

TRACY M. MONTGOMERY

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I am a behavioral ecologist interested in how group-living animals cope with individual, social, and ecological demands in fluctuating environments. I am a lead researcher at two long-term field sites: the Mara Hyena Project in Kenya (where I study social carnivores, spotted hyenas) and the Ankoatsifaka Research Station in Madagascar (where I study social lemurs, Verreaux's sifaka). In my research, I combine observational, remote sensing, and laboratory approaches to understand how individual physiological and behavioral processes produce group- and community-level social dynamics in wild populations.

EDUCATION

- 2013 – 2020 Dual PhD, Michigan State University, East Lansing MI
Zoology and Ecology, Evolution, and Behavior (EEB)
Dissertation: Physiological mediation of social behavior in group-living carnivores
Advisor: Dr. Kay E. Holekamp
- 2006 – 2010 B.A. Biology (*cum laude*) and French, Amherst College, Amherst MA

RESEARCH and ACADEMIC POSITIONS

- 2021 – pres. Universität Konstanz,
Centre for the Advanced Study of Collective Behaviour, Konstanz DE
Research affiliate
- 2020 – pres. Max Planck Institute of Animal Behavior, Konstanz DE
Postdoctoral researcher. Supervisor: Dr. Meg Crofoot
- 2016 – 2020 Michigan State University, PhD candidate
- 2015 – 2016 University of Michigan, Core Assay Facility, Ann Arbor MI
Lab-based endocrine research for PhD. Supervisor: Dr. Jacinta Beehner
- 2014 – 2015 Michigan State University, Mara Hyena Project, Maasai Mara, Kenya
Field-based observational research for PhD. Supervisor: Dr. Kay Holekamp
- 2013 – 2014 Michigan State University, PhD student
- 2013 Université de Lausanne, Inkawu Vervet Project, KwaZulu-Natal, South Africa
Field assistant. Supervisors: Dr. Erica van de Waal & Dr. Erik Willems
- 2011 – 2012 New England Aquarium, Right Whale Research Project, Boston MA & Lubec ME
Research assistant. Supervisors: Dr. Scott Kraus & Dr. Moira Brown
- 2010 – 2011 Michigan State University, Mara Hyena Project, Maasai Mara, Kenya
Research assistant and camp manager. Supervisor: Dr. Kay Holekamp
- 2009 – 2010 Amherst College, Clotfelter Research Lab, Amherst MA
Honors research thesis. Supervisor: Dr. Ethan Clotfelter

GRANTS, FELLOWSHIPS, and AWARDS

Research grants

- 2021 Research Grant from Cluster of Excellence at Universität Konstanz (€139,131)
Social transmission of predation risk across wild groups of Verreaux's sifaka (lead-PI)
- 2021 DEI Grant from Cluster of Excellence at Universität Konstanz (€3,800)
Supporting safe, inclusive, and diverse field biology (co-PI)
- 2019 Society for Integrative and Comparative Biology Grant-in-Aid of Research (\$900)
- 2018 American Society of Mammalogists Grant-in-Aid of Research (\$1,500)
- 2017 Research Grant from the endowment for Dr. Marvin Hensley (\$8,900)
- 2015 – 2018 Research Grants from the endowment for John R. Shaver (2 grants, total \$2,150)

Fellowships

- 2019 – 2020 P.E.O. Scholar Award (\$15,000)
- 2018 – 2020 Michigan State University College of Natural Science fellowships
(3 awards, total \$19,500)
- 2014 – 2020 Michigan State University EEB fellowships (5 awards, total \$9,600)
- 2013 – 2018 National Science Foundation Graduate Research Fellowship (\$138,000)
- 2013 Michigan State University BEACON Top-Up Fellowship (\$5,000, declined)
- 2013 – 2019 Michigan State University Distinguished Fellowship (\$80,000)

Travel awards

- 2018 International Society for Behavioral Ecology Travel Award (\$500)
- 2017 Animal Behavior Society Graduate Student Travel Award (\$500)
- 2017 Michigan State University Zoology travel grant (\$300)
- 2015 – 2017 Michigan State University EEB travel grants (2 grants, total \$2,990)

Other awards

- 2020 EEB Distinguished Student Speaker (\$500)

PUBLICATIONS (* = mentored co-author)

Peer-reviewed journal publications

- 2023 **Montgomery TM**†, Lehmann KDS†, Gregg S*, Keyser K*, McTigue LE*, Beehner JC, Holekamp KE. Determinants of hyena participation in risky collective action. *Proceedings of the Royal Society B* 290: 20231390. doi: 10.1098/rspb.2023.1390
† = These two authors contributed equally to this work.
Featured in [Nature News & Views](#), [PNAS Front Matter](#), and [Wissenschaft.de](#).
- 2022 McCormick SK*, Laubach ZM, Strauss ED, **Montgomery TM**, Holekamp KE. Evaluating drivers of female dominance in the spotted hyena. *Frontiers in Ecology and Evolution* 10: 934659. doi: 10.3389/fevo.2022.934659
- 2022 Laubach ZM, Gering E, Yang E, **Montgomery TM**, Getty T, Holekamp KE. Associations between *Toxoplasma gondii* infection and steroid hormone levels in spotted hyenas. *International Journal for Parasitology: Parasites and Wildlife* 17: 53-59. doi: 10.1016/j.ijppaw.2021.11.007

- 2022 Greenberg JR, **Montgomery TM**, Holekamp KE, Beehner JC. Validation and effects of drying and prey hair on fecal hormone concentrations in spotted hyenas. *Journal of Mammalogy* 103: 394-406. doi:10.1093/jmammal/gyab168
- 2022 **Montgomery TM**, Greenberg JR, Gunson JL*, John K*, Laubach ZM, Nonnamaker E*, Person ES*, Rogers H*, Ronis EM*, Smale L, Steinfield KR*, Strong R*, Holekamp KE, Beehner JC. Measuring salivary cortisol in wild carnivores. *Hormones and Behavior* 137: 105082. doi: 10.1016/j.yhbeh.2021.105082
- 2021 Laubach ZM, Greenberg JR, Turner JW, **Montgomery TM**, Pioon MO, Sawdy MA, Smale L, Cavalcante RG, Padmanabhan KR, Lalancette C, vonHoldt B, Faulk CD, Dolinoy DC, Holekamp KE, Perng W. Early-life social experience affects offspring DNA methylation and later life stress phenotype. *Nature Communications* 12: 4398. doi: 10.1038/s41467-021-24583-x
- 2021 Gering E, Laubach ZM, Weber PSD, Hussey GS, Lehmann KDS, **Montgomery TM**, Turner JW, Perng W, Pioon MO, Holekamp KE, Getty T. *Toxoplasma gondii* infections are associated with costly boldness toward felids in a wild host. *Nature Communications* 12: 3842. doi: 10.1038/s41467-021-24092-x
- 2018 **Montgomery TM**, Pendleton EL*, Smith JE. Physiological mechanisms mediating patterns of reproductive suppression and alloparental care in cooperatively breeding carnivores. *Physiology and Behavior* 193: 167-178. doi: 10.1016/j.physbeh.2017.11.006
- 2017 Smith JE, Lehmann KDS, **Montgomery TM**, Strauss ED, Holekamp KE. Insights from long-term field studies of mammalian carnivores. *Journal of Mammalogy* 98: 631-641. doi: 10.1093/jmammal/gyw194
- 2017 Lehmann KDS†, **Montgomery TM**†, MacLachlan SM*, Parker JM*, Spagnuolo OS*, VandeWetering KJ*, Bills PS, Holekamp KE. Lions, hyenas and mobs (oh my!). *Current Zoology* 63: 313-322. doi: 10.1093/cz/zow07
 † = These two authors contributed equally to this work.
- 2014 **Montgomery TM**, Brown AC, Gendelman HK*, Ota M*, Clotfelter ED. Exposure to 17 α -ethinylestradiol decreases motility and ATP in sperm of male fighting fish *Betta splendens*. *Environmental Toxicology* 29: 243-252. doi: 10.1002/tox.21752
- 2011 Stevenson LM, Brown AC, **Montgomery TM**, Clotfelter ED. Reproductive consequences of exposure to waterborne phytoestrogens in male fighting fish *Betta splendens*. *Archives of Environmental Contamination and Toxicology* 60: 501-510. doi: 10.1007/s00244-010-9561-y

Book chapters and other publications

- 2020 Gering E, Laubach Z, Weber P, Hussey G, Turner J, Lehmann K, **Montgomery T**, Holekamp K, Getty T. 2020. Time makes you older, parasites make you bolder - *Toxoplasma gondii* infections predict hyena boldness toward definitive lion hosts. *Evolution in Action: Past, Present and Future*. Springer Nature Switzerland. doi: 10.1007/978-3-030-39831-6_16.
- 2017 **Montgomery TM**, Holekamp KE. Dominance, testosterone, and cortisol. *Encyclopedia of Evolutionary Psychological Science*. Springer International Publishing. doi: 10.1007/978-3-319-16999-6_1439-1.

RESEARCH PRESENTATIONS

Invited talks

- 2023 Full-Stack Bioacoustics Workshop. Deploying a localization array of passive acoustic monitors in a seasonal Madagascar forest. Konstanz DE.
- 2023 Centre for the Advanced Study of Collective Behaviour Seminar Series. Social information transmission in the wild: How do prey collectively monitor and respond to predation risk? Konstanz DE & Online. Available [online](#).
- 2021 Max Planck Institute of Animal Behavior Seminar Series. Integrating resources, predation risk, and neighboring groups to understand movement choices. Konstanz DE.
- 2020 Long Term Animal Research Seminar Series. Long-term studies of spotted hyenas in Kenya. Online. Available [online](#).
- 2020 Michigan State University EEB Distinguished Student Speaker. Collective action in complex societies. East Lansing MI.
- 2016 University of Michigan Integrative Behavioral Ecology Discussion Group. Social endocrinology of competition and cooperation in spotted hyenas. Ann Arbor MI.

Conference presentations

- 2020 Holekamp KE, **Montgomery TM**, Strauss ED. Social competition and cooperation affect reproductive success of female spotted hyenas. Society for Integrative and Comparative Biology, Austin TX. Invited oral presentation.
- 2019 **Montgomery TM**, Lehmann KDS, Holekamp KE. Individual participation in cooperative mobbing behavior in spotted hyenas. Animal Behavior Society Conference, Chicago IL.
- 2018 **Montgomery TM**, Lehmann KDS, Holekamp KE. Individual participation in cooperative mobbing behavior. International Society of Behavioral Ecology Conference, Minneapolis MN.
- 2018 **Montgomery TM**, Beehner JC, Holekamp KE. Immediate benefits of social play behavior. Indiana University CISAB Animal Behavior Conference, Bloomington IN.
- 2017 **Montgomery TM**, Beehner JC, Holekamp KE. Adaptive function of social play behavior. Animal Behavior Society Conference, Toronto, Canada.
- 2015 Lehmann KDS, **Montgomery TM**, Holekamp KE. Cooperation and communication in spotted hyenas. Behaviour Conference, Cairns, Australia. Invited oral presentation.
- 2011 Clotfelter ED, Brown AC, **Montgomery TM**, Stevenson LM, Gendelman HK, Ota M. Reproductive consequences of exposure to waterborne phytoestrogens and ethinyl estradiol in male fighting fish *Betta splendens*. Society of Integrative and Comparative Biology Annual Meeting, Salt Lake City UT.

TEACHING and MENTORING

Primary instructor

- 2018 Behavioral Ecology of African Mammals (IBIO490), Kenya. Lead instructor. Redesigned and updated course, including syllabus, lectures, and assignments.
- 2017 Behavioral Ecology of African Mammals (IBIO490), Kenya. Instructor.

Graduate student instructor (TA)

- 2018 (spring) Ecology Lab (IBIO355L), Michigan State University. Lab instructor.
2017 (fall) Ecological Aspects of Animal Behavior (IBIO415), Michigan State University. Discussion instructor.
2017 (spring) Environmental Physiology (IBIO483), Michigan State University. Discussion instructor.

Invited guest lecturer

- 2018 – 2019 Ecological Aspects of Animal Behavior (IBIO415), Michigan State University.
2015 Behavioral Ecology of African Mammals (IBIO490), Kenya.

Undergraduate instructor (TA)

- 2010 (spring) Adaptation and the Organism (BIOL181), Amherst College. Teaching assistant.
2008 (spring) Chemical Principles (CHEM161), Amherst College. Teaching assistant.

Thesis supervision

- 2022 – 2023 Ann-Kathrin Pohle. MSc thesis, Universität Konstanz. Evaluating delayed benefits of juvenile social play in spotted hyenas.

Mentoring and advising (* = pursued independent research projects with me)

- 2022 – pres. Max Planck ARTEMIS: African Research Talents Experiencing Mentoring in Science (Pierrot Ramanamandimby*). Organized international visit and taught Intro to R workshop for a group of African PhD students as part of this program.
2022 – pres. Graduate research assistants from Université d'Antananarivo, Madagascar (Harinjara Rafaliarintsoa*, Jean-Claude Razafimampandra, Haja Fabrice Razafindrabe*)
2021 – pres. Undergraduate and post-baccalaureate research assistants from Universität Konstanz (Axel Bauer, Miriam Dietrich, Alexia Freude, Selina Grosse, Ann-Kathrin Pohle, Svenja Sausen, Kevin Schuster, Maximiliane Ziefle)
2021 – pres. Animal Behaviour Collective (Nathalia Bustamante, Anuska Mohapatra)
2014 – 2020 14 mentee-led conference posters presented at American Society of Mammalogists Annual Meeting, Animal Behavior Society Conference, Mid-Michigan Symposium for Undergraduate Research Experiences, and University Undergraduate Research and Arts Forum. Two posters by different mentees won a First Place Award (each \$100).
2014 – 2020 Undergraduate research assistants from Michigan State University (Kylie Ayers, Ally Brown, Hanna Burton, Ashley Dunn*, Rachel Gaines, Kara Hartunian, Jenna Parker, Sara Saikalis, Olivia Spagnuolo, Kelsey VandeWetering)
2019 SROP: Summer Research Opportunities Program (Jessica Calvario*)
2018 – 2019 MI-LSAMP: Michigan Louis Stokes Alliance for Minority Participation Program (Candice Rivers*)
2016 – 2019 Professorial Assistantship Program (Julie Javorka*, Abby Shaw, Eliza Turnage)
2014 – 2016 Beckman Scholars Program (Sarah MacLachlan*)

2014 – 2015 NSF IRES: International Research Experience for Students Program (Matt Farr, Spencer Freeman, Molly McEntee, Chase O'Neil, Heidi Rogers, Ashlei Tinsley)

Professional development (only full-day or longer experiences included)

2024 Sign up! Career Building Program. Full-year professional development program for female postdocs pursuing an academic career.

2022 Laboratory Animal Science Course on Non-Human Primates. Five-day FELASA certification course about ethics and welfare in primate research.

2021 Advanced Wilderness First Aid Course. Four-day course by Outdoor Schule Süd.

2019 (spring) Teaching College Science (ISE870). Semester-long class.

2019 Graduate School Leadership Academy. 8-week professional development workshop series. Created mentoring expectations and assessment resource [guide](#).

2019 Natural Science Cultural Competency Training. Full-day workshop.

2018 Graduate School Leadership Summit. Full-day workshop.

2016 (fall) Professional Development (IBIO801). Semester-long class.

SERVICE and OUTREACH

Academic service

2023 – pres. Organizer for Gesellschaft für Primatologie Conference, Universität Konstanz.

2023 – pres. Institute Seminar Organization Committee, Max Planck Institute of Animal Behavior.

2022 – pres. Bücklestraße Social Hour Coordinator, Max Planck Institute of Animal Behavior.

2018 – pres. Reviewer for *American Journal of Primatology*, *Animals*, *Behavioral Ecology and Sociobiology*, *Biology Letters*, *Conservation Physiology*, *Hormones and Behavior*, *Integrative and Comparative Biology*, *Journal of Mammalogy*, *Theriogenology Wild*.

2021 – 2022 Diversity Committee, Centre for the Advanced Study of Collective Behaviour.

2020 – 2021 Contributor to Open Data Science workshop and Github, Max Planck Institute of Animal Behavior.

2019 – 2020 Graduate student representative, EEB Academic Program Committee, Michigan State University.

2019 Updated departmental best practices in graduate mentoring and redesigned departmental annual progress report for Integrative Biology (found [here](#)). Contributed to Michigan State University Graduate School Mentoring Implementation [Toolkit](#).

2018 – 2019 Graduate student representative, Integrative Biology Department Meetings, Michigan State University.

2017 – 2018 Graduate student representative, Integrative Biology Graduate Affairs Committee, Michigan State University.

Public outreach

2022 [Field Perspectives](#). Founder of a blog that aims to promote safe, inclusive, and diverse field research.

- 2016 – 2020 [Biology on Tap](#), Lansing MI. Founder and organizer of a monthly pub talk series.
- 2014 – 2019 Michigan State University Science Festival, East Lansing MI. Leader/presenter of public workshops about evolution in action, and designer/presenter of interactive activities.
- 2014 – 2019 Girls Math & Science Day, East Lansing MI. Designer/presenter of interactive activities for girls in grades 6-8 about field research.
- 2014 – 2019 Darwin Discovery Day at the Michigan State University Museum, East Lansing MI. Designer/presenter of interactive activities for K-12 students about biology.
- 2014 – 2018 Potter Park Zookambi, Lansing MI. Teacher at a zoo-sponsored field ecology summer camp for grades 8-12.
- 2014 – 2015 Learning to Love Hyenas, Maasai Mara, Kenya. Presenter of weekly educational talks about spotted hyena biology at tourist lodges.
- 2014 – 2015 Mara Hyena Project blog and Instagram, Maasai Mara, Kenya.
- 2008 – 2010 Beneski Museum of Natural History, Amherst MA. Collections assistant and museum tour guide.

SKILLS

Field: behavioral data collection, biological sample collection and storage, animal immobilization and collaring, field camp and vehicle maintenance, international permitting

Lab: hormone extraction from feces and saliva, radio- and enzyme-immunoassays (validation and assay)

Software: Adobe Audition, BORIS, MS Access, MS Office, R, QGIS

Languages: English (native), French (advanced), German (basic), Swahili (basic)