

Anna Shoemaker

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EDUCATION

Montana State University

Ph.D. in Microbiology and Cell Biology

Expected graduation: 2026

University of Washington

B.S. in Microbiology

2020

University of Washington

B.S. in Physics: Applied Physics

2020

Minor in Applied Math

PUBLICATIONS

Shoemaker, A, Nichodemus, M, Antill, E, Baumann, P, Colman, D, Hodson, A, Kleber, G, McDonnell, A, Steigmeyer, A, Skidmore, M, Boyd, E. (In Prep) Resource Generalism and Mixotrophy Enables Global Distribution of *Polaromonas*. *Environmental Microbiology*.

Shoemaker, A, Colman, D, Baumann, P, Skidmore, M, Boyd, E. (Submitted) Subglacial Oases for Aerobic Diversity during Snowball Earth. *Proceedings of the National Academy of Sciences*.

Shoemaker, A, Omelon, C, Rorabeck, K, Lamoureux, S, Boyd, E, Skidmore, M. (Submitted) Iron cycling in a ferruginous Arctic lake: Implications for a thawing permafrost. *Limnology and Oceanography*.

Boyd, E, Colman, D, Menchaca, A, Spietz, R, **Shoemaker, A**, Finn, C, Mencin, D, Andrade-Barahona, E, Cox, A, Kieft, T, Bilek, S, Hungerford, J, Onstott, T. (2025) Seismic Shifts in the Geochemical and Microbial Composition of a Yellowstone Aquifer. *PNAS Nexus*.

Colman, D, Keller, L, Arteaga-Pozo, E, Andrade-Barahona, E, St. Clair, B, **Shoemaker, A**, Cox, A, Boyd, E. (2024). The Co-Evolution of Hot Spring Geochemistry and Microbiology. *Nature Communications*.

Shoemaker, A, Maritan, A, Cosar, S, Nupp, S, Menchaca, A, Jackson, T, Dang, A, Baxter, B, Colman, D, Dunham, E, Boyd, E. (2024). Wood-Ljungdahl pathway encoding anaerobes facilitate low-cost primary production in hypersaline sediments at Great Salt Lake, Utah. *FEMS Microbiology Ecology*.

Cooper, Z, Rapp, J, **Shoemaker, A**, Anderson, R, Zhong, Z-P, Deming, J. (2022). Evolutionary Divergence of Marinobacter Strains in Cryopeg Brines as Revealed by Pangenomics. *Frontiers in Microbiology*.

Golkowski, M, Lau, H-T, Chan, M, Kenerson, H, Vidadala, V, **Shoemaker, A**, Maly, D, Yeung, R, Gujral, T, Ong, S-E. (2020). Pharmacoproteomics Identifies Kinase Pathways that Drive the Epithelial-Mesenchymal Transition and Drug Resistance in Hepatocellular Carcinoma. *Cell Systems*.

Golkowski, M, Vidadala, V, Lau, H-T, **Shoemaker, A**, Shimizu, M, Beavo, J, Maly, D, Ong, S-E. (2020). Kinobead/LC-MS Phosphokinome Profiling Enables Rapid Analyses of Kinase-Dependent Cell Signaling Networks. *Journal of Proteome Research*.

FIELD EXPERIENCE

Antarctic Peninsula, Antarctica

February-March 2026

- Sailed on the R/V Sikuliaq to Palmer Station with the A2MP project studying the microbiome of ascidians using techniques including qPCR and enrichment culturing.

Yellowstone National Park, Wyoming, USA

August 2025

- Characterized the activity of microorganisms through depth sampling of hot springs in Lower Geyser Basin and Norris Geyser Basin.

Great Salt Lake, Utah, USA

February 2025

- Collected samples from hypersaline brine ponds at Compass Minerals (North Arm, GSL) for culturing, activity assays, metagenomic analysis.

Spitzbergen, Svalbard, Norway

March 2024

- Co-led an expedition to sample proglacial icings for geochemical, molecular, and microbial analysis of three Arctic glaciers.

Spitzbergen, Svalbard, Norway

June-August 2023

- Sampled and characterized the microbial communities of a diverse range of Arctic habitats including pro-glacial lakes, pingos, acid mine drainage, fjord water column, and more as part of a summer field course with University Centre of Svalbard (UNIS).

Forni Glacier, Alps, Italy

August 2022

- Sampled cryoconite and glacial forefield sediments to study successional patterns of glacial retreat via molecular techniques.

RESEARCH EXPERIENCE

Department of Microbiology, Montana State University, Bozeman, MT

2021–current

Graduate Researcher, Eric Boyd, Ph.D.

- Committee members: Jon Hawkings, Ph.D., Mark Skidmore, Ph.D., Dan Colman, Ph.D.
- Examining the impact oxidative reduction potential of subglacial systems on the oxidation state of proteins encoded by subglacial microbial communities.
- Investigating the distribution and resilience of *Polaromonas* species using pangenomics and the characterization of two isolates.
- Characterized the metabolic flexibility of subglacial microbial iron reducers within glacial sediments.
- Described microbial communities and the microbial role in schwertmannite cycling in Colour Lake, Axel Heiberg Island.

Process Development, Seagen, Seattle, WA

2020–2021

Research Associate I, Matthew Leith

- Worked on perfusion cell culture using Chinese hamster ovary (CHO) cells to develop monoclonal antibody-based therapies for the treatment of cancer.

UW Virology Division, University of Washington, Seattle, WA 2020

Clinical Lab Technician I, Angela Yu

- Aided in the COVID-19 effort in a BSL-2 lab processing tests from the state of Washington.

School of Oceanography, University of Washington, Seattle, WA 2018–2020

Undergraduate Research Assistant, Jody Deming, Ph.D.

- Isolated *Marinobacter* strains from cryopegs collected in Utqiagvik, AK. Isolates were used in a pangenomic study of the genus.
- Worked to characterize the effects of different salinities and temperatures on the growth of a *Psychrobacter* isolate.
- Generated growth curve data for bacterial isolates in culture with psychrophilic diatoms and performed temperature characterization on these isolates.

Department of Astronomy, University of Washington, Seattle, WA 2020

Undergraduate Research Assistant, Emily Levesque, Ph.D.

- Worked on the classification of variable objects of the Andromeda Galaxy (M31) detected by the Zwicky Transient Facility and through the Global Relay of Observatories Watching Transients Happen (GROWTH) database.

Department of Pharmacology, University of Washington, Seattle, WA 2016–2018

Undergraduate Research Assistant, Shao-En Ong, Ph.D.

- Became practiced with chemical labeling and molecular biology procedures such as cloning, western blotting, SILAC, and co-immunoprecipitation.

GRANTS, HONORS, AND AWARDS

CoA Student Scholar Travel Award, Montana State University (\$500)	2025
NASA International Summer School in Astrobiology (\$2,000)	2024
Donald L. Smith Memorial Scholarship, Montana State University (\$3,200)	2024
Professional Advancement Grant, Montana State University (\$500)	2023
Professional Development Support, Montana State University (\$1,500)	2023
International Travel Grant for Field Course (\$500)	2022
Dean's List, University of Washington	2020
Mary Gates Research Scholarship, University of Washington (\$5,000)	2019

TEACHING AND MENTORING EXPERIENCE

Guest Lecturer Montana State University, Bozeman, MT Microbial Diversity, Ecology, and Evolution (BIOM 415)	2026
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Teaching Assistant Montana State University, Bozeman, MT Earth System Sciences (Earth 101)	2021–2022
Undergraduate students	
Michelina Nichodemus	2025-2026
Mackenzie Cysewski	2025
Patric Baumann	2022-2025
Rory Swobada	2021-2022

SELECTED PRESENTATIONS

Oral Presentation, “Utilization of Trace Oxygen by Subglacial Facultative Iron Reducers,” AbSciCon, May 13th, 2026.

Poster Presentation, “Preferential Use of Trace Oxygen by Facultative Iron Reducers in Subglacial Habitats,” American Geophysical Union, December 16th, 2025.

Oral Presentation, “Between a Rock and a Hard Place: The Importance of Iron in Subglacial Ecosystems,” Microbiology and Cell Biology Departmental Presentation, Montana State University, April 11th, 2025.

Poster Presentation, “Microbial Iron Reduction in Subglacial Systems: Subglacial dynamics enable the co-existence of metabolically diverse *Rhodoferrax* ecotypes,” American Geophysical Union, December 13th, 2024.

Oral Presentation, “Investigating Iron Reduction in Subglacial Systems,” Minds on Mountains, April 14th, 2023.

Oral Presentation, “Elevated Salinity Effects on Growth Yield of Psychrophilic Bacteria,” Undergraduate Research Symposium, May 18th, 2020.

Poster Presentation, “Growth of Sea-Ice Bacteria at Different Salinities and Temperatures,” Undergraduate Research Symposium, May 17th, 2019.

Oral Presentation, “Functional Interaction of Cyclic Adenosine Monophosphate (cAMP) and Hippo Signaling in Tumor Suppression and Tissue Homeostasis,” Undergraduate Research Symposium, May 18th, 2018.

SKILLS

Wet Lab: Anaerobic cell culturing; environmental bacterial culture and isolation; DNA and RNA extractions; ¹⁴C activity assays; ion and gas chromatography; western blotting; cloning; mammal cell culture; primer design; PCR, IB-PCR

Programming and Applications: R, Python, MatLab, Bash, JavaScript, HTML, CSS, GitHub, GIS (ArcGIS, QGIS), ApE – A plasmid Editor

FIRST AID CERTIFICATIONS

Wilderness First Aid Certification (2024)

SCIENCE COMMUNICATION AND OUTREACH

Upward Bound

Science Educator, Yellowstone National Park, WY, 7/2024

Montana State University: Earth Sciences Student Colloquium

Committee President, Bozeman, MT, 4/2023 – 4/2024

Montana State University: Women in Science and Engineering

Graduate Mentor, Bozeman, MT, 4/2022

University of Washington: Society of Physics Students

Treasurer, Seattle, WA, 9/2019 – 6/2020

University of Washington: Planetarium and Astrobiology with the Mobile Planetarium

Planetarium Presenter, Seattle, WA, 11/2016 – 6/2020