

# Daniel W. Roush

POSTDOCTORAL SCHOLAR - QIYUN LAB

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## Education

### Arizona State University

DOCTORATE OF PHILOSOPHY IN MICROBIOLOGY, *Defense Passed July 2020*

Dissertation: Photosynthetic Agents of Carbonate Bioerosion in Endolithic Microbiomes

Tempe, AZ

Aug. 2013 - Aug. 2020

### Missouri University of Science and Technology

MASTER OF SCIENCE IN APPLIED AND ENVIRONMENTAL BIOLOGY

Thesis: Production of 1,3-propanediol from Glycerol under Haloalkaline Conditions by *Halanaerobium hydrogeniformans*

Rolla, MO

Aug. 2011 - Dec. 2013

BACHELOR OF SCIENCE IN BIOLOGY

Aug. 2007 - May 2011

## Research Experience

### Microbial ecology of endolithic phototrophs

PHD DISSERTATION, GARCIA-PICHEL LAB

- Discovered anoxygenic phototrophs as important endolithic microbiome members
- Characterized phototroph colonization, succession, and population dynamics within intertidal carbonates
- Developed Cydrasil, a curated cyanobacterial 16S rRNA gene database, analysis pipeline, and web app

Tempe, Arizona

Aug. 2013 - Present

### Production of 1,3-propanediol under haloalkaline conditions by *Halanaerobium hydrogeniformans*

MASTERS THESIS, MORMILE LAB

- Identified potential 1,3-PDO capabilities of *H. hydrogeniformans* using sequenced genome and JGI/IMG tools
- Induced 1,3-PDO production capabilities using Vitamin B<sub>12</sub>

Rolla, Missouri

Aug. 2011 - Aug. 2013

### Engineering sensing strains for the detection of novel quorum sensing homoserinelactones

UNDERGRADUATE RESEARCH, WESTENBERG LAB

- Used synthetic biology techniques to develop strains of *E. coli* to screen for production of novel HSLs from *B. japonicum*

Rolla, Missouri

Aug. 2009 - May. 2011

### Expression of *Geobacter sulfurreducens* cytochromes in *Escherichia coli*

UNDERGRADUATE RESEARCH, IGEM

- Engineered expression of outer-membrane cytochromes from *G. sulfurreducens* in *E. coli* for use in aerobic microbial fuel cells

Rolla, Missouri

Jan. 2008 - May. 2011

## Skills

**Programming** Python, bash/shell scripting, R, LaTeX, Javascript

**Web** HTML5, CSS, Bootstrap, Vuetify, Vue.JS, Amazon Web Services (AWS)

**OS** Linux/UNIX, Windows, OSX

**Bioinformatics** Microbiome Analysis (Qiime, Qiime2), Phylogenetic Reconstruction (RAxML, BEAST2), Databases (NCBI, JGI/IMG/M, Silva), Alignment (BLAST, mafft, MEGA, Infernal, SSU-Align), Network Analysis, FastQC

**Microbiology** Aseptic Technique, Enrichment Culturing, Strain Isolation, Anaerobic Cultivation, Differential Staining

**Microscopy** Confocal Laser Scanning Microscopy, Epifluorescence Microscopy, Light Microscopy

**Molecular Biology** PCR, qPCR, Synthetic Biology, Cloning, Transformation, Conjugation

**Analytical Chemistry** High Pressure Liquid Chromatography (Pigments, Fermentation), Gas Chromatography (Fermentation), Mass Spectrometry

## Teaching Experience

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### Bioinformatic Analysis of High-throughput DNA Data from Microbiomes, 1 semester

INSTRUCTOR

- Developed and implemented an active learning curriculum including a capstone Microbiome analysis project
- Enrollment: 10 undergraduate and graduate students

ASU

2017

### Advanced Bacteriology Lab, 4 semesters

TEACHING ASSISTANT

ASU

2014 - 2019

### Human Anatomy/Physiology I, 2 semesters

TEACHING ASSISTANT

ASU

2018 - 2019

### Capstone: Issues in Biotechnology, 1 semester

TEACHING ASSISTANT

ASU

2018

### Conceptual Approaches to the Life Sciences, 1 semester

TEACHING ASSISTANT

ASU

2017

### Cell Biology, 1 semester

TEACHING ASSISTANT

ASU

2016

### Microbial Diversity and Systematics, 1 semester

TEACHING ASSISTANT

ASU

2016

### Microbiology Lab, 3 semesters

TEACHING ASSISTANT

MS&T

2012 - 2013

### Molecular Genetics Lab, 1 semester

TEACHING ASSISTANT

MS&T

2011

## Leadership & Outreach

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### Microbiology Graduate Student Association

COFOUNDER & PRESIDENT

ASU

2016 - 2018

### Intel International Science and Engineering Fair

JUDGE

Phoenix, Arizona

May 2016, May 2019

### SciFilms

SCIENCE ADVISOR

ASU

2014 - 2015

### STEAM Machines K-12 Outreach

SCIENCE ADVISOR

ASU

2013 - 2014

### Science Olympiad

REGIONAL EVENT COORDINATOR

MS&T

2010 - 2013

## Mentoring

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### Evelyn Turcotte

SCHOOL OF LIFE SCIENCES UNDERGRADUATE

Current: Research Associate at Mayo Clinic, Applying for Medical School this Fall

ASU

2016 - 2018

### Dylan Courtney

BIOCHEMICAL ENGINEERING UNDERGRADUATE

Current: PhD Candidate at University of Wisconsin-Madison

Missouri S&T

2012 - 2013

## Honors & Awards

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2020	<b>PhD Completion Award</b> , School of Life Sciences	ASU
2018	<b>ISPP Travel Award</b> , ISPP 2018	Vancouver, BC
2018	<b>GPSE Travel Award</b> , ISPP 2018	ASU
2018	<b>School of Life Sciences Travel Award</b> , ISPP 2018	ASU
2018	<b>Ambassador</b> , School of Life Sciences Alumni Ambassador Program	ASU
2017	<b>Outstanding Abstract Award</b> , ASM Microbe 2017	New Orleans, LA
2017	<b>ASM Travel Grant</b> , ASM Microbe 2017	New Orleans, LA
2017	<b>Young Investigator Oral Presentation</b> , ASM Microbe 2017	New Orleans, LA
2017	<b>College of Liberal Arts and Sciences Travel Award</b> , ASM Microbe 2017	ASU
2017	<b>School of Life Sciences Travel Award</b> , ASM Microbe 2017	ASU
2017	<b>Invited Speaker</b> , Microbiology and Molecular Biology Retreat	ASU
2017	<b>Ambassador</b> , School of Life Sciences Alumni Ambassador Program	ASU
2015	<b>Invited Speaker</b> , Microbiology and Molecular Biology Retreat	ASU
2014	<b>Continuation Grant</b> , Science Foundation Arizona	ASU
2013	<b>Graduate Research Fellow</b> , Science Foundation Arizona	ASU
2013	<b>Doctoral Recruitment Award</b> , ASU School of Life Sciences	ASU
2013	<b>Young Investigator Oral Presentation</b> , ASM General Meeting	Denver, CO
2013	<b>ASM Travel Grant</b> , ASM General Meeting	Denver, CO
2013	<b>2nd Place</b> , Missouri Valley Regional ASM Annual Meeting	Columbia, Missouri
2011	<b>Graduate Research Fellow</b> , TWA Environmental Science Scholarship Fund	MS&T

## Tools & Resources

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### Cydrasil: A comprehensive phylogenetic tree of cyanobacterial 16s rRNA gene sequences

D. Roush, A. Giraldo-Silva, V. M. C. Fernandes, N. Maria Machado de Lima, S. McClintock, S. Velasco Ayuso, K. Klicki, B. Dirks, W. Arantes Gama, K. Sorochkina, F. Garcia-Pichel

URL: <https://github.com/FGPLab/cydrasil>, 2018, DOI: 10.5281/zenodo.1409274

## Patents

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### Conversion of glycerol to 1,3-propanediol under haloalkaline conditions

M. Mormile, D. Roush, D. Elias, O. Sittton

University of Missouri, 9,328,360 B2, 2016

## Publications

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### FIRST AUTHOR

#### Succession and colonization dynamics of endolithic phototrophs within intertidal carbonates

D. Roush, F. Garcia-Pichel

*Microorganisms* 8.2 (2020) pp. 1–15. DOI: 10.3390/microorganisms8020214

#### A New Niche for Anoxygenic Phototrophs as Endoliths

D. Roush, E. Couradeau, B. Guida, S. Neuer, F. Garcia-Pichel

*Applied and Environmental Microbiology* 84.4 (2018). American Society for Microbiology Journals, DOI: 10.1128/AEM.02055-17

#### Metabolic Capabilities of the Members of the Order Halanaerobiales and Their Potential Biotechnological Applications

D. Roush, D. Elias, M. Mormile

*Current Biotechnology* 3.1 (2014) pp. 3–9. DOI: 10.2174/221155010301140303102741

#### Production of 1,3-propanediol from glycerol under haloalkaline conditions by Halanaerobium hydrogeniformans

D. Roush

Missouri S&T, Master's Thesis, 2013

### CO-AUTHOR

#### The Compositionally Distinct Cyanobacterial Biocrusts From Brazilian Savanna and Their Environmental Drivers of Community Diversity

N. M. Machado-de-Lima, V. M. C. Fernandes, **Roush, Daniel**, S. Velasco Ayuso, J. Rígonato, F. Garcia-Pichel, L. H. Z. Branco

*Frontiers in Microbiology* (2019). DOI: 10.3389/fmicb.2019.02798

**Diversity and mineral substrate preference in endolithic microbial communities from marine intertidal outcrops (Isla de Mona, Puerto Rico)**

E. Couradeau, **Roush, Daniel**, B. S. Guida, F. Garcia-Pichel

*Biogeosciences* 14.2 (2017) pp. 311–324. doi: 10.5194/bg-14-311-2017

**Exposure to predicted precipitation patterns decrease population size and alter community structure of cyanobacteria in biological soil crusts from the Chihuahuan Desert**

V. M. C. Fernandes, N. Maria Machado de Lima, **Roush, Daniel**, J. Rudgers, S. L. Collins, F. Garcia-Pichel

*Environmental Microbiology* 20 (2017) pp. 259–269. doi: 10.1111/1462-2920.13983

## Presentations

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**A New Environmental Niche for Anoxygenic Phototrophs**

D. Roush, F. Garcia-Pichel

*16th International Symposium on Phototrophic Prokaryotes*, 2018, Vancouver, British Columbia

**A New Environmental Niche for Anoxygenic Phototrophs**

D. Roush, E. Couradeau, B. Guida, F. Garcia-Pichel

*ASM Microbe 2017*, 2017, New Orleans, Louisiana

**A New Environmental Niche for Anoxygenic Phototrophs**

D. Roush, E. Couradeau, B. Guida, F. Garcia-Pichel

*56th Annual Meeting of the American Society for Microbiology - ASN Branch*, 2015, Flagstaff, Arizona

**Production of 1,3-Propanediol from Glycerol Under Haloalkaline Conditions**

D. Roush, M. Mormile, D. Elias, O. Sittton

*113th General Meeting of the American Society for Microbiology*, 2013, Denver, Colorado

**Production of 1,3-Propanediol from Glycerol Under Haloalkaline Conditions**

D. Roush, M. Mormile, D. Elias, O. Sittton

*Annual Meeting of the American Society for Microbiology - Missouri Branch*, 2013, Columbia, Missouri