

Heather Mead

Project Manager • Staff Scientist • Ph.D.

Immunology Core • Translational Genomics Research Institute • Flagstaff, AZ

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SUMMARY

I am broadly interested in the genetic mechanisms of pathogen virulence and host immunity. In particular, how microbes sense and respond to their external environment on a molecular level and how we can use these patterns to prevent, treat and diagnose infectious diseases. I specialize in experimental design, troubleshooting and execution of *in vitro* and *in vivo* models, using microbiology techniques and 'omics approaches.

EDUCATION

Ph.D., Biology

Northern Arizona University, Flagstaff, AZ

April 2021

Bachelor of Science, Microbiology

Northern Arizona University, Flagstaff, AZ

December 2016

- Minor in chemistry

Associate of Science

Coconino Community College, Flagstaff, AZ

May 2014

RESEARCH EXPERIENCE

Translational Genomics Research Institute, City of Hope

Flagstaff, AZ

Staff Scientist

2021-

Objective: Coordinate and assist in project development and goal completion for the Immunology Core research projects. Oversee research staff in experimental design and execution of multiplexed genomic assays. Ensure timely analysis and reporting of research results. Coordinate the biosafety, facilities, and equipment needs. Contribute to grant applications and manuscripts.

Pathogen and Microbiome Institute, Northern Arizona University

Flagstaff, AZ

Animal Biosafety Level Three (ABSL-3) Facility Manager

2017–2021

Biosafety Level Three (BSL-3) Research Assistant

2017–2021

Federal Select Agent Clearance

2017-2021

Advisor: Bridget Barker, Ph.D.

Animal Biosafety Level Three Manager Objective: I accepted this position during the inaugural year of the ABSL-3 facility and program. Therefore, I was deeply involved with all aspects of initiating research operations. Now, the center provides *in vivo* models to study host pathogen interactions which require biosafety level three containment (BSL-3), such as SARS-CoV-2 and *Coccidioides* spp. I am responsible for designing and completing host infections, data collection and sample processing. In addition, I manage the day to day operations of the ABSL-3 laboratory; writing and implementing standard operating procedures and risk assessments, facility and equipment maintenance, employee training, inventory tracking, regulatory and safety compliance, assisting in IACUC and IBC documentation and animal care.

Biosafety Level Three Research Assistant Objective: I specialize in experimental design, troubleshooting and execution which require BSL-3 containment. I recently co-lead characterizing the HACE2 transgenic mouse model for the novel COVID-19 viral infection. Previously, I have assisted in obtaining host immune response data (serum, cytokines, PBMC, metabolomics, tissue histology). In addition to optimizing *in vitro* and *in vivo* RNA extraction of fungal and viral organisms, growth rate assays, phenotypic microarrays, CRISPR genetic modification, characterization of phenotypes across populations, obtaining high quality gDNA for long and short read sequencing. I regularly operate in high pressure environments and under challenging circumstances. Computationally, I am trained in genome assembly, SNP calling, tree building, RNA sequencing analysis, using *in silico* prediction software, R statistical analysis and interacting with large data sets.

Pathogen and Microbiome Institute, Northern Arizona University

Flagstaff, AZ

Undergraduate Research Assistant

2015–2017

Advisor: Bridget Barker, Ph.D.

Objective: As an independent project, I characterized the morphogenesis of five strains of *Coccidioides* in a novel *in vitro* system. This research resulted in my primary first author publication. In addition, I assisted in research tasks such as culturing of BSL-2 organisms, nucleic acid extraction and quantification, conventional and real time PCR and media prep.

Translational Genomics Research Institute, City of Hope

Flagstaff, AZ

Helios Scholars Research Internship

2015

Objective: I was responsible for developing and validating macrophage culturing techniques and protocols for the lab. I designed co-culture assays with fungal cells, determine appropriate infection ratios, engulfment time and intracellular killing.

PUBLICATIONS

1. Gorris, M.E., Caballero Van Dyke, M.C., Carey, A., Hamm, P.S., **Mead, H.L.**, Uehling, J.K. (2021), A Review of *Coccidioides* Research, Outstanding Questions in the Field, and Contributions by Women Scientists. *Curr Clin Micro Rpt.* <https://doi.org/10.1007/s40588-021-00173-9>
2. E.A. Higgins Keppler, **H.L. Mead**, B.M. Barker, H.D. Bean. Lifecycle dominates the volatilome character of the dimorphic fungus *Coccidioides* spp. 2021. mSphere Apr 2021, 6 (2) e00040-21; DOI: 10.1128/mSphere.00040-21
3. **Mead, H.L.**, Hamm, P.S., Shaffer, I.N., Teixeira, M.M., Wendel, C.S., Wiederhold, N.P., et al. Differential Thermotolerance Adaptation between Species of *Coccidioides*. *J Fungi (Basel)*. 2020;6(4).
4. **Mead, H.L.**, Van Dyke, M.C.C., Barker, B.M. Proper Care and Feeding of *Coccidioides*: A Laboratorian's Guide to Cultivating the Dimorphic Stages of *C. immitis* and *C. posadasii*. *Curr Protoc Microbiol.* 2020;58(1):e113.
5. **Mead, H.L.**, Roe, C.C., Higgins Keppler, E.A., Van Dyke MCC., Laux, K.L., Funke, A.L., et al. Defining Critical Genes During Spherule Remodeling and Endospore Development in the Fungal Pathogen, *Coccidioides posadasii*. *Front Genet.* 2020;11:483.
6. Teixeira, M.M., Muszewska, A., Travis, J., Moreno, L.F., Ahmed, S., Roe, C., **Mead, H.**, Steczkiewicz, K., Lemmer, D, de Hoog, S., Keim, P., Wiederhold, N., Barker, B. M. et al. Genomic characterization of *Parengyodontium americanum* sp. nov. *Fungal Genetics Biology*: 2020.103351.
7. **Mead, H.L.**, Blackmon, A.V., Vogler, A.J., Barker, B.M. Heat inactivation of *Coccidioides posadasii* and *Coccidioides immitis* for use in lower biosafety containment. *Applied Biosafety.* 2019.
8. **Mead, H.L.**, Teixeira, deM., Galgiani, JN., Barker, B.M. Characterizing *in vitro* spherule morphogenesis of multiple strains of both species of *Coccidioides*. *Medical Mycology.* 2018.

PUBLICATIONS IN PREPARATION

1. **H.L. Mead**, D. Kollath, M.D. Teixeira, C.C. Roe, P. Keim, C. Donohoo, C. Plude, J. Terriquez, N. Nadurkar, B.L.W. O'Connor, B.M. Barker. Disease Triangle Dynamics of Coccidioidomycosis in Northern Arizona; a One Health Approach. *Target Journal: Emerging Infectious Disease*

RESEARCH GRANTS, SCHOLARSHIPS AND AWARDS

RESEARCH GRANTS

- 2018 Independent Project: A survey of *Coccidioides* patient isolates on the Colorado Plateau.
\$4,786.00
Center for Ecosystem Science and Society; Grant for Community, Culture and Environment for Graduate Student Research.
- 2016 Hooper Undergraduate Research Award \$5,000.00
Northern Arizona University

TRAVEL GRANTS

- 2019 Fungal Genetics Conference Travel Scholarship \$400.00
Genetic Society of America
- 2018 Graduate Student International Travel Scholarship \$1,500.00
Northern Arizona University
- 2018 Young Researcher Attendance Award \$200.00
International Society of Human and Animal Mycology
- 2017 Undergraduate Travel Scholarship \$2,000.00
Northern Arizona University
- 2017 Arizona Representative for Undergraduate Research at the Capital Hill
Council for Undergraduate Research

FELLOWSHIPS AND SCHOLARSHIPS

- 2021 Graduate Student Government Scholarship- NAU \$2,000.00
- 2020 Lawson Scholar - ARCS Foundation \$8,000.00
American Leadership and Aid Advancement in Science and Technology
- 2019 Lawson Scholar - ARCS Foundation \$8,000.00
American Leadership and Aid Advancement in Science and Technology
- 2016 Justin P. Carder Memorial Scholarship Fall 2016 \$1,200.00
- 2014 Northern Arizona Transfer GEMS \$30,000.00
National Science Foundation

AWARDS

- 2021 First Place Poster Presentation
Graduate Student Government-NAU
- 2021 Honorable Mention Graduate Student Poster Design
Graduate Student Government-NAU
- 2016 Distinguished Senior Golden Axe Award
Northern Arizona University
- 2016 Best Undergraduate Poster in Microbial Ecology and Diversity \$50.00
American Society of Microbiology
- 2016 American Society of Microbiology Undergraduate Research Capstone \$3,000.00
American Society of Microbiology
- 2016 Third Place Research Poster
Northern Arizona Undergraduate Research and Design Symposium
- 2015 Second Place Outstanding Oral Presentation \$750.00
The Translational Genomics Research Institute Intern Symposium

RESEARCH PRESENTATIONS

ORAL

H.L. Mead, D. Kollath, M.D. Teixeira, C.C. Roe, P. Keim, C. Donohoo, C. Plude, J. Terriquez, N. Nadurkar, B.L.W. O'Connor, B.M. Barker. Disease Triangle Dynamics of Coccidioidomycosis in Northern Arizona Disease. (2021). Coccidioidomycosis Study Group 2021 Virtual Meeting.

H.L. Mead. Coccidioides causative agent of Valley fever. Characterization of parasitic behaviors in the laboratory and in the field. Pathogen and Microbiome Institute-Biodefense Meeting. 2021

H.L. Mead, M.D. Teixeira, B.M. Barker. Wildland fire and Valley Fever risk management. (2019). Northern Arizona University, Flagstaff, AZ.

The U.S. Forest service has documented Valley Fever cases amongst the wildland firefighters while responding to fires in endemic regions. In this talk I addressed U.S.F.S Risk Management leaders. I discussed the epidemiology and ecology of Coccidioides and help strategize risk management tactics for the future.

H.L. Mead, M.D. Teixeira, J. Terriquez, B.M. Barker. Valley Fever Awareness Improves Patient Outcomes. (2019). Pine Stories Competitor. Flagstaff, AZ.

This presentation was an oral story telling competition to a general audience. I discussed the importance of patient awareness in regions endemic to Valley Fever.

H.L. Mead, M.D. Teixeira, J. Terriquez, B.M. Barker. Disease Surveillance in Northern Arizona. (2019). Three Minute Research Presentation Competitor (3MRP). Northern Arizona University, Flagstaff, AZ.

I presented my thesis research was presented to a non-specialist audience in just three minutes.

H.L. Mead, M.D. Teixeira, E.R.G. Lewis, B.M. Barker. Understanding Early Innate Immune Responses to Infection with *Coccidioides*, Causative Agent of Valley Fever. (2017). Arizona Biomedical Research Committee Symposium, Phoenix, AZ.

I gave an oral presentation on behalf of my mentor. This presentation detailed the recent findings related to innate immune response in Coccidioides.

H.L. Mead, E.R.G. Lewis, A.L. Doyle, M.M. Teixeira, P.S. Keim, B.M. Barker. Culturing *Coccidioides*: Optimizing *In Vitro* Culture Media to Reflect Nutrient Availability *In Vivo*. 2016. American Society of Microbiology Regional Meeting. Phoenix, AZ.

I gave an oral presentation at this regional meeting to a scientific audience.

H.L. Mead, E.R.G. Lewis, A.L. Doyle, M.M. Teixeira, P.S. Keim, B.M. Barker. Culturing *Coccidioides*: Optimizing *In Vitro* Culture Media to Reflect Nutrient Availability *In Vivo*. 2015. The Translational Genomics Research Institute Intern Symposium. Phoenix, AZ.

I gave an oral presentation to a scientific and general audience. I won second place for best oral presentation.

POSTER

Mead, H.L., Hamm, P.S., Shaffer, I.N., Teixeira, M.D., Wendel, C.S., Wienderhold, N.P., Thompson III, G.R., Muñoz-Salazar, R., Castañón-Olivares, L.R., Keim, P., Plude, C., Terriquez, J., Galgiani, J.N., Orbach, M.J., Barker, B.M. Coccidioidomycosis Study Group 2021 Virtual Meeting.

Mead, H.L., Kollath, DR., Donohoo, C., Teixeira, M., Nadurkar, N., Terriquez, J., Barker, B.M. Disease Surveillance in Northern Arizona. (2019). Coccidioidomycosis Study Group. Davis, CA.

Mead, H.L., Roe, C.C., Teixeira, M., Barker, B.M. Investigating and Refining the Arizona Population Structure of *Coccidioides*. (2019). Fungal Genetics Conference. Asilomar, CA.

Mead, H.L., Roe, C.C., Teixeira, M., Barker, B.M. Investigating Differential Expression Utilized during the Fungal Morphogenesis of the Attenuated Strain of *Coccidioides posadasii*. (2018). Northern Arizona University Graduate Student Government Poster Symposium. Flagstaff, AZ.

Mead, H.L., Roe, C.C., Teixeira, M., Barker, B.M. Investigating Differential Expression Utilized during the Fungal Morphogenesis of the Attenuated Strain of *Coccidioides posadasii*. (2018). International Society for Animal and Human Mycology. Amsterdam, Kingdom of the Netherlands.

Mead, H.L., Roe, C.C., Teixeira, M., Barker, B.M. Importance of Valley Fever Research to Arizona Residents. (2017). Council for Undergraduate Research Posters on the Hill. Washington, D.C.

Mead, H.L., Roe, C.C., Teixeira, M., Barker, B.M. Investigating Differential Expression Utilized during the Fungal Morphogenesis of the Attenuated Strain of *Coccidioides posadasii*. Coccidioidomycosis Study Group. (2017). Stanford, CA.

H.L. Mead, E.R.G. Lewis, A.L. Doyle, M.M. Teixeira, P.S. Keim, B.M. Barker. Culturing *Coccidioides*: Optimizing *In Vitro* Culture Media to Reflect Nutrient Availability *In Vivo*. (2016). American Society of Microbiology Regional Meeting. Phoenix, AZ.

H.L. Mead, E.R.G. Lewis, A.L. Doyle, M.M. Teixeira, P.S. Keim, B.M. Barker. Culturing *Coccidioides*: Optimizing *In Vitro* Culture Media to Reflect Nutrient Availability *In Vivo*. (2016). Coccidioidomycosis Study Group. Fresno, CA.

H.L. Mead, E.R.G. Lewis, A.L. Doyle, M.M. Teixeira, P.S. Keim, B.M. Barker. Culturing *Coccidioides*: Optimizing *In Vitro* Culture Media to Reflect Nutrient Availability *In Vivo*. (2016). American Society of Microbiology National Meeting. Boston, MA.

H.L. Mead, E.R.G. Lewis, A.L. Doyle, M.M. Teixeira, P.S. Keim, B.M. Barker. Culturing *Coccidioides*: Optimizing *In Vitro* Culture Media to Reflect Nutrient Availability *In Vivo*. (2015). The Translational Genomics Research Institute Intern Symposium. Phoenix, AZ.

TEACHING EXPERIENCE

2020 Dimorphic Fungal Pathogens and Human Health, Guest Lecture for the Undergraduate Mycology Course.
Catherine Gehring, Ph.D. Associate Chair & Director of Graduate Studies, Biological Sciences. Northern Arizona University

2019 Dimorphic Fungal Pathogens and Human Health, Guest Lecture for the Undergraduate Mycology Course.
Catherine Gehring, Ph.D. Associate Chair & Director of Graduate Studies, Biological Sciences. Northern Arizona University

2019 Medically Relevant Fungi Laboratory, Guest Instructor for the Undergraduate Mycology Course.
Catherine Gehring, Ph.D. Associate Chair & Director of Graduate Studies, Biological Sciences. Northern Arizona University

2019 Effective Methods of BSL-3/ABSL-3 Laboratory Work, Primary instructor for all new *Coccidioides* BSL-3/ABSL-3 users.

Bridget Barker, Ph.D. Associate Director of ABSL-3 operations. Northern Arizona University

2019 The World of Fungi, Guest Lecture for Biology 181
Dan Kollath. M.S. Biology. Instructor. Northern Arizona University

SERVICE

VOLUNTEER POSITIONS

2020 Undergraduate Symposium Poster Judge
Northern Arizona University

2019 Academic Integrity Hearing Board Member
Northern Arizona University

2019 Academic and Research Safety Committee
Northern Arizona University

2019 Science in the classroom
DeMiguel Elementary School

2019 Coccidioidomycosis Study Group Annual Meeting Abstract Committee

2018 Northern Arizona University Undergraduate Research Symposium Biological Sciences Judge

2018 Coccidioidomycosis Study Group Annual Meeting Abstract Committee

2017 Flagstaff City STEM Celebration Genetics Activity

2016 Flagstaff City STEM Celebration Genetics Activity

2016 Flagstaff City Festival of Science Biology Booth

SCIENTIFIC MENTORING

2019-2020 Mitchell Bryant; pursuing a bachelor's degree at NAU. I am responsible for supervising this student's laboratory training and independent project development.

2018-2019 Austin Blackmon. B.S. Microbiology at NAU 2018. Currently pursuing a Ph.D. in Molecular and Cellular Biology at University of Arizona. I was responsible for providing general laboratory (molecular and microbiological) techniques, and over saw their independent project development. This student was second author on a paper with me.

2017-2020 Kaitlyn Parra; pursuing a bachelor's degree at NAU. I was responsible for supervising this student's general laboratory work, training, and independent project.

2016 Laura Coleman; pursuing a bachelor's degree in Biology at NAU. I was responsible for supervising this student's general laboratory work and training.

2016 Responsible for guiding Helios Scholar™ individual summer research project. I provided training and support of experimental design, execution and data analysis.
Translational Genomics Institute

PROFESSIONAL DEVELOPMENT COURSES

2020 Epidemiology Bootcamp
Center for Health Equity in Research
Northern Arizona University

2019 The Containment Philosophy

- 2018 Behavioral-Based Improvement Solutions
Packaging and Shipping Division 6.2 Materials
Center for Disease Control
- 2018 Effective Methods of Supervising Undergraduate Employees
Northern Arizona University
- 2017 Fungal Pathogen Genomics
Welcome Genome Campus Advanced Courses and Scientific Conferences
-

PROFESSIONAL MEMBERSHIPS

- 2018– Arizona Biosafety Alliance
Promoting biosafety and biosecurity in Arizona. <http://azba.org/>
- 2018– Genetics Society of America
Genetics Society of America (GSA) is the professional membership organization for scientific researchers and educators in the field of genetics. Our members work to advance knowledge in the basic mechanisms of inheritance, from the molecular to the population level. <https://genetics-gsa.org/>
- 2017– International Society of Human and Animal Mycology
ISHAM is a world-wide organization that intends to represent all medical mycologists, clinical scientists and fundamental researchers with interest in fungal diseases. <https://www.isham.org/>
- 2016–2018 American Society of Microbiology
With over 30,000 members, including researchers, educators and health professionals, ASM is one of the largest life science societies in the world. <https://www.asm.org>