

Heather Mead, Ph.D.

Research Assistant Professor

Immunology Core • Translational Genomics Research Institute • Flagstaff, AZ

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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

Flagstaff, AZ

Research Assistant Professor

2022-Present

Objective:

Translational Genomics Research Institute

Flagstaff, AZ

Staff Scientist

2021-Present

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, manuscripts and data analysis. Develop and obtain funding for independent research projects.

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 was responsible for designing and completing host infections, data collection and sample processing. In addition, I managed 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 specialized in design, troubleshooting and execution of experiments requiring BSL-3 containment. I co-lead characterization of the HACE2 transgenic mouse model for the novel COVID-19 viral infection. Other job duties included obtaining host immune response data from multiple sample types and sources: serum, cytokines, PBMC, metabolomics, tissue histology. I optimized *in vitro* and *in vivo* RNA extraction of fungal and viral organisms, growth rate assays, phenotypic microarrays, CRISPR genetic modification, and characterization of phenotypes across populations; additionally, I established SOPs for obtaining high quality gDNA for long and short read sequencing. Data analysis for this role involved genome assembly, SNP calling, tree building, RNA sequencing analysis, using *in silico* prediction software, R statistical analysis and handling large data sets.

Pathogen and Microbiome Institute, Northern Arizona University Flagstaff, AZ

Undergraduate Research Assistant

2015–2017

Advisor: Bridget Barker, Ph.D.

Objective: In this 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. I cultured BSL-2 organisms, performed nucleic acid extraction and quantification, and mastered conventional and real time PCR.

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, determined appropriate infection ratios, observed engulfment time and assayed intracellular killing.

PUBLICATIONS

1. **Mead, HL** Kollath D, Teixeira MM, Roe CC, Keim P, Donohoo C, Plude C, Terriquez T, Nadurkar N, O'Connor BLW, Barker BM. Coccidioidomycosis in Northern Arizona; an investigation of the host, pathogen and environment using a disease triangle approach. *mSphere*. 2022. <https://doi.org/10.1128/msphere.00352-22> PMID: 35972134

2. Elko E, Nelson GA, **Mead HL**, Kelley EJ, Verche VL, Cardoso AA, Ely JL, Boyle AS, Pina A, Henson, SN, Rahee F, Keim PS, Celona KR, Yi J, Settles EW, Yu GC, Morris SR, Zaia JA, Ladner JT, Altin. COVID-19 vaccination recruits and matures cross-reactive antibodies to conserved epitopes in endemic coronavirus Spike proteins. *Cell Reports*. 2022. <https://doi.org/10.1016/j.celrep.2022.111022> PMID: PMC8811912
3. Dong W, **Mead HL**, Tian L, Park JG, Garcia JI, Jaramillo S, Barr T, Kollath DS, Coyne VK, Stone NE, Jones A, Zhang J, Li A, Wang LS, Milanes-Yearsley M, Torrelles JB, Martinez-Sobrido L, Keim PS, Barker BM, Caligiuri MA, Yu J. The K18-Human ACE2 Transgenic Mouse Model Recapitulates Non-severe and Severe COVID-19 in Response to an Infectious Dose of the SARS-CoV-2 *Virus*. *J Virol*. 2022 Jan 12;96(1):e0096421. <https://doi.org/10.1128/JVI.00964-21> Epub 2021 Oct 20. PMID: PMC8754221.
4. de Melo Teixeira M, Stajich JE, Sahl JW, Thompson GR, Brem RB, Dubin CA, Blackmon AV, **Mead HL**, Barker BM. A chromosomal-level reference genome of the widely utilized *Coccidioides posadasii* laboratory strain "Silveira." *G3*. 2022. <https://doi.org/10.1093/g3journal/jkac031> PMID: PMC8982387
5. Ceglia V, Kelley EJ, Boyle AS, Zurawski S, **Mead HL**, Harms CE, et al. A Framework to Identify Antigen-Expanded T Cell Receptor Clusters Within Complex Repertoires. *Front Immunol*. 2021;12: 735584. <https://doi.org/10.3389/fimmu.2021.735584> PMID: PMC8670329
6. Gorris ME, Caballero Van Dyke MC, Carey A, Hamm PS, **Mead HL**, Uehling JK. A Review of *Coccidioides* Research, Outstanding Questions in the Field, and Contributions by Women Scientists. *Curr Clin Micro Rpt*. 2021. <https://doi.org/10.1007/s40588-021-00173-9> PMID: PMC8327307
7. Higgins Keppler EA, **Mead HL**, Barker BM, Bean HD. Lifecycle dominates the volatilome character of the dimorphic fungus *Coccidioides spp.* *mSphere*. Apr 2021, 6 (2) e00040-21; <https://doi.org/10.1128/mSphere.00040-21> PMID: PMC8546678
8. **Mead HL**, Hamm PS, Shaffer IN, Teixeira MM, Wendel CS, Wiederhold NP, et al. Differential Thermotolerance Adaptation between Species of *Coccidioides*. *J Fungi* (Basel). 2020;6(4). <https://doi.org/10.3390/jof6040366> PMID: PMC7765126.
9. **Mead HL**, Van Dyke MCC, Barker BM. 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. <https://doi.org/10.1002/cpmc.113> PMID: 32894648.
10. **Mead HL**, Roe CC, Higgins Keppler EA, Van Dyke MCC, Laux KL, Funke AL, et al. Defining Critical Genes During Spherule Remodeling and Endospore Development in the Fungal Pathogen, *Coccidioides posadasii*. *Front Genet*. 2020;11:483. <https://doi.org/10.3389/fgene.2020.00483> PMID: PMC7243461.

11. Teixeira MM, Muszewska A, Travis J, Moreno LF, Ahmed S, Roe C, **Mead HL**, Steczkiewicz K, Lemmer D, de Hoog S, Keim P, Wiederhold N, Barker BM. *et al.* Genomic characterization of *Parengyodontium americanum* sp. 2020. *Fungal Genetics Biology*: 2020.103351. <https://doi.org/10.1016/j.fgb.2020.103351> PMID: PMC7194163.
12. **Mead HL**, Blackmon AV, Vogler AJ, Barker BM. Heat inactivation of *Coccidioides posadasii* and *Coccidioides immitis* for use in lower biosafety containment. *Applied Biosafety*. 2019. <http://doi.org/10.1177/1535676019856525> PMID: PMC8025829.
13. **Mead HL**, Teixeira MM, Galgiani JN, Barker BM. Characterizing *in vitro* spherule morphogenesis of multiple strains of both species of *Coccidioides*. *Medical Mycology*. 2018. <https://doi.org/10.1093/mmy/myy049> PMID: PMC6506604.

PUBLICATIONS IN PREPARATION

1. Henson SN, Elko EA, Swiderski PM, Liang Y, Engelbrektson AL, Piña A, Boyle AS, Fink Z, Facista SJ, Martinez V, Rahee F, Brown A, Kelley EJ, Nelson GA, Raspet I, **Mead HL**, Altin JA, Ladner JT. PepSeq: a fully in-vitro platform for highly-multiplexed serology using customizable DNA-barcoded peptide libraries, *Nature Protocols*, accepted June 2022
2. Higgins Keppler EA, Van Dyke MC, **Mead HL**, Magee DM, Lake DF, Barker BM, Bean HD. Volatile metabolites in lavage fluid are correlated to the immune response to Valley fever in murine model lung infections. Anticipated submission to *Journal of Clinical Biology* in October 2022.

RESEARCH GRANTS, SCHOLARSHIPS AND AWARDS

RESEARCH GRANTS

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

TRAVEL GRANTS

- 2019 Fungal Genetics Conference Travel Scholarship
Genetic Society of America
- 2018 Graduate Student International Travel Scholarship
Northern Arizona University
- 2018 Young Researcher Attendance Award
International Society of Human and Animal Mycology
- 2017 Undergraduate Travel Scholarship
Northern Arizona University
- 2017 Arizona Representative for Undergraduate Research at the Capitol Hill
Council for Undergraduate Research

FELLOWSHIPS AND SCHOLARSHIPS

- 2021 Graduate Student Government Scholarship- NAU
- 2020 Lawson Scholar - ARCS Foundation
American Leadership and Aid Advancement in Science and Technology
- 2019 Lawson Scholar - ARCS Foundation

- American Leadership and Aid Advancement in Science and Technology
2016 Justin P. Carder Memorial Scholarship Fall 2016
2014 Northern Arizona Transfer GEMS
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
American Society of Microbiology
2016 American Society of Microbiology Undergraduate Research Capstone
American Society of Microbiology
2016 Third Place Research Poster
Northern Arizona Undergraduate Research and Design Symposium
2015 Second Place Outstanding Oral Presentation
The Translational Genomics Research Institute Intern Symposium

RESEARCH PRESENTATIONS

ORAL

Mead HL, Kollath D, Teixeira MM, Roe CC, Keim P, Donohoo C, Plude C, Terriquez T, Nadurkar N, O'Connor BLW, Barker BM. Coccidioidomycosis in Northern Arizona; an investigation of the host, pathogen and environment using a disease triangle approach. 2022. Southwest One Health Symposium.

Mead HL. Harnessing Antibody and Cell mediated immunity to combat infectious diseases. 2022. Science on Tap. Flagstaff, AZ.

A presentation of Altin lab research at a local forum hosted by the NAU graduate student government.

Mead HL, Kollath D, Teixeira MM, Roe CC, Keim P, Donohoo C, Plude C, Terriquez T, Nadurkar N, O'Connor BLW, Barker BM. Disease Triangle Dynamics of Coccidioidomycosis in Northern Arizona Disease. 2021. Coccidioidomycosis Study Group 2021 Virtual Meeting.

Mead HL. Coccidioides; causative agent of Valley fever. Characterization of parasitic behaviors in the laboratory and in the field. 2021. Pathogen and Microbiome Institute-Biodefense Meeting. Northern Arizona University, Flagstaff, AZ.

Mead HL, 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.

Mead HL, 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.

Mead HL, 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 to a non-specialist audience in just three minutes.

Mead HL, 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.

Mead HL, 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.

Mead HL, 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 HL, Hamm PS, Shaffer IN, Teixeira MM, Wendel CS, Wienderhold NP, Thompson III, GR, Muñiz-Salazar R, Castañón-Olivares LR, Keim P, Plude C, Terriquez, J, Galgiani JN, Orbach MJ, Barker BM. 2021. Coccidioidomycosis Study Group Virtual Meeting.

Mead HL, Kollath DR, Donohoo C, Teixeira M, Nandurkar N, Terriquez J, Barker B.M. Disease Surveillance in Northern Arizona. 2019. Coccidioidomycosis Study Group. Davis, CA.

Mead HL, Roe CC, Teixeira MM, Barker BM. Investigating and Refining the Arizona Population Structure of *Coccidioides*. 2019. Fungal Genetics Conference. Asilomar, CA.

Mead HL, Roe CC, Teixeira MM, Barker BM. 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 HL, Roe CC, Teixeira MM, Barker BM. 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 HL, Roe CC, Teixeira MM, Barker BM. Importance of Valley Fever Research to Arizona Residents. 2017. Council for Undergraduate Research Posters on the Hill. Washington, D.C.

Mead HL, Roe CC, Teixeira MM, Barker BM. Investigating Differential Expression Utilized during the Fungal Morphogenesis of the Attenuated Strain of *Coccidioides posadasii*. 2017. Coccidioidomycosis Study Group. Stanford, CA.

Mead HL, Lewis ERG, Doyle AL, Teixeira MM, Keim PS, Barker BM. Culturing *Coccidioides*: Optimizing *In Vitro* Culture Media to Reflect Nutrient Availability *In Vivo*. 2016. American Society of Microbiology Regional Meeting. Phoenix, AZ.

Mead HL, Lewis ERG, Doyle AL, Teixeira MM, Keim PS, Barker BM. Culturing *Coccidioides*: Optimizing *In Vitro* Culture Media to Reflect Nutrient Availability *In Vivo*. 2016. Coccidioidomycosis Study Group. Fresno, CA.

Mead HL, Lewis ERG, Doyle AL, Teixeira MM, Keim PS, Barker BM. Culturing *Coccidioides*: Optimizing *In Vitro* Culture Media to Reflect Nutrient Availability *In Vivo*. 2016. American Society of Microbiology National Meeting. Boston, MA.

Mead HL, Lewis ERG, Doyle AL, Teixeira MM, Keim PS, Barker BM. 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

- 2022 Harnessing Antibody Mediated Immunity to Develop a Universal Human Coronavirus Vaccine. Guest Lecture for Undergraduate Biology 182 course. Melinda McKinney. Ph.D. Biology Faculty. Coconino Community College.
- 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
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PROFESSIONAL DEVELOPMENT COURSES

- 2020 Epidemiology Bootcamp
Center for Health Equity in Research
Northern Arizona University
- 2019 The Containment Philosophy
Behavioral-Based Improvement Solutions
- 2018 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
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PROFESSIONAL MEMBERSHIPS

- 2018-20 Arizona Biosafety Alliance
Promoting biosafety and biosecurity in Arizona. <http://azba.org/>
- 2018-20 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/>
- 2017-19 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/>

2016–18 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.

Scientific Mentorship

Scientific mentorship is essential to the development of the next generation of leaders in any field. I have therefore supported at least one mentee each year, to whom I dedicate significant time. I am watchful for students who may be struggling for an opportunity despite their potential. My past and current mentees have been students from under-represented minority groups (3), those without prior lab experience (7), and non-traditional (1) or first-generation college students (3). I take their progress and training seriously, and I ensure that each one manages their own project, presents at research conferences, and applies for undergraduate-specific funding opportunities. I support my mentees beyond their time with me by providing letters of reference, a listening ear and scientific feedback. The students I have had the privilege of mentoring are listed below, along with some of their exciting achievements.

- 2021- Payton Smith; B.S. Biomedical Science. NAU, expected completion 2023. This student was a Helios Scholar at TGen during the summer of 2022. Her independent research project was titled “Comparing Markers of Viral Exposure in Saliva and Blood from SpaceX Donors using PepSeq.”
- 2021-2022 Nathan Sarbo; B.S. Biology. NAU, 2022. As an undergraduate, this student led an independent research project titled “Seroprevalence of SARS-CoV-2 among working dogs in Arizona, 2021-2022” in collaboration with the Arizona Health Department. He will be co-first author on the resulting publication. Nate is currently working as a Research Technician with the Immunology Core at TGen North.
- 2019-2021 Karis Miller; M.S. Biology. NAU, 2021. I mentored the development and lab work associated with her thesis titled “Investigating *Coccidioides* specific pH response and targeted gene deletion using CRISPR-Cas9”. Currently, she is a Program Coordinator for BNI Research Education.
- 2019-2020 Mitchell Bryant; B.S. Biology. NAU, 2020. This student received an undergraduate research grant for a project titled “Development of auxotrophic mutant of *Coccidioides* using CRISPR-Cas9”. Subsequently, he was awarded second prize at the NAU Undergraduate Research Symposium for his presentation covering the project. Currently, he is a Ph.D. student in the University of Illinois Bio-Engineering Program.
- 2018-2019 Austin Blackmon; B.S. Microbiology. NAU, 2018. As an undergraduate, this student developed a project which resulted in his being second author on a paper alongside me titled “Heat inactivation of *Coccidioides posadasii* and *Coccidioides immitis* for use in lower biosafety containment.” Currently, he is a Ph.D. candidate in Molecular and Cellular Biology at the University of Arizona.
- 2017-2020 Kaitlyn Parra; B.S. Microbiology. NAU, 2021. As an undergraduate, this student led an independent research project titled “Valley Fever PAWS: Coccidioidomycosis in *Canis lupus familiaris*.” Currently, she is a Research Associate at The Pathogen and Microbiome Institute.
- 2016 Laura Coleman; M.S. Science Communication. UC Santa Cruz, 2022 I was responsible for supervising this student’s general laboratory work and training as a Helios Scholar. I provided training and support in experimental design, execution, and data analysis. This individual is now working as a Science Writing Intern with the NASA Communication Office.

Institutional Service

2022	Stem Outreach Volunteer TGen
2022	Helios Scholar Mentor TGen
2021	Coccidioidomycosis Study Group Annual Meeting Abstract Committee Virtual Meeting
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 De Miguel Elementary School
2019	Coccidioidomycosis Study Group Annual Meeting Abstract Committee
2018	Undergraduate Research Symposium Biological Sciences Judge Northern Arizona University
2018	Coccidioidomycosis Study Group Annual Meeting Abstract Committee
2017	Flagstaff City STEM Celebration Genetics Activity TGen- NAU Booth
2016	Flagstaff City STEM Celebration Genetics Activity TGen Booth
2016	Flagstaff City Festival of Science Biology Booth TGen Booth