

Geoff Zahn, PhD

Translational mycology | Host-Microbe symbiosis

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<https://gzahn.github.io>



Professional Appointments

2024 – Current

Visiting Faculty – Dartmouth College

2023 – Current

Associate Professor – Utah Valley University

2017 – 2023

Assistant Professor – Utah Valley University

2020 – Current

Consultant – Forensic bioinformatics and data science

2018 – 2021

Director of Environmental Biology -GeoDataCrawler Research Institute

2015 – 2017

Postdoc Associate – University of Hawai`i at Manoa (Amend Lab)

Education

2015 PhD Biology

University of Arkansas

“The Functional and Distributional Ecology of Mycetozoans under Changing Edaphic and Climatic Dynamics”

2010 BS Ecology

Missouri State University

“Pil1 recruits synaptojanins and amphiphysins to facilitate receptor-mediated endocytosis in yeast”

Publications

*mentee | †corresponding/senior author

[Google Scholar Profile](#) | **31 Peer-reviewed Publications** | **H-index: 17** | **i10-Index: 21**

Amend, A., Gunde-Cimerman, N., Dias-Coelho, M., Durkin, C., Ettinger, C., Gifford, H., Gladfelter, A., Gostincar, C., Granit, L., Grigoriev, I., Gutiérrez, M., Hickman, K., James, T., Jones, A., Levi, R., David-Palma, M., Peng, X., Quandt, A., Rama, T., Vargas-Gastelum, L., Whitner, S., Williams, A., Yarden, O., Yenewodage, A., [Zahn, G.](#) **The ten most pressing questions about marine Fungi (and how to answer them).** *Limnology and Oceanography Letters*. (In Review)

Mora, J*. E., Olson, M., Rocks, S., & [Zahn, G.](#)† **Aquatic plant mycobiomes change with watershed urbanization.** *Science of the Total Environment* (In Review)

Pre-print: *bioRxiv*. <https://doi.org/10.1101/2024.06.23.600282>

Miller, I*. P., Laney, A. G., [Zahn, G.](#), Sheehan, B. J., Whitley, K. V., & Kuddus, R. H. (2024). **Isolation and preliminary characterization of a novel bacteriophage vB_KquU_φKuK6 that infects the multidrug-resistant pathogen *Klebsiella quasipneumoniae*.** *Frontiers in Microbiology*, 15. <https://doi.org/10.3389/fmicb.2024.1472729>

- Wainwright, B., Leon, J.*, Vilela, E.*, Hickman, KJE*, ... [Zahn, G.](#)[†] (2024). **Wallace's line structures seagrass microbiota and is a potential barrier to the dispersal of marine bacteria.** *Environmental Microbiome*.
- Hickman, K. J. E.*, & [Zahn, G.](#)[†] **Ten simple rules for leading a successful undergraduate-intensive research lab.** *PLOS Computational Biology*. 2024
- Wainwright BJ, Millar T*, Bowen L*, Semon L*, Hickman KJE*, Lee JN, [Zahn G.](#)[†] **The core mangrove microbiome reveals shared taxa potentially involved in nutrient cycling and promoting host survival.** *Environmental Microbiome*. 2023
- Rawson C*, [Zahn G.](#)[†] **Inclusion of database outgroups reduces false positives in fungal metabarcoding taxonomic assignments.** *Mycologia*. 2023
- Mikryukov, V., Dulya, O., Zizka, A., ... [Zahn, G.](#) ... Tedersoo, L. **Connecting the multiple dimensions of global soil fungal diversity.** *Science Advances*. 2023
- [Zahn G.](#)[†] **Marker Genes (16S and ITS) Protocol for Plant Microbiome Analyses.** *BIO-PROTOCOL*. 2022
- Watmough, S., Gilbert-Parkes, S., Basiliko, N., Lamit, L. J., ... [Zahn, G.](#) **Variation in carbon and nitrogen concentrations among peatland categories at the global scale.** *PLOS ONE*, 17(11), e0275149. 2022.
- Tedersoo, L., Mikryukov, V., Zizka, A., ... [Zahn, G.](#), ... Abarenkov, K. **Global patterns in endemism and vulnerability of soil fungi.** *Global Change Biology*. 2022
- McGee, S.*, Tidwell, A.*, Riggs, E., Veltkamp, H.*, [Zahn, G.](#)[†] **Long-term soil fungal community recovery after fire is impacted by climate change.** *Western North American Naturalist*. 2022
- Sur G.L.*, [Zahn G.](#), Stacy EA. **Examination of host-taxon, environment, and distance effects on leaf fungal endophytes in the dominant woody genus, *Metrosideros*, on O'ahu.** *Fungal Ecology*. 2021
- Wilson, T., Poulson, A., Packer, C., Carlson, R., Davis, R., Dey, M.*, Owen, N.*, Smalley, S.*, Dodge, R.*, Baadsgaard, A., Stevens, M., [Zahn, G.](#)[†] **Essential oil, insect, and microbe relationships in *Juniperus osteosperma* (Cupressaceae) trees killed by wildfire.** *Phytologia*. 2021
- Tedersoo, L., Mikryukov, V., Anslan, ... [Zahn G.](#), ... Abarenkov, K. **The Global Soil Mycobiome consortium dataset for boosting fungal diversity research.** *Fungal Diversity*. 2021
- Quek, Z., [Zahn, G.](#), Lee, N., Ooi, J., Lee, J., Huang, D., & Wainwright, B. **Biogeographic structure of fungal communities in seagrass *Halophila ovalis* across the Malay Peninsula.** *Environmental Microbiology Reports*. 2021
- Egan, C., Koko, J., Muir, C., [Zahn, G.](#), Swift, S., Amend, A., Hynson, N. **Restoration of the mycobiome of the endangered Hawaiian mint *Phyllostegia kaalaensis* increases its resistance to a common powdery mildew.** *Fungal Ecology*. 2021
- Tipton, L., [Zahn, G.](#), Darcy, J. L., Amend, A. S., & Hynson, N. A. (2021). Hawaiian fungal amplicon sequence variants reveal otherwise hidden biogeography. *Microbial Ecology*. 2021
- Darcy, J., Swift, S., Cobian, G.*, [Zahn, G.](#), Perry B., Amend, A. **Fungal communities living within leaves of native Hawaiian dicots are structured by landscape-scale variables as well as by host plants.** *Molecular Ecology*. 2020
- Wainwright, B., [Zahn, G.](#), Afiq-Rosli, L., Tanzil, J., Huang, D. **Host age is not a consistent predictor of microbial diversity in the coral *Porites lutea*.** *Scientific Reports*. 2020
- [Zahn G.](#), Tipton L., Datlof E.*, Kivlin S., Sheridan P., Amend A., Hynson N. **Fungal aerobiota are not affected by time nor environment over a 13-y time series at the Mauna Loa Observatory.** *PNAS*. 2020
- [Zahn G.](#)[†], Amend A. **Foliar fungi alter reproductive timing and allocation in *Arabidopsis* under normal and water-stressed conditions.** *Fungal Ecology*. 2019
- Wainwright, B., [Zahn, G.](#), Zushi, J.*, Lee, N., Ooi, J., Lee, J*. **Seagrass-associated fungal communities show distance decay of similarity that has implications for seagrass management and restoration.** *Ecology and Evolution*. 2019

Wainwright, B., Bauman, A., [Zahn, G.](#), Todd, P., & Huang, D. **Characterization of fungal biodiversity and communities associated with the reef macroalga *Sargassum ilicifolium* reveals fungal community differentiation according to geographic locality and algal structure.** *Marine Biodiversity*. 2019

Wainwright, B., Afiq-Rosli, L., [Zahn, G.](#), Danwei Huang. **Characterisation of coral-associated bacterial communities in an urbanised marine environment shows strong divergence over small geographic scales.** *Coral Reefs*. 2019

Wainwright, B., [Zahn, G.](#), Arlyza, S., Amend, A. **Seagrass-associated fungal communities follow Wallace's line, but host genotype does not structure fungal community.** *Journal of Biogeography*. 2018

[Zahn, G.](#)[†], Amend, A. **Foliar microbiome transplants confer disease resistance in a critically-endangered plant.** *PeerJ*. 2017

Datlof, E.*, Amend, A., Earl, K., Hayward, J., Morden, C., Wade, R., [Zahn, G.](#), Hynson, N. (2017). **Uncovering unseen fungal diversity from plant DNA banks.** *PeerJ*. 2017

Wainwright, B., [Zahn, G.](#), Spalding, H., Sherwood, A., Smith, C., Amend, A. **Fungi associated with mesophotic macroalgae from the 'Au'au Channel, west Maui are differentiated by host and overlap terrestrial communities.** *PeerJ*. 2017

[Zahn, G.](#)[†], Wagai, R., Yonemura, S. **The effects of amoebal bacterivory on carbon and nitrogen dynamics depend on temperature and soil structure interactions.** *Soil Biology and Biochemistry*. 2016

[Zahn, G.](#)[†], Stephenson, S., Spiegel, F. **Ecological distribution of protosteloid amoebae in New Zealand.** *PeerJ*. 2014

De Haan, M., Cocquyt, C., Tice, A., [Zahn, G.](#), Spiegel, F. **First records of Protosteloid Amoebae (Eumycetozoa) from the Democratic Republic of the Congo.** *Plant Ecology and Evolution*. 2014

Murphy, E., Boxberger, J., Colvin, R., Lee, S., [Zahn, G.](#), Loor, F., Kim, K. **Pil1, an eisosome organizer, plays an important role in the recruitment of synaptojanins and amphiphysins to facilitate receptor-mediated endocytosis in yeast.** *European Journal of Cell Biology*. 2011

Code and software publications

[CommunityAssemblR](#) – Simulations of microbiome biotic interactions

[mycobank](#) – Fungal name synonym and taxonomy correction

[hubfindr](#) – Identification of network hub taxa in microbial communities

[virulator](#) – Detection of novel virus signatures in metagenomes

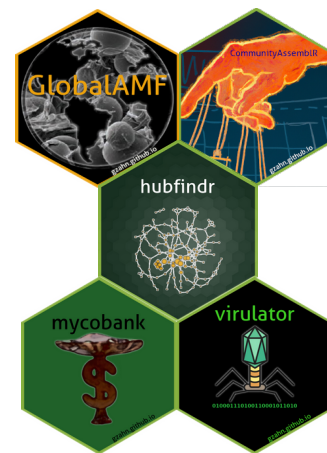
[QIIME Database builder](#) – QIIME2 plugin for custom taxonomies

[Microbiome Workshop](#) – 2-day intro to microbiome data analysis

[Custom Unix tools](#) – Collection of bioinformatics scripts

[R for Biologists](#) – 16-week online course

[Bioinfo Data Skills Course](#) – 16-week online course



Funding (Total \$3,372,199 awarded)

RCN: FOMO-Net: The fungal oceanic mycomass observation network for global quantification of marine fungal biomass and nutrient flux

PI | NSF BIO | \$450,000 (Pending)

ROA: Co-dispersal of bacteria and AM Fungal spores

Co-PI | NSF Supplement to DEB-2205650 | \$80,000

S-STEM: Faculty-Mentored Experiences for Improving Undergraduate Biology Student Outcomes

PI | NSF (DUE – 2424080) | \$1,918,705

Myco-Ed: Mycological Curriculum for Education and Discovery

Senior Personnel | JGI

Burning questions in microbial ecology: Ecological mechanisms that control microbiome transplant outcomes

Co-PI | NSF BIO | \$878,200 (Declined, resubmitting)

Molecular predictors of mangrove holobiont assembly

Writer/Senior Personnel | Singapore MOE (IG20-SI003) | \$180,000

GEL: Using neural networks to link host expression and microbiome assembly

PI | UVU Grants for Engaged Learning (GEL-007) | \$30,000

Previous external funding

Faculty-Mentored Experiences for Improving Undergrad Biology Student Outcomes PI | NSF (DUE – 1833880) | \$972,287

Methods for fungal endophyte sampling from endangered cacti

PI | 2019 | Capitol Reef National Park Field Station | \$3,000

Assessing the Implementation of Undergraduate Research Teams at an Open Enrollment Institution

Co-PI | 2018 | GREEN Grant, UVU | \$29,327

Engaging undergraduates in advanced research

PI | 2018 & 2019 | UVU Grants for Engaged Learning (GEL-002) | \$19,997

Restoration of critically endangered Hawaiian native plants by understanding and manipulating foliar microbial symbionts

Co-PI | 2015 | OANRP Rare Plant Management Grant | \$40,500

JSPS alumni travel award

PI | 2014 | Japan Society for the Promotion of Science | \$750

JGI travel award

PI | 2014 | Joint Genome Institute | \$450

The Importance of Microbial Interactions to Soil Carbon Cycling on a Warming Planet

PI | 2013 | JSPS Summer Fellowship | \$12,500

The Importance of Microbial Interactions to Soil Carbon Cycling on a Warming Planet

PI | 2013 | NSF EAPSI Fellowship | \$5,070 + living expenses

Assessing the status of USDA Green Ribbon Schools nationally

PI | 2013 | Clean Air, Cool Planet Climate Fellowship | \$5,000

Mycological Society of America Travel Award

PI | 2011 | \$350

NSF GK-12 Fellowship

PI | 2011 | \$30,500

Awards

Dean's Award of Excellence for Faculty Scholarship – UVU

Awarded 2020 & 2022 | \$5,500

Presidential Award for Faculty Scholarship – UVU

Awarded 2019 | \$8,000

Plant conservation from a microbial perspective

Awarded 2016 | MSA Translational Mycology Postdoctoral Award | \$2,500

Selected Presentations

Invited

Linking ecological lessons from natural microbial dispersal to microbiome transplantation success

University of Maine 2025

Building a better holobiont

The Ohio State University 2024

Using AI to detect biotic processes that influence microbiome transplantation success

Dartmouth EEESL 2024

Using neural networks to detect biotic interactions during disruptive community assembly of fungi

Mycological Society of America 2024

Toward predictive modeling of mycobiome transplantations

National Univ. of Singapore 2024

Modeling community assembly processes for useful and reproducible microbiome transplantations

NIAES, Japan 2024

Translating mentored undergraduate research into student retention and success

NSF S-STEM Symposium 2023

Less content, more context: Research as pedagogy in undergraduate mycology courses

Mycological Society of America 2022

Who's there and who cares: the how and why of fungal community structure

Univ. of Arkansas/Missouri State Univ 2018

Plant conservation from a microbial perspective

O`ahu Army Natural Resources Program 2016

Contributed

Marine fungi appear in random associations in Mediterranean sponge holobionts

MarFunDive - Stazione Zoologica Anton Dohrn 2024

Metagenomic Tools for Mycobiome Analyses in Model vs. Non-Model Systems

Mycological Society of America 2023

Aquatic Plant-Associated Fungi Along an Urbanization Gradient

Mycological Society of America 2023

Improving the Accuracy of Meta-Amplicon Taxonomic Assignments Through the Inclusion of Outgroups in Fungal Databases

Mycological Society of America 2023

Inspecting the microbiome and metabolomic compartments of Mediterranean sponge holobionts through an integrated 'omics approach

International Sponge Symposium, Netherlands 2022

Fungal endophytes and pathogens in endangered hawaiian endemics: Plant conservation from a microbial perspective

Mycological Society of America 2016

The interactive effects of protozoan predation pressure and environmental factors on carbon and nitrogen cycling in soils under warming conditions

ISME, South Korea 2014

Teaching and Mentoring

Designed and director of Undergrad Bioinformatics Degree Program

Instructor of record for:

Mycology

Course-based research experience – Fungal systematics, anatomy, physiology, and ecology

Plant Pathology

Course-based research experience – Fungal, protistan, bacterial, nematode, and viral pathogens

Data Analysis for Biologists

Data cleaning, visualization, modeling, and reporting (R language)

Bioinformatics Data Skills

Command-line data skills, bash scripting, metagenomic analysis, High-performance computing

Microbiome Boot Camp

Numerical ecology, community ecology analysis, spatial analysis, R package design, scientific writing

Organismal Biology

Intro majors biology, evolution, phylogenetics, tree of life survey, intro ecology

Director and PI of NSF S-STEM Biology Program (UVU)

Career and academic mentor to 41 NSF Scholars

Manage budget and reporting

Graduate committee member:

Valerio Mazzella (Stazione Anton Dohrn)

Rae Berner (Washington State U)

Becca Evans (Washington State U)

Gary Sur (U Hawaii at Manoa)

Syrena Whitner (U Hawaii at Manoa)

Nichole Paulette

Lauren Groathouse

Nicholas Fryer

Zachary Petersen

Samuel Anaya

Miles Spencer

Rollo Simmons

Reagan Dodge

Natalia Backman

Sarah van Dijk

Logan Weseman

Erika Lakin

Clayton Rawson

Jonathan Wasden

Spencer McGee

Alyssa Tidwell

Harrison Haws

Nicholas Long

David Parker

Garrett Matthews

Bryce Brunetti

Undergraduate thesis supervisor:

(External funding for mentees: \$110,630)

Tayler Fearn

Austen Miller

Jo Hickman

Josh Leon

Jacob Mora

Annette Lewis

Ozzly Rallis

Hayden Johnson

Whitney Kraatz

Magnolia Morelli

Service

Department

Associate department chair – Utah Valley University (2023 – 2024)

Faculty search committees (Chair 1x, Member 6x)

Bioinformatics program development

Strategic planning committee

NSF S-STEM program director

College and University

Faculty Senate (2017-2020)

High-performance computing committee chair (2020 – Current)

Program and course development (Univ. of Arkansas, Utah Valley Univ.)

Profession

Associate Editor of *Mycologia*
Education Committee Mycological Society of America
Fungal Oceanic Mycological Observation Network
Consortium of Fungi
Champion, National Microbiome Data Collaborative
Mangrove Microbiome Initiative
IUCN SSC – Chytrids, Zygomycetes, Downy Mildews, Slime Moulds Specialist Group
IUCN SSC – Aquatic Fungi Specialist Group
Invited to 2024 White House Summit on STEMM Equity and Excellence

Society membership

International Society for Microbial Ecology
Mycological Society of America
International. Society for Fungal Conservation
Japan Society for the Promotion of Science Alumni Assoc.
Genetics Society of America
Council for Undergraduate Research

Invited Reviewer

NSF Panel and *ad hoc* reviews
NSF GRFP
BARD US-Israel Agricultural Development Fund
Soil Biol. and Biochem. (Distinguished)
Pedobiologia (Distinguished)
ISME Journal
PeerJ
Oikos
Fungal Ecology (Distinguished)
Molecular Ecology
Ecology and Evolution
American Fern Journal
New Phytologist
Phytobiomes
Microbiology Spectrum
PNAS
PLOS Computational Biology

Outreach

Stockman Grass Farmer [Magazine](#)
ScienceNews [Article](#)
Hawaii [News Now](#)
Science fair judge (annual)
Utah Fungus Fest Speaker
NSF GK-12 Fellow (6th-grade)
Mycological art
Poster judge (MSA meeting, annually)

