**Molly A. Hirst, Ph.D.**

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Last update: 8 Dec 2023

**Education**

2016 - 2023 **Doctor of Philosophy in Ecology and Evolutionary Biology**

**Master of Science in Ecology and Evolutionary Biology** (embedded, 2018)

University of Michigan (UM), Ann Arbor, MI

Thesis: *On the evolution of sperm morphology and sperm-related genes in a howler monkey hybrid system*

Co-Advisors: Dr. Liliana Cortés Ortiz, Dr. Patricia J. Wittkopp

 Committee: Dr. Jacob L. Mueller, Dr. Cody W. Thompson

2011 - 2015 **Bachelor of Science in Biological Sciences,** High Distinction

 **Bachelor of Arts in Anthropology and French Studies,** High Distinction

 GPA: 3.83/4

University of Michigan-Dearborn, Dearborn, MI

 Research Advisor: Dr. Orin G. Gelderloos

2009 - 2011 **Associate in Science in Liberal Arts** (2012)

 GPA: 3.99/4

 Schoolcraft College, Livonia, MI

**Peer-Reviewed Journal Publications**

In prep. MA Hirst, A Inforzato, A Goldberg, P Domingues de Freitas, L Cortés-Ortiz. Using a new *Alouatta pigra* genome assembly to understand sperm-related gene divergence between sister species with different mating systems.

In prep. MA Hirst, AZ Rodas-Martínez, MD Baiz, D Canales-Espinosa, L Cortés-Ortiz. Directional bias in the occurrence of sperm morphological and testicular abnormalities in highly backcrossed howler monkey hybrids.

In revision MD Baiz\*, SK Campbell\*, MA Hirst\*. Primate hybrid zones as emerging models for understanding speciation in the genomic era. *American Journal of Primatology.*

 \*These authors contributed equally

2023 MA Hirst, AZ Rodas-Martínez, KM Milich, L Cortés-Ortiz. Differences in sperm morphology between *Alouatta palliata* and *Alouatta pigra* are consistent with the intensity of sperm competition in each species. *American Journal of Primatology,* e23538. <https://doi.org/10.1002/ajp.23538> PMID: 37487624

Biodiversity Publications

2022 JD Curlis, MA Hirst, A Curlis, D Curlis. Natural History Note: *Anolis carolinensis* habitat use. *The Herpetological Bulletin.* 53(2): 316-317.

2019 JD Curlis, MA Hirst, MD Baiz. Second observation of *Dermatemys mawii* in the upper Yucatán peninsula: a new population or an old individual? *The Herpetological Bulletin*. 149: 47-48.

**Conference Abstracts** (1st author only)

2023 Invited Symposium Presentation at the 29th International Primatological Society Congress, Virtual

2022 Midwest Primate Interest Group in Ann Arbor, MI

2022 Invited Symposium Presentation at the 28th International Primatological Society Congress in Quito, Ecuador

2021 Virtual Presentation at The Evolution Conference

2019 Podium Presentation at the Midwest Primate Interest Group Meeting in DeKalb, IL

2018 Poster at The Genetics Training Program Retreat in Ann Arbor, MI

2018 Poster at the 27th International Primatological Society Congress in Nairobi, Kenya

2017 Poster at The Genetics Training Program Retreat in Ann Arbor, MI

2017 Poster at The Evolution Conference in Portland, OR

2015 Poster at the UM – Dearborn CASL Undergraduate Research Showcase

2014 Poster at the UM – Dearborn Natural Sciences Research Symposium

2014 Poster at the UM – Dearborn CASL Undergraduate Research Showcase

2013 Podium Presentation at the Stewardship Network’s Science, Practice, and Art of Restoring Native Ecosystems Conference, Michigan State University in Lansing, MI

2013 Poster at the Michigan Academy Annual Conference, Hope College in Holland, MI

2013 Poster at the UM-Dearborn Natural Sciences Research Symposium

**Selected Data and Programming Skills**

I possess a diverse range of data and programming skills and experience, with a special focus on Big Data. My expertise includes generating, preparing, analyzing, visualizing, and presenting whole-genome data. In cloud computing, I am adept at managing high-performance clusters for big data (multiple terabytes), and I am experienced with various data storage environments like SQL databases and cloud storage solutions like the Great Lakes Cluster and slurm.

My programming proficiency spans across several languages: I am advanced in R, intermediate in Python, and have foundational skills in SQL. Additionally, I am adept at using the Linux command line. My statistical analysis capabilities are robust, encompassing multivariate and discriminant analysis, analysis of variance, principal component analysis, model development and selection, Bayesian genomic cline analysis, and general statistics.

I have also developed pipelines for processing whole-genome data from multiple individuals, a task that requires a deep understanding of both the technical and biological aspects of whole-genome analysis. This experience underscores my ability to handle complex data sets and extract meaningful insights from them.

**Teaching Assistantships and Guest Lectures**

2023 Guest Lecture for the Genetics Training Program, *UM*

2023 Guest Lecture for Molecular Anthropology (ANTHRBIO 450), *UM*

2019 Evolution (EEB 390), *UM*

2017 Genetics Laboratory (MCDB 306), *UM*

2016 Introductory Biology: Ecology, Genetics and Evolution (BIOL 171), *UM*

2011 Introductory Biology (BIO 101) Winter Semester, *Schoolcraft College*

2011 Introductory Biology (BIO 101) Summer Semester, *Schoolcraft College*

2010 Introductory Biology (BIO 101) Fall Semester, *Schoolcraft College*

**Mentoring**

2021 Pinqing Hu, undergraduate in EEB, mapping the *Alouatta* X-chromosome, *UM*

2018-19 Ecology and Evolutionary Biology “Big Sib” graduate student mentor, *UM*

2012-15 Rotating undergraduate students in the Gelderloos Lab, *UM-Dearborn*

**Research and Museum Fellowships and Assistantships**

2023 Graduate Student Curatorial Assistant: Mammals Division, *UM Museum of Zoology*

Advisor: Dr. Cody W. Thompson

2023 Graduate Student Curatorial Assistant: Fungi Division, *UM Museum of Zoology*

Advisor: Dr. Alison H. Harrington

2022 Graduate Student Research Assistant, *UM*

Genomics analysis of *Alouatta* X-linked genes and NSF grant editing

 Advisor: Dr. Liliana Cortés Ortiz

2022 Graduate Student Curatorial Assistant: Fungi Division, *UM Museum of Zoology*

Advisor: Dr. Alison H. Harrington

2021 Smithsonian Tropical Research Institute Fellow, Gamboa, the Panama Canal, and Barro Colorado Island, Panama

2020 Graduate Student Curatorial Assistant: Bird Division, *UM Museum of Zoology*

Advisor: Dr. Brett W. Benz

2016 Museum technician: Mollusk Division, *UM Museum of Zoology*

 Advisor: Dr. Tae Hwan Lee

2015-16 Museum technician: Mammals Division, *UM Museum of Zoology*

 Advisor: Dr. Cody W. Thompson

2015-16 Research Assistant, *UM*

Phylogenetics of *Alouatta*

Advisor: Dr. Liliana Cortés-Ortiz

2014-15 Research Assistant, *UM-Dearborn*

Phylogenetics of African *Tomopterna* frogs

Advisor: Dr. Matthew P. Heinicke

2012-15 Research Assistant, *UM-Dearborn*

Environmental research of the Rouge River Floodplains and the Jens Jensen Landscape

Advisor: Dr. Orin G. Gelderloos

**Fieldwork Assistantships and Skills**

2021-22 E. S. George Reserve, Michigan, U.S.A.

 Passerine bird mist netting and captive bird care for migratory research in the Winger Lab at UM.

2021 Panama Canal, Gamboa, and Barro Colorado Island, Panama

 *Anolis apletophalus* sperm collection and analysis under the main project: Genomic basis of thermal adaptation: a large-scale field-transplant experiment in the Panama Canal.

2021 Texas, U.S.A.

 Colubrid and viperid snake collection for ongoing venom research and museum curation at UM.

2020 Mojave, California, U.S.A.

 Lizard lassoing for ongoing phenotypic diversity research at UM.

2019 Tabasco, Mexico

Sampled various biological tissues from wild howler monkeys (genus *Alouatta*) for ongoing genetic and morphological analysis.

2012-15 Dearborn, Michigan, U.S.A.

Collection, management, and analysis of plant and wildlife data from the Jens Jensen landscape and the Rouge River Floodplains. Data include species identification, sampling species richness and succession, soil composition and cores, and elevational transects.

**Certifications and Training**

In progress IBM Data Science Professional Certificate

2023 Graduate Teacher Certificate, *UM* Center for Research on Learning and Teaching

2021 Responsible Conduct of Research and Scholarship Training, *UM*

2020 Certified Planet Blue Ambassador for Sustainability, *UM*

2020 Covid 19: Working Safely in U-M Research Labs, *UM*

2020-23 Introduction to the Non-Human Primate and Zoonoses Training, *UM*

2020-23 Introduction to Wildlife Training, *AALAS Learning Library*

2020-23 Orientation to Animal Care and Use at the UM

2019 Cultivating a Culture of Respect, *UM*

2017-19 NIH Genetics Training Program Fellowship through the Dept. of Human Genetics, *UM*

2015 General Laboratory Safety Training, *UM*

2015 Bloodborne Pathogens Training, *UM*

**Grants, Honors, and Awards (Graduate school only)**

2021 Visiting Predoctoral Fellowship, Smithsonian Tropical Research Institute, Panama

2021 Featured in the 2020-21 Schoolcraft College President’s Notable Alumnus Report

2020 International Primatological Society Research Grant ($1,500)

2020 Evolution and Human Adaptation Program Research Award ($1,000), *UM*

2020 American Society of Mammalogists Grants-in-Aid of Research ($1,500)

2020 EEB Block Grant for Research ($1,849), *UM*

2019 Rackham Graduate Student Research Grant ($1,500), *UM*

2019 Dr. Nancy Williams Walls Award for Field Research ($1,704), *UM*

2019 Genetics Training Program Conference Travel Grant ($500), *UM*

2019 EEB Conference Travel Grant ($400), *UM*

2018 EEB Block Grant for Research ($1,745), *UM*

2018 Rackham Graduate Student Research Grant ($1,500), *UM*

2018 Rackham Conference Travel Grant ($1,300), *UM*

2018 Genetics Training Program Conference Travel Grant ($500), *UM*

2018 EEB Conference Travel Grant ($400), *UM*

2018-19 Michigan Pre-Doctoral Training Program in Genetics Fellowship ($23,844), *UM*

2017-18 Michigan Pre-Doctoral Training Program in Genetics Fellowship ($23,844), *UM*

2017 Rackham Conference Travel Grant ($800), *UM*

2017 EEB Conference Travel Grant ($400), *UM*

2017 EEB Block Grant for Research ($1,496), *UM*

2016 Rackham Merit Fellowship (several semesters of funding), *UM*

**Professional Societies and Memberships**

2022 Genetics Society of America

2020-21 Society for the Study of Evolution

2020 American Society of Primatologists

2020-21 American Society of Mammalogists

2017,20 American Society of Naturalists

2018-23 International Primatological Society

2018 American Society of Primatologists

2017 American Association for the Advancement of Science

2012-15 Tau Sigma National Honor Society, Golden Key International Honour Society

**Service, Scientific Outreach, and Broader Impacts**

2023 Mammal & Bird Divisions collection tours for biology students, *UM*

2023 Peer reviewer for: *Integrative and Comparative Biology*

2022-23 Fungi Division collection tours for biology students, *UM*

2022 UM Museum of Natural History ID Day: Mammals expert, *UM*

2022 EEB Frontier’s Master student bird walk leader, *E. S. George Reserve, UM*

2022 MI DNA Day Genomics and Inheritance instructor, *Martin Luther King Jr. High School*, Detroit, MI

2021 The Evolution Conference Session Moderator: Sex/Recombination; virtual

2021 Ecology and Evolutionary Biology Science Fun Fact Blog Contributor, *UM*

2020 Michigan Science Writers Blog Contributor, *UM*

2018-20 Elected GREEBs (Graduate Researchers in Ecology and Evolutionary Biology) Seminar Committee Member, *UM*

2019 MI DNA Day Epigenetics Instructor, *Martin Luther King Jr. High School*, Detroit, MI

2019 Ask A Scientist at the Museum of Natural History, *UM*

2019 F.E.M.M.E.S. (Females Excelling More in Math, Engineering, and Science) Capstone: Phylogenetics and Biodiversity Instructor, *UM*

2018 International Primatological Society Congress Session Moderator: Genetics and Population Dynamics, United Nations Office at Nairobi, Kenya

2018 Spring into Science: Michigan Owl Ambassador with Stage Nature Center, *Cranbrook Institute of Science*

2018 F.E.M.M.E.S. Capstone: Phylogenetics Instructor, *UM*

2018 Elected MI DNA Day Board Member: Marketing Chair, *UM*

2017-18 MI DNA Day Genetics and Inheritance Instructor, *Pioneer High School* and *Skyline High School*, Ann Arbor

2017-18 BioBlitz Biodiversity Ambassador, Detroit, MI

2014 Medicine Bear Native American Advocacy Group founding member, *UM-Dearborn*

2012-13 Maple Breakfast and Festival Naturalist, *Cranbrook Institute of Science*

**Workshop and Seminar Participation**

2023 Help! I have to share my data: Preparation for sharing and choosing a repository for long-term data storage, *UM*

2023 Data, data, everywhere! Managing and organizing data, *UM*

2023 Be Prepared! Writing a data management or data sharing plan, *UM*

2022 NIH Career Symposium, 3-day virtual symposium

2022 Where to Start? Outreach for Community Engaged Scholarly Projects, *UM*

2021 Discussing Genetics: Reproductive Genetics, Genetics Society of America and pgED (Personal Genetics Education Project)

2021 Discussing Genetics: History of Eugenics, Genetics Society of America and pgED

2021 Strategies for Equitable Engagement in Online Classes, UM

2021 Teaching for Equity and Inclusion in Remote Contexts, UM

2020 ECR^2 (Evolution Community Resources for Early-Career Researchers): Leveraging your PhD

2020 CVs, Resumes, and Cover Letters – Two-Part Series, UM

2020 The Allied Genetics Conference Workshop: Everything You Ever Wanted to Know About Sex

2020 The Allied Genetics Conference Workshop: Reproducibility for Everyone

2020 The Allied Genetics Conference Workshop: Raising a Woke Generation of Geneticists: How and Why to Include Eugenics History in Genetics Classes

2020 The Allied Genetics Conference Workshop: How to Write a Review Paper

2020 Advanced Research Computing on the Great Lakes Cluster, UM

2020 Research Computing on the Great Lakes Cluster, UM

2020 The Allied Genetics Conference Workshop: Career Development

2020 Creating Figures and Diagrams in Adobe Illustrator: Beyond the Basics, UM

2020 Creating Figures and Diagrams in Adobe Illustrator: The Basics, UM

2020 Intensive 3-day R Workshop with Dr. Pat Schloss, UM

2020 Social Media for Scientists, NIH: Intramural Training & Education Webinar

2020 Rubrics 101: Content, Transparency, and Grading, *UM*

2020 Selection-Based Species Delimitation Workshop by Drs. L. Lacey Knowles and Arnaud Becheler, *UM*

2019 Disrespect and Disruption in Teaching-Learning Sessions (DEI Workshop), *UM*

2019 Developing your Teaching Philosophy, *UM*

2018 Introduction to the Flux Cluster and Batch Computing, *UM*

2018 Introduction to the Command Line, *UM*

2018 Marketing Workshop, *UM*

2018 Competence and Confidence, *UM*

2017 Time Management for Graduate Students, *UM*

2017 Preparing Manuscripts for Publication: Increasing your Chances for Success, *UM*

2016 Importation of Biological Materials (certified), *UM*

2016 MORE Mentoring Planning, *UM*

2016 Introduction to R, *UM*

**Selected Skills**

Coding Languages: Linux (intermediate), R (advanced), Python (intermediate), SQL (beginner)

Human Languages: English (native), French (advanced), Spanish (beginner)

Natural History: World wildlife identification and photography

Museum Collections: Mammal, bird, fungi, herpetofauna, and mollusk collections maintenance including bird and mammal preparation (skeleton, skin, and tissue), whole specimen colubrid and viperid snake capture, preparation, and preservation. Fungi specimen preparation and curation, digital curation via general computing and in Specify.

**Collaborators and Affiliations**

*Institutions*: University of Michigan Department of Ecology and Evolutionary Biology and Museum of Zoology, University of Michigan Genetics Training Program, Smithsonian Tropical Research Institute, Wisconsin National Primate Research Center, Universidad Juárez Autónoma de Tabasco, Universidad Veracruzana, University of Michigan-Dearborn.

*People*: Liliana Cortés Ortiz, Alba Z. Rodas-Martínez, Domingo Canales-Espinosa, Alexandre Inforzato, Amy Goldberg, Krista Milich, Patrícia Domingues de Freitas, Susanna J. K. Campbell, Marcella D. Baiz, John David Curlis, Ariel F. Kahrl, Noah Gripshover, Daniel Nicholson, Christian L. Cox, Michael L. Logan, W. Owen McMillan, Orin G. Gelderloos, Matthew P. Heinicke, Cody W. Thompson, Brett W. Benz, Alison H. Harrington, Trisha J. Wittkopp, Jacob L. Mueller, Peter A. Cerda, Hayley L. Crowell, Matthew L. Holding, Teresa M. Pegan, Eric R. Gulson-Castillo, Benjamin M. Winger.

**Professional References and Contact Information**

Dr. Liliana Cortés Ortiz

Research Assistant Professor

Ph.D. Co-advisor

Ecology and Evolutionary Biology

University of Michigan

lcortes@umich.edu

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Dr. Cody W. Thompson

Collection Manager: Division of Mammals and Assistant Research Scientist

Mammal collections advisor; Ph.D. committee member

University of Michigan

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(734) 615-2810

Dr. Alison H. Harrington

Collection Manager: Division of Fungi, Lichens, Bryophytes

Fungi collections advisor

University of Michigan

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(734) 936-8028

Dr. Patricia J. Wittkopp

Arthur F. Thurnau Professor

Ph.D. Co-advisor

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Dr. Jacob Mueller

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Dr. Brett W. Benz

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Bird collections advisor

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Dr. Orin G. Gelderloos

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Undergraduate Research Advisor

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