several smaller groups, with the eventual goal of overall integration. We recorded their behaviors through the ZooMonitor program from June 2024 to August 2026. Researchers conducted focal follows of chimpanzees, using a structured ethogram to record behaviors. We compared behavior budgets across four groups to assess the impact of group membership: (1) chimpanzees whose social groups have remained constant, (2) chimpanzees who have had additions made to their group, (3) chimpanzees who have had reductions to their group, and (4) chimpanzees who were transferred between social groups. Though behavioral data has not yet been analyzed, this knowledge could be helpful to the Indianapolis Zoo's primate keepers to make informed decisions as they conduct structured introductions across different social groups in a safe and supported way. Understanding how behaviors shift will be important as sub-groups change, and all individuals eventually become one large fission-fusion group.

4. Behavioral responses of Japanese macaques to touchscreen cognition tasks

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Providing primates with opportunities to engage in cognitive touchscreen tasks has many benefits and has become rather prevalent in captive settings. Touchscreens provide a lens into primate minds while also serving as a form of enrichment, however their influence on the overall activity budgets and behavioral patterns of primates remains understudied. Japanese macaques (*Macaca fuscata*, N = 11) at Lincoln Park Zoo voluntarily participate in daily touchscreen tasks where they are rewarded for their participation and responses with preferred food items, but staff availability to facilitate touchscreen opportunities can naturally vary. This study explores the macaques' behavioral responses to variation in their ability to engage with touchscreen tasks. Macaque social dynamics are organized around despotic, linear dominance hierarchies, and therefore we predict opportunities to engage with cognitive touchscreen tasks may elicit aggression as they compete for access to food rewards. We collected behavioral data across two study periods (May and July 2026) where the macaques had the opportunity

to engage with the touchscreens (i.e., baseline), followed by a period with no opportunity, and finally the touchscreens were reintroduced. Each experimental period was three weeks in duration. We expect aggression to increase relative to baseline both during the period of touchscreen absence and following touchscreen reintroduction. This study will provide the first evaluation of how macaques respond to natural variation in the availability of touchscreen enrichment. This research can inform how we schedule care programs for primates as well as how the availability of these programs impacts primate social behavior and wellbeing.

5. Age-class gut microbiome development in *Semnopithecus schistaceus*

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The gut microbiome undergoes substantial development across early life as changes in diet, physiology, maternal dependence, and environmental exposure shape microbial community assembly. However, developmental trajectories remain poorly characterized in wild primates, particularly among colobines whose specialized foregut-fermenting digestive systems rely heavily on microbial function. We examined age-related gut microbiome variation in wild Central Himalayan langurs (*Semnopithecus schistaceus*) inhabiting a human-modified landscape in Uttarakhand, India. Fecal samples collected from adults and non-adults were analyzed using 16S rRNA gene amplicon sequencing of the V4–V5 region. Microbial diversity and community composition were compared among adult females and three non-adult developmental stages: newborn, infant, and juvenile. Adult females exhibited significantly greater microbial diversity than offspring. Among non-adults, Shannon diversity tended to increase across development but did not differ significantly among age classes (Kruskal–Wallis: $\chi^2 = 5.13$, $p = 0.077$). In contrast, microbial community composition differed significantly across developmental stages, with age class explaining 31.9% of compositional variation (PERMANOVA: $R^2 = 0.319$, $F = 4.21$, $p = 0.005$). Newborns exhibited the greatest inter-individual variation, whereas infants and juveniles showed reduced dispersion and greater compositional overlap. Despite developmental restructuring, dominant fermentative phyla, particularly Bacillota and Bacteroidota, persisted across age classes. These findings demonstrate that non-adult gut microbiomes represent dynamic developmental communities rather than simply less-diverse versions of adult microbiomes. Core components of colobine fermentative microbiota appear to become established early, while microbial community organization continues to restructure across ontogeny in wild Himalayan langurs.

6. The potential of individual golden monkey (*Cercopithecus mitis kandti*) identification for research and conservation

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Identifying individual animals is fundamental to research and conservation because it enables researchers to monitor animals over time. In some primate species, this is straightforward, but in others quite challenging. Golden monkeys (*Cercopithecus mitis kandti*) are an endangered subspecies of blue monkey that live in the Virunga Massif of the Albertine Rift and Gishwati Forest, Rwanda. They are poorly studied in part because they are difficult to identify. They lack an obvious distinguishing feature, live in large mixed-sex groups in dense bamboo habitat, and move rapidly through the forest canopy. From 2017-2024, we tested whether individual monkeys could be distinguished using a suite of external morphological characteristics. Using field observations, photos, and video, we identified characteristics that consistently distinguished individuals in four habituated groups in Volcanoes National Park, the

Rwandan part of the Virunga Massif. These included facial features (e.g., presence/absence of white nose hair), body size, coat coloration, the presence/size of an orange patch on the head, ear shape, and nipple size and shape in adult females. When present, scars, ear cuts, and broken fingers aided recognition. Using this approach, to date, we have identified >500 individuals. This effort creates opportunities for studies that rely on individual identification, such as life history parameters (e.g., birth and death rates, interbirth intervals, weaning, mortality/survival, age at reproduction), reproductive success, dispersal patterns, and social interactions.

7. Adiposity in the primate order: A critical review of captive and wild evidence

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Humans are routinely described as the fattest primates. This comparison is the basis of arguments about encephalization, life history, and metabolic disease, but rests on relatively few types of data. Healthy adult humans carry roughly 14 to 31 percent body fat while other primates are reported to have less than 9 percent. Similarly, human neonates are fat whereas chimpanzee neonates are not. Other aspects of primate adiposity are less well studied. This review explores what is actually known about adipose quantity, anatomical distribution, and life history variation across the primate order. We survey three literatures that rarely intermingle: biomedical work on captive macaques, baboons, vervets, and marmosets, in which obesity and metabolic syndrome are induced or incidentally acquired; whole body dissection and imaging studies, which give direct compositional data from small, largely captive or zoo derived samples; and field studies, where adiposity is usually inferred from body mass, morphometrics, condition scores, or fecal/urinary biomarkers rather than directly measured. Preliminary analysis suggests three broad limitations. First, direct body composition data exist for barely a dozen species in captivity and are even rarer for wild animals. Captive values are confounded with diet, activity restriction, and provisioning. Second, adiposity is treated as a single measure, broken down at best into subcutaneous and visceral depots. Other fat depots such as omental, mesenteric, perirenal, and epicardial, among other depots, are rarely distinguished from one another. Further, functionally distinct tissues go largely undiscussed: brown adipose, despite its thermogenic role, and bone marrow adipose, despite being conserved across vertebrates and exceeding a tenth of adipose mass in humans. We close by outlining the future work needed to empirically evaluate human exceptionalism in adiposity.

8. Family matters: Sex differences in sibling grooming relationships of wild juvenile olive baboons (*Papio anubis*)

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The juvenile period, the developmental stage following weaning and before puberty, is significantly longer in primates compared to other mammals. Given sociality is a predictor for long-term survivorship in primates, this extended period of development may have evolved as a time for cultivating complex social skills needed in adulthood. Sibling interactions are incredibly important for social learning, as juveniles find a balance between competition and cooperation with their kin. In olive baboons (*Papio anubis*), females maintain familial bonds through adulthood, while males typically leave their natal troop after reaching sexual maturity. Using long term data from the Uaso Ngiro Baboon Project in Laikipia, Kenya, we investigated the influence of sex on the creation and maintenance of maternal sibling relationships in juvenile olive baboons. Given that males are less likely to live alongside kin as adults, we predicted higher social investment among sister-sister dyads. Preliminary analyses of 4.5 years of ad libitum grooming from 37 sibling dyads show that overall males received significantly more grooming from their siblings than they gave, whereas females groomed their siblings more than they received ($p=.034$), and both female and male juveniles tended to groom with their sisters more than their brothers, but this didn't reach

significance ($p=.080$). Sibling age was also found to be a significant factor, juveniles groomed younger siblings more than they received and were groomed by older siblings more than they gave ($p<.001$), and juveniles were groomed by older sisters significantly more than other siblings ($p=.002$). While grooming occurred among all sibling dyads in the sample, these findings may suggest that the maintenance of sibling relationships in juveniles is primarily driven by older females.

9. Inbreeding and other demographic challenges faced by critically endangered diademed sifakas in the Tsinjoarivo-Ambalaomby new protected area, Madagascar

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Rainforest sifakas and the closely related Indri are the largest extant Malagasy lemurs and tend to exist at lower population densities relative to other sympatric lemurs. As such, they are often highly threatened (all EN or CR) and are particularly vulnerable to small population size effects when habitats shrink or become disconnected. At Tsinjoarivo-Ambalaomby Protected area, diademed sifakas (*Propithecus diadema*) have been studied continuously since 2002, with some study groups in isolated fragments as small as 24 hectares. Capture and marking with collars has allowed tracking of individuals across time. These individuals have shown some signs of resilience: dispersal between fragments (moving through cleared/agricultural land) has been observed in both recently matured and older adult males, and one recently matured female. However, the most-studied fragment (227 ha; home to 3-4 sifaka groups) began showing known inbreeding in 2021, after which two groups' breeding pairs were composed of full siblings derived from another group in that fragment. One group (FRAG6) produced three offspring, and the other (FRAG5) existed as a pair without producing offspring for four years before reproducing in 2025. One offspring produced in FRAG6 was discovered to have dental abnormalities: one large supernumerary left P_2 , and two small supernumerary I^2 . These results suggest that sifakas do not have firm mechanisms preventing inbreeding with close relatives and reinforce the need to keep habitats connected to maintain genetic health of populations. Future work should use genotyping to fully document the degree of inbreeding and better estimate when it may have started.

10. Dental crowding and commensalism in *Papio* spp.

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Chacma baboons (*Papio ursinus*) from South Africa's Cape Peninsula live in close proximity to humans and frequently consume human-derived foods. Inclusion of such foods is associated with differences to the gut microbiome and hormones, though few studies have examined the relationship between human-derived foods and aspects of oral health in non-human primates. Among humans, dental crowding is known to correlate with large-scale dietary shifts. Thus, if commensalism among non-human primates involves a shift toward softer foods, it is reasonable to predict that reduced masticatory loads could result in smaller jaws and, consequently, increased dental crowding. In this preliminary study, we examine the relationship between dental crowding and commensalism by comparing a sample of commensal Cape

chacma baboons (n=30) to samples from other baboon populations (non-Cape *Papio ursinus*, n=8; *Papio hamadryas*, n=19; and *Papio anubis*, n=8). Crowding was scored ordinally in maxillary and mandibular incisors, premolars, and third molars based on degree of displacement, rotation, and/or overlapping of teeth. Maximum severity of crowding across all teeth was recorded per individual. Kruskal-Wallis H tests yielded significant differences ($p < 0.05$) in lower premolars, lower third molars, and maximum severity between the four groups. Post hoc Mann-Whitney U tests suggest the greatest differences in lower premolar crowding are between Cape chacma and *Papio anubis*. Further, 91.5% of mandibular third molar crowding occurred in Cape chacma. These results suggest that dental crowding in commensal Cape chacma baboons is associated with consumption of human-derived foods.

11. Investigating the impact of behavior and posture on heart rate and activity in wild baboons

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Measuring stress is crucial to understanding the health and fitness of animals. Cardiac measures like heart rate are a reliable proxy for stress, but they are also highly affected by routine behaviors, such as posture and activity. Therefore, the analysis of stress using heart rate in wild animals requires investigating the behaviors that impact heart rate. In this project, we use an innovative method of heart monitoring to understand how day-to-day behaviors and posture impact heart rate and activity levels in wild baboons (*Papio cynocephalus*). In the Amboseli baboon population in Kenya, three female individuals were implanted with an insertable cardiac monitor (ICM), which collected heart rate and activity data (measured with an accelerometer) every five minutes. To record behavior and posture, each baboon was filmed for 20 minutes on three separate days. Behavior (e.g., feeding, walking, resting, or socializing) and posture (e.g., sitting or standing) were then coded in BORIS. These observations were synced with heart and activity measurements to test how the duration of each behavior in a five minute period affected heart rate and level of activity for that period. We found social behavior increased significantly the heart rate of baboons when compared to feeding, resting or walking, whereas no behavior affected activity level. Standing baboons had a significantly higher heart rate than those who were sitting but no significant changes were observed in activity score between different postures. These findings confirm the association between daily behaviors and heart rate, and can be used to inform future studies of cardiac data in wild baboons.

12. Playful teasing in wild chimpanzees

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Playful teasing and joking require complex socio-cognitive abilities, including the recognition of social norms and others' expectations. These ambiguous behaviors blur the line between play and aggression, and could be useful in bond maintenance or strengthening. Human infants and zoo-housed great apes show structurally similar teasing behaviors, characterized by intentionally provocative behavior and play characteristics. However, the occurrence and characteristics of playful teasing in wild populations remain little described. Drawing on previous work identifying playful teasing in zoo-housed apes, we applied this coding scheme to videos of wild Western chimpanzees (*Pan troglodytes verus*) in the community at Fongoli, Senegal. Teasing events were not only identified in this population, but showed similar patterns and features to those seen in captive groups. Additionally, we observed several instances of a game-like

sub-type of teasing not seen in previous studies. The presence of teasing in a wild population provides support to evolutionary hypotheses, such as bond-testing.

13. Variation in triiodothyronine concentrations across environments and social groups in wild mountain gorillas (*Gorilla beringei beringei*)

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Thyroid hormones play an important role in regulating metabolic rate, and thus provide insight into how animals respond to varying environmental conditions. Mountain gorillas (*Gorilla beringei beringei*) provide an interesting opportunity to explore the relationship between these hormones and factors such as elevation, season, temperature, and diet, due to the significant environmental heterogeneity their habitat encompasses. Here, we investigate variation in triiodothyronine (T3) concentrations in wild mountain gorillas monitored by the Rwanda Development Board and the Dian Fossey Gorilla Fund in Volcanoes National Park, Rwanda. We hypothesized that T3 concentrations would differ between eastern and western subpopulations within the park because of differences in habitat composition, elevation range, and food availability in the regions where these subpopulations range. Using 1,452 fecal samples collected from 101 individual gorillas in 2024, we quantified T3 using an enzyme-linked immunosorbent assay. T3 concentrations were ~42% higher in the western than the eastern subpopulation (ratio = 1.42, 95% CI [1.22, 1.65], $p < 0.0001$). Western groups range in the high-elevation southwestern sector of the park, where conditions are generally colder than in the lower-elevation eastern ranges, suggesting that elevation and habitat composition may contribute to this difference. T3 also varied among social groups and among repeated samples from the same individual, with 17.5% of the variance attributable to social groups and 75.2% occurring within individuals over time. Considering all social groups together, the lowest-T3 groups were distributed across both subpopulations and had larger proportions of bamboo in their home ranges than the rest. This suggests that variation extends beyond the western and eastern contrast and may reflect dietary resources such as bamboo availability, though these social group differences require further investigation.

14. Patterns of stereotypic behavior in relation to environmental and social factors in zoo chimpanzees

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Many chimpanzees in human care engage in atypical stereotypic behaviors, which seem to serve little to no functional purpose and are often considered an indication of welfare. Stereotypies have sometimes been linked to stressful situations, while others may be socially learned behaviors. We observed chimpanzees (*Pan troglodytes*) from various backgrounds housed at the Indianapolis Zoo and recorded their behaviors through the ZooMonitor program, from June-August across three years (2024-2026). This study analyzed several documented stereotypic behaviors from this population of twenty chimpanzees, including coprophagia, regurgitation, self-injury, and individual-specific stereotypy. We analyzed behaviors in correlation with environmental and social factors, including weather and visitor crowd size. Tracking and monitoring these behaviors is important, as they may lead to injury or other unwanted behaviors.

These data and analyses can provide zoo staff with the information they need to reduce these behaviors and improve the wellbeing of chimpanzees.

15. Emergence of a rare behavior: Increased male-male grooming in wild olive baboons (*Papio anubis*)

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Like in many other primate groups, social grooming in olive baboons (*Papio anubis*) is an important behavior for developing and maintaining social relationships with others. Among mature olive baboons, females regularly groom with both males and females, but male-male grooming is extremely rare. This is likely a reflection of the male-biased dispersing patterns typical among baboons. We used long-term data collected at the Uaso Ngiro Baboon Project from January 2022-May 2026 on a relatively large olive baboon troop (~115 individuals) to explore the frequency of male-male grooming and when it occurs to examine the pattern of relationships among the grooming dyads. In early 2023, the troop began seeing an increase in sexually mature males selecting other mature males as grooming partners. This is an unusual and surprising behavior. While the sample size remains too small to run statistical analyses, we observed 221 male-male grooming bouts consisting of a total of 92 unique mature male-male grooming dyads. Most of the dyads we observed groomed infrequently and the groomees did not reciprocate, but dyads with a history of close association or a kin relationship chose one another as grooming partners at higher rates than other mature male-male grooming dyads. We discuss possible factors influencing this shift in behavior including demographics (large troop size with a history of troop fission and a high rate of males remaining in the natal troop), health, and age of males in the grooming dyads.

16. What we hear and what we miss: Mapping the primate bioacoustics literature, 1977-2025

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Bioacoustic methods now underpin much of what we know about primate vocal communication, and increasingly about primate populations: acoustic monitoring can survey cryptic, nocturnal, and unhabituated species that observational methods reach poorly, and can do so continuously and non-invasively. Whether the literature accumulating around these methods covers primates evenly has not yet been examined. We systematically searched Web of Science and Scopus using paired taxonomic and communication term blocks, screened 9,571 unique records after deduplication in R, and coded 106 empirical studies of primate vocal communication published between 1977 and 2025 for species, study location, level of evidence, and study design. Seventy species are represented, yet four, *Callithrix jacchus*, *Pan troglodytes*, *Macaca mulatta*, and *Pan paniscus*, account for roughly a third of all studies. Cercopithecines (37 studies) and hominoids (29) dominate, whereas strepsirrhines (6), colobines (5), and tarsiers (2) fall far below their share of primate diversity. Thirty-eight of 106 studies were conducted at captive facilities in North America and Europe, including national primate research centers, university laboratories, and zoos, while Madagascar, home to roughly a fifth of all primate species, contributed six. Coverage therefore tracks research infrastructure more closely than it tracks primate diversity. This mismatch is not for want of a suitable method: passive acoustic monitoring is well suited to precisely the taxa and habitats that are missing yet appeared in only eight studies. Primate bioacoustics has therefore developed powerful tools, yet their applications in captive and field studies have remained relatively narrow. The implications for conservation monitoring, and for the range of species on which general claims about primate vocal communication currently rest, are discussed.

17. Daily activity budget of two confiscated Bengal slow loris (*Nycticebus bengalensis*) in a forest patch of Lawachara National park, Sylhet, Bangladesh

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The Bengal slow loris (*Nycticebus bengalensis*), the only nocturnal primate in Bangladesh, remains poorly understood due to its elusive behavior and nocturnality and is often misunderstood by the public. This species is classified as Endangered both globally and nationally. However, there is still limited information about its behavior, especially after confiscation and release into the wild. Public awareness remains alarmingly low; many local communities are either unaware of its existence or misidentify it as a bad omen or exotic pet, complicating conservation efforts. To address these critical gaps, this study examined the activity patterns of two radio-collared Bengal slow lorises, one male and one female, released in Lawachara National Park. From September to December 2023, we conducted 29 nights of observations. We used radio telemetry and instantaneous focal sampling at five-minute intervals. A total of 2,139 behavioral records were collected between 17:00 and 05:00 hours. The lorises were active during 71% of the observed period. They were out of sight for 23% of the time and identified only by eyeshine in 6% of observations. Movement was the most common activity (42%), followed by alertness (17%), feeding (12%), foraging (11%), resting (10%), grooming (6%), and sleeping (2%). The male spent more time in moving and foraging. The female spent more time being alert and resting. These differences may be related to environmental conditions, seasonal changes, or the effects of release into a new habitat. These results provide useful information on the night-time behavior of Bengal slow lorises after release. They also highlight the importance of proper rehabilitation, release, and monitoring for the conservation of this poorly studied species.

18. Preliminary results on seasonal variation in the activity budgets of non-human primates: A meta-analysis

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Seasonal precipitation can shape primate behavior through direct and indirect pathways. While many primates respond to rainfall by seeking shelter or reducing activity, long-term behavioral flexibility may reflect precipitation-driven changes in habitat conditions and food availability. In strongly seasonal habitats, fluctuations in precipitation alter plant phenology and resource distributions, potentially affecting how primates allocate their time. We conducted a systematic review of the primate literature, compiling 48 studies representing 24 genera and 37 species to assess variation in wet- and dry-season behaviors across populations. We first performed random-effects meta-analyses using log response ratios (Irr) for each activity category (wet season activity/dry season activity) as our effect sizes. We found statistically significant variation in Irr across all activity categories, with 84%, 98%, 97%, and 97% of the variation in feeding, moving, resting, and socializing, respectively, reflecting true population-level differences. We then performed random-effects meta-regressions to investigate how other environmental factors influenced variation in wet- and dry-season behaviors across populations. Preliminary results showed significant relationships between seasonal variation in temperature and Irr for time spent moving and resting, with populations that experienced more extreme seasonal differences in temperature spending more time moving and less time resting during the wet season, compared with the dry season. We also found

significant relationships between latitude and *Irr* for feeding and resting, with populations occupying more temperate latitudes spending more time feeding and less time resting during the wet season, compared with the dry season. Our findings suggest that the magnitude of seasonal differences in primate activities is highly variable across populations, reflecting the importance of local environmental conditions on behavioral strategies.

19. Attentional biases of Japanese macaques to images of their groupmates

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Macaque social dynamics are complex, multifaceted, and often difficult to understand. How macaques perceive their own social relationships is even less understood. Nevertheless, accurate assessments of both are essential to ensure that macaques can thrive in managed care. This study employs a touchscreen cognitive task (specifically, the dot-probe paradigm) to measure Japanese macaques' (*Macaca fuscata*, *N* = 11) attentional biases to images of their groupmates at Lincoln Park Zoo. The photo stimuli of conspecifics' faces for these tasks were standardized to control for variation in facial redness, background color, and gaze direction. We aim to examine variation in response latency to touch a probe following the presentation of paired photo stimuli. When presented with a pair of stimuli with marked rank disparities, we predict that the macaques will bias their attention toward the more dominant individuals. When presented with a pair of stimuli who have nearly equal ranks, we predict that the macaques will show an attentional bias toward conspecifics with whom they share the closest social relationships. Dominance status will be calculated using patterns of directed aggression, and social relationship strength will be calculated using patterns of association and grooming. This research will provide new insights into how macaques think about establishing and maintaining their social relationships. The ability to predict how individuals will respond to natural fluctuations in dominance hierarchies has major implications for managing the care of this species, as well as understanding comparative elements of primate social cognition.

20. Describing individual baboon diets through metabarcoding.

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Many primates overcome the challenges of eating plants by having broad diets. Among primates, savanna baboons are especially nonspecialized, exhibiting high adaptability, diversity, and selectivity in diet choice. These characteristics of baboon nutritional ecology drive individual diet variation that can affect immediate health and lifetime fitness. However, individual variation in baboon diets remains largely undescribed because observational methods are limited in their ability to describe the richness and diversity of an individual's diet. More recently, diet metabarcoding offers a genetic sequencing-based method that can provide individual dietary resolution at a population scale. In this study, we examine the ability of diet metabarcoding to describe individual diets in a population of wild baboons in the Amboseli ecosystem in Kenya. 24,480 fecal samples were collected from individual baboons of known identity between 2000 and 2018. Samples were extracted and sequenced at the *trnL*(UAA) and *ITS1* loci. We recovered 123 unique ASVs representing diet items. Sequenced diets were compared with concurrently collected behavioral diets to understand each method's relative descriptive ability. Diets described by diet metabarcoding exhibited higher richness, diversity, and taxonomic specificity than diets described through observational methods. However, diet metabarcoding is unable to detect dietary proportions or specific plant parts and can overlook some species. Diet metabarcoding is also constrained by the availability of reference barcodes for some plant taxa. Diet metabarcoding is a powerful tool for describing individual

diets at the population scale, but proper interpretation of the data relies on careful consideration of its strengths and weaknesses.

21. Variation in creatinine concentration, specific gravity, and muscle mass across captivity status and age in wild mountain gorillas (*Gorilla beringei beringei*) and captive lowland gorillas (*Gorilla gorilla gorilla*)

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Studying physiological variation aids in monitoring the health and development of long-lived wild primates. Biomarkers are measurable indicators of physiological processes that can be quantified non-invasively from natural byproducts, like urine, allowing repeated assessment without causing stress or disrupting natural behavior. Urinary creatinine (CR) is a byproduct of muscle energy metabolism, and individuals with greater muscle mass generally have higher CR values. Because urine concentration affects measured CR, CR can be evaluated relative to specific gravity (SG). We evaluated CR–SG relationships across gorilla populations and tested whether SG-adjusted CR varied with age and sex. Spot urine samples were collected from 113 wild mountain gorillas (*Gorilla beringei beringei*) in Volcanoes National Park, Rwanda (N = 832), and 5 captive western lowland gorillas (*Gorilla gorilla gorilla*) at the Detroit Zoo (N = 10). Urine was assayed using a colorimetric reaction. CR–SG regressions were fit using $SG - 1$ and constrained through the origin, reflecting the expectation that water has $SG - 1 = 0$ and $CR = 0$.

CR–SG slopes differed strongly between populations: captive western lowland gorillas had a substantially steeper slope than wild mountain gorillas (7340 vs. 2314; $t(840) = -16.96$, $p < 0.0001$), indicating higher CR at comparable urine concentrations. Within mountain gorillas, mixed models accounting for repeated samples found no significant effects of age, sex, or age-by-sex interactions on SG-adjusted CR. These data provide the first reported urinary creatinine values for wild mountain gorillas and establish an initial reference for evaluating variation across individuals, development, and populations.