

ZACHARY M. LAUBACH, PHD

Department of Ecology and Evolutionary Biology
University of Colorado, Boulder
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EXECUTIVE SUMMARY

Current position: Research Associate, Department of Ecology & Evolutionary Biology, University of Colorado Boulder; Co-Director, The Mara Hyena Project

Research interests: Behavioral ecology, Evolution, Functional genomics, Causal inference

Extramural funding as PI:

- *Pending:* NSF Long Term Research in Environmental Biology (LTREB) DEB140885)
- *Current:* NSF Postdoctoral Research Fellowship in Biology, DBI 2010607 (2021-2024)
- *Completed:* Morris Animal Foundation Postdoctoral Fellowship D19ZO-411 (2019-2021); NSF Doctoral Dissertation Improvement Grant (DDIG) 1701384 (2017 - 2019)

Productivity: 21 peer-reviewed journal articles (11 as 1st author) and 3 book chapters (2 as 1st author), h-index 11

APPOINTMENTS

Res. Assoc.	<i>University of Colorado, Boulder</i> Department of Ecology and Evolutionary Biology	2024 - Current
Postdoc	<i>University of Colorado, Boulder</i> Department of Ecology and Evolutionary Biology Mentors: Drs. Rebecca Safran (CU Boulder) & Kim Hoke (CSU)	2020 - 2024
Asst. Res. Scientist	<i>Michigan Technological University</i> Michigan Technological Research Institute	2012 - 2013
Res. Asst.	<i>Michigan State University</i> Mara Hyena Project	2010 - 2011

EDUCATION

PhD	<i>Michigan State University</i> (Dual degree PhD) Department of Integrative Biology Program in Ecology, Evolution, and Behavioral Biology Advisor: Dr. Kay E. Holekamp	2019
MS	<i>University of Michigan</i> School of Natural Resources and Environment Conservation Biology Advisors: Dr. Johannes Foufopoulos and Dr. Bobbi Low	2010
BS	<i>Juniata College</i> Environmental Science Advisor: Dr. Uma Ramakrishnan	2007

GRANTS

NSF Long Term Research in Environmental Biology (LTREB) DEB140885 (pending) LTREB: Elucidating mechanisms mediating phenotypic responses to rapid urbanization. PI: Z. M. Laubach , Co-PI: K. E. Holekamp, L. Johnson-Ulrich, D. R. Schield	\$599,954
NSF Postdoctoral Research Fellowship Biology (PRFB), DBI 2010607 (2021 - 2024) Longitudinal and experimental tests of a Rule of Life in animals: Variation in parental care establishes lifelong patterns of DNA methylation associated with physiological stress. PI: Z. M. Laubach Mentors: R. J. Safran, K. L. Hoke	\$207,000
• Includes receipt for 1-year of supplemental funding from 2023-2024	
Morris Animal Foundation Postdoctoral Fellowship D19ZO-411 (2019 - 2021) Pastoralist communities as a potential source of <i>Toxoplasma gondii</i> infection in a wild carnivore and effects on host behavior and survival. PI: Z. M. Laubach Mentor: K. E. Holekamp	\$100,000
BEACON - NSF DBI 0939454 (2018 – 2019) Impacts of brain-manipulating parasites on host fitness and social behavior. PI: C. Adami Co-Is: E. Gering, T. Getty, A. Hintze, Z. M. Laubach	\$90,132
NSF Doctoral Dissertation Improvement Grant (DDIG) 1701384 (2017 - 2019) Early social experience and epigenetic mediation of adult phenotypes. PI: Z. M. Laubach Mentor: K. E. Holekamp	\$20,151
BEACON - NSF DBI 0939454 (2015 - 2016) Trans-generational epigenetic inheritance in living and digital hyenas PI: K. E. Holekamp Co-Is: R. Miikkulainen, Z. M. Laubach , A. Hintze, E. Meyerson	\$161,326

PUBLICATIONS (* Indicates authors contributed equally)

In prep, review, or revision

24. Madden, S. A., Safran, R. J., Garcia, S., Pardue, A., Particelli, G. L. and **Laubach, Z. M.** (in prep.) Effects of nest temperature on Barn Swallow nestling growth depend on social environment.
23. Watowich, M.* , Weibel, C. J. * , Carrera, S. C., Kulachi, I. G., Levy, E., Lucci, S., Ortiz-Ross, X., Patterson, S. K., Strauss, E. D., Tuosto, K., Zippel, M. N., Lea, A. J., Lange, E. C.* , **Laubach, Z. M.*** (in revision) *Proceedings of the Royal Society B*. A systematic review of early-life effects in wild vertebrate populations.
22. **Laubach, Z. M.**, Madden, S. A., Pardue, A., and Safran, R. J. (in revision) *The American Naturalist*. Parental care modifies the roles of size and growth in the development of early-life physiology.

Published

2024

21. **Laubach, Z. M.***, Bozack, A. K., Aris, I. M., Slopen, N., Tiemeier, H., Hivert, M. F., Cardenas, A., and Perng, W.* 2024. Maternal prenatal social experiences and offspring epigenetic age acceleration from birth to mid-childhood. *Annals of Epidemiology*.
 - Featured in [The Denver Post](#)
 - Featured interview on [EPI Talk Podcast](#)
 - Featured in [CU Boulder Today](#)
20. Choudhary, P.*, Monasso, G.*, Karhunen, V., Ronkainen, J., Mancano, G., Howe, C. G., Niu, Z., Zeng, X., Guan, W., Dou, J., Feinberg, J.I, Mordaunt, C., Pesce, G., Baiz, N., Alfano, R., Martens, D., Wang, C., Isaevska, E., Keikkala, E., Mustaniemi, S., Thio, C. H. L., Fraszczyk, E., Tobi, E. W., Starling, A. P., Cosin-Tomas, M., Urquiza, J., Röder, S., Hoang, T. T., Page, C., Jima, D. D, House, J. S., Maguire, R. L., Ott, R., Pawlow, X., Sirignano, L., Zillich, L., Malmberg, A., Rauschert, S., Melton, P., Gong, T., Karlsson, R., Fore, R., Perng, W., **Laubach, Z. M.**, Czamara, D., Sharp, G., Breton, C. V., Schisterman, E., Yeung, E., Mumford, S. L., Fallin, M. D., LaSalle, J. M., Schmidt, R. J., Bakulski, K. M., Annesi-Maesano, I., Heude, B., Nawrot, T. S., Plusquin, M., Ghantous, A., Herceg, Z., Nisticò, L., Vafeiadi, M., Kogevinas, M., Vääräsmäki, M., Kajantie, E., Snieder, H., Corpeleijn, E., Steegers-Theunissen, R. P. M., Yang, I. V., Dabelea, D., Fossati, S., Zenclussen, A. C., Herberth, G., Magnus, M., Håberg, S. E., London, S. J., Munthe-Kaas, M. C., Murphy, S. K., Hoyo, C., Ziegler, A. G., Hummel, S., Witt, S. H., Streit, F., Frank, J., Rääkkönen, K., Lahti, J., Huang, R., Almqvist, C., Hivert, M., Jaddoe, V. W. V., Järvelin, M., Kantomaa, M., Felix, J. F., Sebert, S. 2024. Maternal education attainment in pregnancy and epigenome-wide DNA methylation changes in the offspring from birth until adolescence. *Molecular Psychiatry*. DOI: 10.1038/s41380-023-02331-5

2023

19. McDermott, M. T., Madden, S. A., **Laubach, Z. M.**, Ayala, M. J., and Safran, R. J. 2023. Females with increased costs maintain reproductive output: A field experiment in a common songbird. *Integrative and Comparative Biology*. 63, 1. DOI: 10.1093/icb/icad042
18. Bozack, A. K., Rifas-Shiman, S. L., Gold, D. R., **Laubach, Z. M.**, Perng, W., Marie-France Hivert, M., Cardenas, A., 2023. DNA methylation age at birth and childhood: performance of epigenetic clocks and characteristics associated with epigenetic age acceleration in the Project Viva cohort. *Clinical Epigenetics*. 15, 62. DOI: 10.1186/s13148-023-01480-2.

2022

17. McCormick, K., **Laubach, Z. M.**, Strauss, E., Montgomery, T. M., and Holekamp, K. E. 2022. Evaluating multiple drivers of female dominance in spotted hyenas. *Frontiers in Ecology and Evolution*. DOI: 10.1098/rsbl.2022.0194.
16. **Laubach, Z. M.**, Holekamp, K. E., Aris, I. M., Slopen, N., and Perng, W. 2022. Applications of lifecourse epidemiology conceptual models in ecology and evolutionary biology. *Biology Letters*. 18: 7. DOI: 10.1098/rsbl.2022.0194.
15. Montgomery, T. M., Greenberg J. R., Gunson, J. L., John, K., **Laubach, Z. M.**, Nonnamaker, E., Person, E. S., Rogers, H., Ronis, E., Smale, L., Steinfield, K., Strong, R., Holekamp K. E., Beehner, J. C. 2022. Measuring salivary cortisol in wild carnivores. *Hormones and Behavior*. DOI:10.1016/j.yhbeh.2021.105082.
14. **Laubach, Z. M.**, Gering, E., Yang, E., Montgomery T. M., Getty, T., and Holekamp K. E. 2022. Associations between *Toxoplasma gondii* infection and steroid hormone levels in spotted hyenas. *International Journal for Parasitology: Parasites and Wildlife*. DOI: 10.1016/j.ijppaw.2021.11.007.

2021

13. Ayala, M. J.*, Carter, J. K.*, Fachon, A.*, Flaxman, S. M.*, Gil, M. A.*, Kenny, H.*, **Laubach, Z. M.***, Madden S. A.*, McDermott, M. T.*, Medina-García, A.*, Safran R. J.*, Scherner, E.*, Schield, D. R.*, Vasquez-Rey, S.*, Volckens, J. S.* 2021. Belonging in STEM: An interactive, iterative approach to create and maintain a diverse learning community. *Trends in Ecology & Evolution*. DOI: 10.1016/j.tree.2021.08.004
 - Featured in [CU Boulder Colorado Arts and Sciences Magazine](#)
12. **Laubach, Z. M.**, Greenberg, J. R., Turner, J. W., Montgomery, T. M., Pioon, M. O., Sawdy, M. A., Smale, L., Cavalcante, R. G., Padmanabhan, K. R., Lalancette, C., vonHoldt, B., Faulk, C. D., Dolinoy, D. C., Holekamp, K. E., and Perng, W. 2021. Early-life social experience affects offspring DNA methylation and later life stress phenotype. *Nature Communications*. DOI: 10.1038/s41467-021-24583-x.
 - Featured in [Nature Portfolio Ecology & Evolution Community](#)
 - Featured in [Inverse](#)
 - Featured in [Epigenie](#)
 - Featured in [CU Boulder Today](#)
 - Featured in [MSU College of Natural Science](#)
11. Gering, E.*, **Laubach, Z. M.***, Weber, P., Hussey, G. S., Lehmann, K. D. S., Montgomery, T. M., Turner, J. W., Perng, W., Pioon, M. O., Holekamp, K. E., and Getty, T. 2021. *Toxoplasma gondii* infections are associated with boldness towards lions in wild hyena hosts. *Nature Communications*. DOI: 10.1038/s41467-021-24092-x.
 - Featured in [National Geographic](#)
 - Featured in [Science Daily](#)
 - Featured in [Ethologisch](#)
 - Featured in [CU Boulder Today](#)
 - Featured in [MSU Today](#)
10. **Laubach, Z. M.**, Murray, E. J., Hoke, K. L., Safran, R. J. Perng, W. 2021. A biologist's guide to model selection and causal inference. *Proceedings of the Royal Society B*. DOI: 10.1098/rspb.2020.2815.

2020

9. Spagnuolo, O. S. B., Jarvey, J. C., Battaglia, M. J., **Laubach, Z. M.**, Miller, M. E., Holekamp, K. E., Bourgeau-Chavez, L. L. 2020. Mapping Kenyan grassland heights across large spatial scales with combined optical and radar satellite imagery. *Remote Sensing*. DOI: 10.3390/rs12071086.

2019

8. **Laubach, Z. M.***, Perng, W.*, Cardenas, A., Rifas-Shiman, S. L., Oken, E., DeMeo, D., Litonjua, A. A., Duca, R. C., Godderis, L., Baccarelli, A., Hivert, M. F. 2019. Socioeconomic status and DNA methylation from birth through mid-childhood: A prospective study in Project Viva. *Epigenomics*. DOI: 10.2217/epi-2019-0040
7. **Laubach, Z. M.**, Faulk, C. D., Dolinoy, D. C., Montrose, L., Jones, T. R., Ray, D., Pioon, M. O., Holekamp, K. E. 2019. Early life social and ecological determinants of global DNA methylation in wild spotted hyenas. *Molecular Ecology*. DOI: 10.1111/mec.15174

2018

6. **Laubach, Z. M.**, Perng, W., Dolinoy, D. C., Faulk, C. D., Holekamp, K. E., Getty, T. 2018. Epigenetics and the maintenance of developmental plasticity: extending the signaling theory framework. *Biological Reviews*. DOI: 10.1111/brv.12396

2013-2016

5. Bourgeau-Chavez, L., Lee, Y. M., Battaglia, M., Endres, S., **Laubach, Z. M.**, Scarbrough, K. 2016. Identification of woodland vernal pools with seasonal change PALSAR data for habitat conservation. *Remote Sensing* 8 (6): 490. DOI: 10.3390/rs8060490

2013-2016 cont'd

4. **Laubach, Z. M.**, Perng, W., Lombardo, M., Murdock, C. C., & Foufopoulos, J. 2015. Determinants of parental care in Mountain white-crowned sparrows (*Zonotrichia oriantha*). *The Auk: Ornithological Advances* 132: 893-902. DOI: 10.1642/AUK-15-9.1
3. Bourgeau-Chavez, L., Endres, S., Battaglia, M., Miller, M., Banda E., **Laubach, Z. M.**, Higman, P., Chow-Fraser, P., and Marcaccio, J. 2015. Development of a bi-national Great Lakes coastal wetland and land use map using three-season PALSAR and Landsat imagery. *Remote Sensing* 7: 8655-8682. DOI: 10.3390/rs70708655
2. **Laubach, Z. M.**, Sampson, G., Blumstein, D. T., Romero, L. M., & Foufopoulos, J. 2013 Are white-crowned sparrow badges reliable signals? *Behavioral Ecology and Sociobiology* 67: 481-492. DOI: 10.1007/s00265-012-1468-3.
1. Bourgeau-Chavez, L. L., Kowalski, K. P., Carlson Mazur, M. L., Scarbrough, K. A., Powell, R. B., Brooks, C. N., Huberty, B., Jenkins, L. K., Banda, E. C., Galbraith, D. M., **Laubach, Z.M.**, and Riordan, K. 2013 Mapping invasive *Phragmites Australis* in the coastal Great Lakes with ALOS Palsar satellite imagery for decision support. *Journal of Great Lakes Research* 39: 65-77. DOI: 10.1016/j.jglr.2012.11.001

BOOK CHAPTERS AND INVITED REVIEWS / COMMENTARIES

Book Chapters

3. Gering, E.*, **Laubach, Z. M.***, Weber, P., Hussey, G. S., Turner, J., Holekamp, K. E., and Getty, T. 2020. Time makes you older, parasites make you bolder: *Toxoplasma gondii* infections predict hyena boldness toward definitive lion hosts in a human-altered landscape. In *Evolution in action: Past, present and future: A Festschrift in honor of Erik D. Goodman*. Wolfgang Banzhaf, Betty Cheng, Kalyanmoy Deb, Kay Holekamp, Richard Lenski, Charles Ofria, Robert Pennock, Bill Punch, Danielle Whittaker, Editors. Springer International Publishing. DOI: 10.1007/978-3-030-39831-6
2. **Laubach, Z. M.**, Faulk, C. D., Cardenas, A., Perng, W. 2017. Nutrition, DNA methylation, and developmental origins of cardiometabolic disease: A signal systems approach. Chapter 6 in *Handbook of Nutrition, Diet and Epigenetics*. Vinood Patel and Victor Preedy, Editors. Springer Publishers. DOI: 10.1007/978-3-319-31143-2_107-1
1. Bourgeau-Chavez, L. L., **Laubach, Z. M.**, Battaglia, M. J., Landon, A. J., Banda E. C., Endres, S. L., Macleod, R., Miller, M. E., and Brooks, C. N. 2015. Great Lakes Coastal Wetland Mapping. Chapter 15 in *Remote Sensing of Wetlands: Applications and Advances*. R. Tiner, V. Klemas and M. Lang, Editors. Taylor and Francis Publishers. DOI: 10.1201/b18210-19

AWARDS / FELLOWSHIPS

- University of Colorado, Boulder Outstanding Postdoc of the Year Award - 2023
- Evolutionary, Ecological, or Conservation Genomics (EECG) Research Award
American Genetic Association (AGA) - 2022 \$6000
- Animal Behavior Society Student Research Grant - 2019 \$1500
- BEACON Travel Award, Michigan State University - 2014, 2018, 2019 \$600
- College of Natural Science Dissertation Completion Fellowship,
Michigan State University (2019) \$6000
- Dr. Marvin Hensley Endowed Scholarship in Zoology, Michigan State University - 2018 \$8700
- Graduate School Research and Travel Fellowship, Michigan State University - 2018 \$1500
- Ecology, Evolutionary Biology and Behavior Program Travel Fellowship,
Michigan State University - 2018 \$1000
- Society for Integrative and Comparative Biology (SICB), Grants-in-aid of Research - 2016 \$1000
- Ecology, Evolutionary Biology and Behavior Summer Fellowship, MSU - 2014-2017 \$1800/yr
- Dr. Marvin Hensley Endowed Scholarship in Zoology, Michigan State University - 2014 \$9165

- BEACON Science and Technology Center Top Up Fellowship, Michigan State University - 2013-2018 \$3000/yr
- School of Natural Resources Travel Grant, University of Michigan - 2010 \$200
- Midwest Ecology and Evolution Conference (MEEC) Travel Grant - 2010 \$200
- Rackham Conference Travel Grant (received twice), University of Michigan - 2010 \$600
- Dr. Lee R. G. Snyder Memorial Research Fellowship, Rocky Mountain Biological Laboratory - 2009 \$1,440
- Harold and Vivian Shapiro/John Malik Awards, University of Michigan - 2009 \$600
- Robbins/Shuman Award, Fulton Financial Advisors - 2008-2009 \$4,500
- Rackham Graduate Student Research Grant, University of Michigan - 2008 \$1,500
- School of Natural Resources and Environment Practicum/Thesis Research Award, University of Michigan - 2008 \$1,000
- Calvert Ellis Award, Juniata College - 2003-2007 \$40,000

INVITED SEMINARS

- | | | |
|---|--------------------------------------|------------|
| 3rd INAS-enKORE Workshop. Taming complexity in ecology: Novel approaches for theory development, enhanced argumentation, and knowledge synthesis.
<i>Applying causal inference in ecology and evolution.</i> | | 2024 |
| University of Pennsylvania
<i>Early-life determinants of future phenotype: the role of developmental plasticity and life history trade-offs.</i> | Department of Biology Seminar Series | 2024 |
| University of Colorado, Boulder
<i>Developmental plasticity and life-history trade-offs involving early-life effects.</i> | Evolutionary Biology Colloquium | 2023 |
| North Carolina State University
<i>Spotted hyena research and health.</i> | College of Veterinary Medicine | 2020, 2022 |
| Eastern Michigan University
<i>The Developmental Origins of Health and Disease (DOHaD) hypothesis: A step into the wild.</i> | Department of Biology | 2018 |
| Michigan Tech. Research Institute
<i>Random Forests: An Overview of What, Why, How, and When</i> | | 2012 |
| Michigan Tech. Research Institute
<i>MSU Hyena Research Project: A Slice from a Long-term Study in the Masai Mara Kenya</i> | | 2012 |

PRESENTATIONS

Platform presentations

- Laubach, Z. M.** 2024. Causation and confounders and colliders, AI! A yellow brick road through a forest of observational data. *Animal Behavior Society*, Western University, London, Ontario.
- Laubach, Z. M.**, Madden, S. A., Pardue, A., and Safran, R. J. 2023. Small size and low parental care contribute to the development of offspring physiology. *American Society of Naturalists*, Asilomar, CA.
- Laubach, Z. M.**, Madden, S. A., Pardue, A., Hoke, K., and Safran, R. J. 2022. The effects of offspring size and parental care on development of offspring physiology. *Animal Behavior Society*, Costa Rica / virtual.

- Laubach, Z. M.**, Gering, E., Yang, E., Montgomery, T. M., & Holekamp, K. E. 2021. Associations between *Toxoplasma gondii* infection and steroid hormone levels in spotted hyenas. *Animal Behavior Society, Virtual Conference*.
- Laubach, Z. M.** Murray, E. J., Hoke, K. L., Safran, R. J. Perng, W. 2021. A biologist's guide to model selection and causal inference. *American Society of Naturalists, Virtual Asilomar*.
- Laubach, Z. M.** 2020. Early social experiences contribute to DNA methylation and development of future stress phenotype. *Early Life Adversity, Virtual Conference*.
- Laubach, Z. M.**, Cavalcante, R., Dolinoy, D. C., Faulk, C., Greenberg, J., Lalancette, C., Montgomery, T., Padmanabhan, K., Perng, W., Pioon, M., Smale, L., Turner, J., vonHoldt, B., & Holekamp, K. E. 2020. Early social experiences contribute to DNA methylation and development of future stress phenotype. *Animal Behavior Society, Virtual Conference*.
- Laubach, Z. M.**, Faulk, C., Dolinoy, D. C., Montrose, L., & Holekamp, K. E. 2019. Associations of early life environment and DNA methylation in wild spotted hyenas. *Animal Behavior Society*. Chicago, IL.
- Laubach, Z. M.**, Faulk, C., Montrose, L., Greenberg, J., Dolinoy, D. C., & Holekamp, K. E. 2017. Associations of early-life social experience with DNA methylation in free-living spotted hyenas. U.S. *DOHaD*. Detroit, MI.
- Laubach, Z. M.** 2017. Epigenetics and phenotypic plasticity: An extension of a signal detection problem. MSU, EEBB Colloquium, East Lansing, MI.
- Laubach, Z. M.**, Faulk, C., Dolinoy, D. & Holekamp, K. E. 2015. Measuring glucocorticoid receptor DNA methylation in Spotted Hyenas. *BEACON Congress*. Michigan State University, East Lansing, MI.
- Laubach, Z. M.**, Faulk, C., Dolinoy, D., Sant, K., & Holekamp, K. E. 2014. Social environment, epigenetics and stress response: an ethological extension in Spotted Hyenas. *Animal Behavior Society (51st Anniversary Meeting)*. Princeton University, Princeton, NJ.
- Laubach, Z. M.**, Faulk, C., Dolinoy, D., & Holekamp, K. E. 2014. Social environment, epigenetics and stress physiology in Spotted Hyenas. *Fish and Wildlife Graduated Student Organization Research Symposium*. Michigan State University, Lansing, MI.
- Laubach, Z. M.**, Blumstein, D. T., Romero, L. M., & Foutopoulos, J. 2013. A test of status badge reliability in Mountain white-crowned sparrows. *Animal Behavior Society (50th Anniversary Meeting)*. University of Colorado Boulder, CO.
- Laubach, Z. M.**, Sampson, G., Blumstein, D. T., Romero, L. M., & Foutopoulos, J. 2010. Functional importance of a plumage badge in intraspecific signaling in white-crowned sparrows. *Ecological Society of America Conference (95th ESA Annual Meeting)*. Pittsburgh, PA.
- Laubach, Z. M.**, Sampson, G., Blumstein, D. T., Romero, L. M., & Foutopoulos, J. 2010. Functional importance of plumage characteristics (design and costs) as intraspecific signals in mountain white-crowned sparrows (*Zonotrichia leucophrys oriantha*). *Midwest Ecology and Evolution Conference*. Aimes, IA.
- Laubach, Z. M.**, Blattenberg, C., Pelkey, N. & Ramakrishan, U. 2007. An Evaluation of Nocturnal and Diurnal Behavior by Male White-tailed Deer using GPS Collar Data. *Northeast Fish and Wildlife Conference*. Mystic, CT.
- Laubach, Z. M.**, Blattenberg, C., Pelkey, N. & Ramakrishan, U. 2007. An Evaluation of Nocturnal and Diurnal Behavior by Male White-tailed Deer using GPS Collar Data. *Juniata Liberal Arts Symposium*. Huntingdon, PA.
- Laubach, Z. M.** & Ramakrishan, U. 2005. Applications in Wildlife Research: Deer Density and Habitat Monitoring. *Appalachian GIS Convention*. California University of Pennsylvania. California, PA.

Poster presentations

- Laubach, Z. M.**, Perng, W., Holekamp, K., Faulk, C., Dolinoy, D. C., Getty, T. 2017. The role of epigenetics in phenotypic plasticity: an extension of signal detection theory. *1st Annual Research Symposium (Ecology, Evolutionary Biology and Behavior Program)*. Michigan State University, East Lansing, MI
- Laubach, Z. M.**, Perng, W., Holekamp, K., Faulk, C., Dolinoy, D. C., Getty, T. 2017. The role of epigenetics in phenotypic plasticity: an extension of signal detection theory. *13th Annual Early Career Scientists Symposium (Ecology and Evolutionary Biology of Phenotypic Plasticity)*. University of Michigan, Ann Arbor, MI
- Laubach, Z. M.**, Walker, A. & Ramakrishan, U. 2007. GIS Application in Wildlife Research: A Comparison between Home Range Extension and Hawth's Analysis Tools. *Pennsylvania Wildlife Society Conference*. State College, PA.

Guest Lectures

University of Colorado, Boulder	EBIO 5460, Causal Inference in Ecology	2023
	<i>A biologist's guide to model selection and causal inference</i>	
Macalester College	Wildlife Disease Ecology Seminar	2022
	<i>T. gondii infections in spotted hyenas: Boldness towards lions and hormonal correlates</i>	
Lincoln University	Research in Health Science	2021
	<i>An overview of research: Personal experiences with spotted hyenas and some general guidelines</i>	
University of Colorado, Boulder	The biology of Sex and Gender	2020
	<i>Social biology and sex roles: A case study in spotted hyenas.</i>	
University of Colorado, Anschutz	Advanced Epidemiology	2019-2021
	<i>Evolutionary perspectives in public health.</i>	
Nova Southeastern University	Biology	2020
	<i>Epigenetics and behavioral ecology of spotted hyenas.</i>	
Michigan State University	Evolution	2017, 2018
	<i>Evolution of social behavior and group living</i>	
Michigan State University	BrlnC Club	2017
	<i>How to read a scientific paper</i>	
Michigan State University	Ecological Aspects of Animal Behavior	2016, 2017
	<i>Associations of early-life social experience with DNA methylation in free-living spotted hyena</i>	
Juniata College	Animal Behavior	2013
	<i>The Evolution of Spotted Hyena Sociality: Lessons from a Long-Term Field Study</i>	
University of Michigan	Field Mammalogy	2012
	<i>MSU Hyena Research Project: A Slice from a Long-Term Study in the Masai Mara Kenya</i>	

TEACHING

Diversity and Inclusion (EBio 5190)	Co-Instructor (CU)	2024
Introduction to Data Management and Analysis for Biologists and Behavioral Scientists	Instructor (MSU)	2018
Behavioral Ecology of African Mammals (IBio 490)	Co-Instructor (MSU)	2017 - 2018
Evolution (IBio 445)	TA (MSU)	2017 - 2018
Ecological Aspects of Animal Behavior (IBio 415)	TA (MSU)	2016
Organismal and Population Biology Laboratory (Bio 172)	TA (MSU)	2013 - 2014
Animal Physiology Laboratory (Bio 226)	TA (U Mich.)	2008 - 2009

Mentorship (* Indicates mentees from underrepresented groups in STEM)

Graduate Students

*Sara Garcia	PhD, University of Colorado, Boulder	2021 - current
*Sage Madden	PhD, University of California, Davis	2021 - current
*Marsden Onsare	MS, University of Nairobi, Kenya	2021 - current
*Timothy Ikime	MS, Michigan State University	2014 - 2015

(provided one-on-one analytical consulting for 2 additional graduate students at MSU)

Undergraduate students

*Aleea Pardue	University of Colorado	2021 - 2022
*Mariana J. Ayala	University of Colorado	2020 - 2021
*Genevieve Redgate	Michigan State University	2017 - 2019
*Karee Lesko	Michigan State University	2017 - 2018
*Lila Afifi	Michigan State University	2017 - 2018
*Emily Bernhardt	Michigan State University	2015 - 2018
*Alyse Maksimoski	Michigan State University	2017
*Caroline Titel	Michigan State University	2016 - 2017
*Jessica Sattler	Michigan State University	2016 - 2017
*Haley Fulco	Michigan State University	2016
*Katherine Steinfield	Michigan State University	2016

(oversaw research experience for 20 additional students while at MSU)

PROFESSIONAL SOCIETY MEMBERSHIPS

American Society of Naturalists (ASN)	2020 - present
Animal Behavior Society (ABS)	2013 - present
American Genetic Association (AGA)	2022 - present
Society for Integrative and Comparative Biology (SICB)	2014 - 2018
U.S. Developmental Origins of Health and Disease (DOHaD)	2017 - 2018

Service

Diversity, Equity, and Inclusion

- Co-Instructor of a Diversity and Inclusion Seminar.** A one-credit seminar to support diversity and inclusion in the Ecology and Evolutionary Biology Department. The seminar is highly interactive and discussion-based, with the goal of producing a product that improves DEI by the end of the semester. Outcomes from seminars have included creating a proposal to eliminate the GRE from the graduate application (which was successful), building out an EBIO hiring guide, improving DEI related elements of the EBIO website, and making the program more welcoming and supportive for international students. 2024
- Improving a sense of belonging in STEM.** A collaboration with a survey statistician to develop a survey and an interactive, iterative process to foster and maintain diversity in small learning communities, published in *TREE*. 2021
- Workshop developer and director** for an *Introduction to Data Management And Analysis for Biologists and Behavioral Scientists*, a collaboration with The African Graduate Student Association and MasterCard Foundation Scholars at Michigan State University; a workshop series attended by 16 Graduate students representing multiple Sub-Saharan African countries as well as 5 undergraduate women in science. 2018
https://github.com/laubach/data_mangmnt_analysis_tutorial

National/International Service

- Morris Animal Foundation Wildlife Fellowship Science Advisory Board** 2024 - current
- NSF ad hoc reviewer** 2021 - current
- Animal Behavior Society Student Grants ad hoc reviewer** 2023
- Poster judge** for American Society of Naturalists, Asilomar Conference 2023
- American Genetic Association Blog Authorship** 2022
[Evolutionary, Ecological, and Conservation Genomics Embarkation: Experiences in early life influence development of future phenotypes](#)
- Session Organizer** for American Society of Naturalist Asilomar virtual conference 2021, 2023
- Session Moderator** for Animal Behavior Society Meeting 2019, 2021
- Reviewer** for: *Biological Reviews, Pediatric Obesity, Molecular Ecology, PLOS One, Annals of Epidemiology, Biology Letters, Functional Ecology, Communications Biology, Journal of Animal Ecology, Epigenomics, Molecular Ecology Resources, Molecular Biology and Evolution, Behavioral Ecology and Sociobiology, Global Ecology and Conservation, Evolutionary Ecology, The Northeastern Naturalist, The Wilson Journal of Ornithology, Ethology*

Institutional Service

- Judge** Michigan State University Undergraduate Research and Arts Forum (UURAF) 2017, 2018
- Judge** Michigan State University Integrative Biology undergraduate award applications 2018

Course Developer/Instructor Michigan State University R workshop African Graduate Student Association: Introduction to Data Management and Analysis for Biologists and Behavioral Scientists	2018
Blog Authorship: <i>BEACON: An NSF Center for the Study of Evolution in Action,</i> <i>Notes From Kenya: MSU Hyena Research</i>	
Session Moderator for BEACON Congress	2015
Judge Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE)	2015
Career Panelist MSU Integrative Biology of Social Behaviors (IBSB) REU Students	2015
Graduate Student Representative MSU Zoology Graduate Affairs Committee	2013 - 2014
Public Outreach Volunteer Michigan State University Darwin Day at the Museum	2014