

# Geoff Zahn, PhD

Translational mycology | Host-Microbe symbiosis

## Current roles

- PI of Zahn microbial ecology lab
- Associate editor of *Mycologia*
- Mycology & Bioinformatics Teacher
- Bioinformatics consultant
- PhD committee member (3 students)
- Associate Department Chair (Biology)
- Director of Undergraduate Bioinformatics Degree
- R package developer
- National Microbiome Data Collaborative Champion

## Professional Appointments

2024 –

**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 (Protist-bacterial interactions)  
University of Arkansas

2010 BS Ecology (Fungal genetics thesis)  
Missouri State University

## Awards and Funding

(Total funding: \$1,373,494)

*Pending*

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

Co-PI | NSF DEB | \$1,448,000

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

PI | NSF DUE | \$1,678,744

**Myco-Ed: Mycological Curriculum for Education and Discovery**

Senior Personnel | JGI



## Contact Info

[gzahn@uvu.edu](mailto:gzahn@uvu.edu)   
[github.com/gzahn](https://github.com/gzahn)   
[Lab website](#)   
[ORCiD Profile](#) 

## Skills

### Computational:

R / Bash / Python  
Unix admin  
High-performance computing  
Metagenomics  
Metatranscriptomics

### Wet-lab:

DNA / RNA  
Microbial culturing  
Microscopy (Fluor/SEM)  
Greenhouse  
Microcosms

### Academic:

Course and program design  
Lab management  
Grant management  
Active learning  
CUREs  
Mentoring

### Statistical methods:

RandomForest  
lmer  
vegan  
neuralnets  
tensorflow  
xgboost  
edible  
igraph / SpiecEasi  
DeSeq2

*Current*

**Molecular predictors of mangrove holobiont assembly**

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

**Faculty-Mentored Experiences for Improving Undergrad Biology Student Outcomes**

PI | NSF (DUE – 1833880) | \$972,287

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

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

*Past*

**Dean's Award of Excellence for Faculty Scholarship – UVU**

Awarded 2020 & 2022 | \$5,500

**Presidential Award for Faculty Scholarship – UVU**

Awarded 2019 | \$8,000

**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

**Plant conservation from a microbial perspective**

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

**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**

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

**JGI travel award**

Awarded 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**

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

**Mycological Society of America Travel Award**

Awarded 2011 | \$350

**NSF GK-12 Fellowship**

Awarded 2011 | \$30,500



**Code contributions**

[CommunityAssemblR](#)

[Microbiome Workshop](#)

[R for Biologists](#)

[Custom Unix tools](#)

[QIIME Database builder](#)

[Bioinfo Data Skills Course](#)

**Collaborations**

National Univ. of Singapore

Joint Genome Institute

Universiti Malaysia Terengganu

Universiti Malaya, Kuala Lumpur

Univ. of Hawai'i at Mānoa

Oxford Univ.

Univ. of Arkansas

Univ. of Nevada, Las Vegas

Okanagan College

University of Colorado, Anschutz

Stazione Anton Dorhn

Washington State Univ.

SUNY Syracuse

Univ. of Colorado, Denver

Pacific NW National Lab

Univ. of Colorado, Denver

SoftCell, Inc.

Young Living, Inc.

**Selected 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

## Publications

[Google Scholar Profile](#) | 33 Publications (+1 in review) | H-index: 15 | i10-Index: 17

### In review

Wainwright, B., Leon, J.\* , Vilela, E.\* , Hickman, KJE\*, ... [Zahn, G.](#)<sup>†</sup> Wallace's line structures the seagrass microbiota and is a potential barrier to the dispersal of marine bacteria. *Environmental Microbiome*.

### 2024

Hickman, K. J. E.\* , & [Zahn, G.](#)<sup>†</sup> Ten simple rules for leading a successful undergraduate-intensive research lab. *PLOS Computational Biology*. 2024

### 2023

Wainwright BJ, Millar T\*, Bowen L\*, Semon L\*, Hickman KJE\*, Lee JN, [Zahn G.](#)<sup>†</sup> The core mangrove microbiome reveals shared taxa potentially involved in nutrient cycling and promoting host survival. *Environmental Microbiome*. 2023

Rawson C\*, [Zahn G.](#)<sup>†</sup> 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

### 2022

[Zahn G.](#)<sup>†</sup> Marker Genes (16S and ITS) Protocol for Plant Microbiome Analyses. *BIO-PROTOCOL*. 2022

Tedersoo, L., Mikryukov, V., Zizka, A., ... [Zahn, G.](#), ... Abarenkov, K. Global patterns in endemicity and vulnerability of soil fungi. *Global Change Biology*. 2022

McGee, S.\* , Tidwell, A.\* , Riggs, E., Veltkamp, H.\* , [Zahn, G.](#)<sup>†</sup> Long-term soil fungal community recovery after fire is impacted by climate change. *Western North American Naturalist*. 2022

### 2021

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.\* , [Zahn, G.](#), Baadsgaard, A., & Stevens, M. 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 Mycobioeme 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



## Public Data Sets

[Metrosideros fungi](#)

[Coral microbiomes](#)

[Post-Fire soil fungi](#)

[Plant virus genomic database](#)

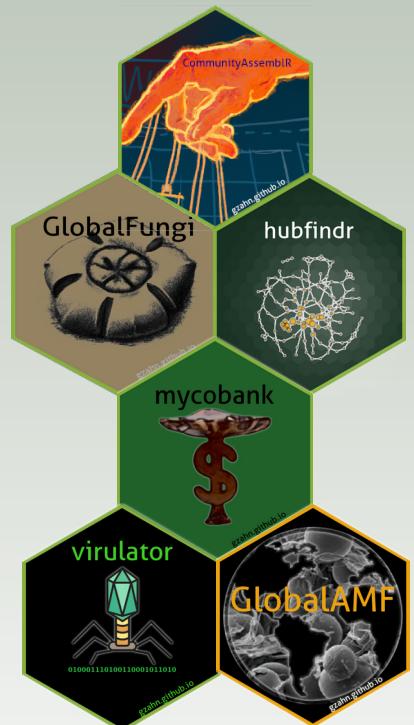
[Seagrass fungi](#)

[Lignin-decomposing fungi](#)

[Urban aquatic plant fungi](#)

etc.

## Software developer



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

### 2020 & Earlier

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., et al. **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.\*., et al.. **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



### Societies and Service

- 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
- 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
- NSF GK-12 Teaching Fellow (2011-2012)
- Faculty senator - UVU (2017-2020)
- Program and course development (Univ. of Arkansas, Utah Valley Univ.)
- Faculty search committees (Chair 1x, Member 6x)
- Associate department chair – Utah Valley University (2023 – 2024)
- IUCN SSC – Chytrids, Zygomycetes, Downy Mildews, Slime Moulds Specialist Group

### Invited Reviewer

- NSF Panel and *ad hoc* reviews
- NSF GRFP
- BARD US-Israel Agricultural Development Fund

#### **Journals:**

- 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*

## Technical Reports

Geoffrey Zahn and Tyler Hacking. 2019. Development of non-detrimental methods to survey fungal endophytes in endangered cacti. Capitol Reef National Park Field Station Report.

Geoffrey Zahn, Anthony Amend. 2017. Role of fungal endophytes and epiphytes in endangered species conservation. O'ahu Army Natural Resources Program Year-End Report

Geoffrey Zahn, Anthony Amend. 2016. Molecular assessment of wild Achatinella mustelina diet. O'ahu Army Natural Resources Program Year-End Report

Geoffrey Zahn, Anthony Amend. 2015. Molecular assessment of wild Achatinella mustelina diet. O'ahu Army Natural Resources Program Year-End Report



## Selected Presentations

*Invited*

### **Toward predictive modeling of mycobiome transplants**

NIAES, Japan | National Univ. of Singapore 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**

University of Arkansas/Missouri State University 2018

### **Plant conservation from a microbial perspective**

O`ahu Army Natural Resources Program 2016

*Contributed*

### **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	(Research-based course)
R for Biologists	(Data analysis/vis/modeling)
Bioinformatics Data Skills	(Bash/HPC/Unix admin)
Microbiome Boot Camp	(Numerical ecology/advanced R)
Organismal Biology	(Majors' intro course)

### Research mentor

3 PhD students (committee member)  
2 MS students  
39 Undergraduate students (thesis advisor)

### Director of NSF S-STEM Biology Program (UVU)

Career and academic mentor to 41 NSF Scholars  
Manage budget and reporting

## Mentee Funding and Awards

GEL Grant awarded to Tayler Fearn (\$5,000)  
**Modeling microbiome transplants with convolutional neural networks**

NSF REU awarded to Austen Miller (\$6,000)

**Mycological Society of America Travel Grant**  
awarded to Tayler Fearn (\$750)

**Mycological Society of America Travel Grant**  
awarded to Jo Hickman (\$750)

NSF REU awarded to Josh Leon (\$6,000)

**NSF Graduate Research Fellowship** awarded to Jo Hickman - Life Sciences - Ecology (\$37,000)

Scholarly Activities Committee (SAC) Grant awarded to Annette Lewis (\$746)

**Does Higher Phylogenetic Diversity in Fungal Communities Lead to Faster Decomposition?**

SAC Grant awarded to Austen Miller (\$3,769)  
**Characterizing a potentially new fungal pathogen of basil**

SAC Grant awarded to Ozzly Rallis (\$1,919)  
**Effects of nicotine-based pesticides on fungal foliar endophytes**

SAC Grant awarded to Hayden Johnson (\$1,440)  
**Foliar endophytes' influence on root architecture**

SAC Grant awarded to Whitney Kraatz (\$518)  
**Developing a scalable protocol for recycling paper waste with edible mushrooms**

Board of Trustees Research Scholarship Award to advisee Magnolia Morelli (\$6,000)  
**Draft genome of a newly described *Gymnopus* species**

**(Total \$110,630)**

SAC Grant awarded to Nichole Paulette (\$769)  
**Effects of Ethanol Vapor on the Germination of *Baudoinia compniacensis***

SAC Grant awarded to Lauren Groathouse (\$602)  
**Exploring the relationship between arthropod and plant endophyte microbiota**

SAC Grant awarded to Zachary Petersen (\$728)  
**Predation of Pathogenic *Staphylococcus* sp. by Slime Molds**

SAC Grant awarded to Nicholas Fryer (\$888)  
**UVU's GRIT Garden Underground Fungal Map**

SAC Grant awarded to Samuel Anaya (\$991)  
**Evolutionary recovery of alcohol tolerance in yeast**

SAC Grant awarded to Brittany Bugg (\$256)  
**Order of arrival and community assembly in wood decomposers**

SAC Grant awarded to Miles Spencer (\$958)  
**Mammal dispersal of fungi in urban areas**

Undergraduate Research Grant (URSCA) awarded to advisee Magnolia Morelli (\$1,944)  
**Primate Mycophagy in the Tropics**

SAC Grant awarded to Rollo Simmons (\$375)  
**Survey of aquatic fungi in Utah Lake**

SAC Grant awarded to Branden Petersen (\$906)  
**MRSA antagonism in fungal species across Utah County**

URSCA awarded to Reagan Dodge and Natalia Backman (\$2,900)  
**Converting cellulose waste into gourmet edible mushrooms**



SAC Grant awarded to Sarah van Dijk (\$1,833)  
**Determining the effect of different pathogens on Arabidopsis thaliana root architecture**

SAC Grant awarded to Logan Wesemann (\$439)  
**Limiting ice nucleation from *P. syringae* using biocontrol**

SAC Grant awarded to Erika Lakin (\$1,440)  
**Fungal endophytes and the hybrid advantage in crucifers**

URSCA awarded to Connor Glassford (\$743)  
**Novel antimicrobials from extremophilic fungi**

URSCA awarded to Clayton Rawson (\$1,460)  
**Survey of extremophilic fungi in Utah**

URSCA awarded to McKenzie Bell (\$954)  
**Fungal bioremediation of microplastics**

URSCA awarded to Katia L'Ecuyer (\$854)  
Produce aisle endophytes

Board of Trustees Research Scholarship Award to advisee Jonathan Wasden (\$6,000)  
**Forest fires and soil fungal recovery**

URSCA awarded to Jonathan Wasden (\$1,987)  
**Forest fires and endophytes**

URSCA awarded to advisees Natiri Swenson (\$840)  
**Pathogenic nematode density under various orchard management strategies**

URSCA awarded to Alyssa Tidwell and Jenni Lawrence (\$2,970)  
**Fungal and bacterial community structure during wetland recovery**

URSCA awarded to Spencer McGee (\$1,740)  
**Soil microbial responses after the Pole Creek Fire in Utah**

URSCA awarded to Garrett Matthews (\$978)  
**Examining the roles of endophytes in leaf decomposition**

URSCA awarded to Bryce Brunetti and Jordan Bayly (\$833)  
**Underwater heroes: finding a chytrid antagonist**

URSCA awarded to Nicholas Long and Harrison Haws (\$3,000)  
**Lifestyle determinants of the human oral mycobiome**

URSCA awarded to Alyssa Tidwell and Spencer McGee (\$3,000)  
**Community assembly of soil fungi within a fire chronosequence**

URSCA awarded to Bryce Brunetti (\$350)  
**Construction of a mock fungal community for high-throughput amplicon research**

