

Benjamin D. Peterson

Postdoctoral Research Assistant, McMahon Lab
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Education

University of Wisconsin - Madison	Madison, WI
PhD in Environmental Chemistry and Technology Program, Department of Civil and Environmental Engineering	2021
State University of New York at Geneseo	Geneseo, NY
Bachelor of Science, <i>summa cum laude</i> Biochemistry Honors Minor (Edgar Fellows Honors Program)	2012

Employment and Research Experience

Postdoctoral Research Assistant	2021-current
<i>McMahon Lab – Departments of Bacteriology</i>	
Microbial links between sulfate reduction and methylmercury production in a eutrophic freshwater lake	

- Pair meta-omics (DNA/RNA sequencing, proteomics using mass spectrometry) techniques with mercury methylation assays to understand link between microbial sulfate reduction and methylmercury production
- Develop interdisciplinary approach to characterizing the impact of sulfate-reduction activity on overall microbial community metabolic activity
- Use extensive metagenomic sequencing data to characterize population and evolution of mercury-methylating gene and its potential role in microbial metabolism

Graduate Research Assistant	2015-2021
<i>McMahon Lab – Departments of Bacteriology and Civil & Environmental Engineering</i>	
Ecophysiology of mercury-methylating organisms in freshwater ecosystems	

- Dissertation project focuses on combining meta-omics techniques with functional assays and biogeochemical measurements to understand how microbes link biogeochemical cycling to the production of toxic methylmercury in freshwater ecosystems
- Serve as microbial ecology specialist on two large-scale U.S. Geology Survey projects studying mercury cycling in impacted sites (Hells Canyon Reservoir in Idaho and the Florida Everglades)
- Collaborate with USGS Mercury Research Laboratory in Middleton, WI
- Maintain the North Temperate Lakes Microbial Observatory time series

Animal Biologist (Contracter with Kelly's Government Services)	2014-2015
<i>National Institute on Aging: Neuroplasticity and Behavior Unit</i>	
PI: Dr. Henriette van Praag	
Impacts of running on initial integration of adult-born hippocampal neurons	

- Designed and led a study to characterize initial integration of new adult-born neurons into hippocampal networks

- Used fluorescent proteins delivered by injection of modified viruses into hippocampus to trace developing neural networks with two-photon microscopy
- Maintained experimental mouse colony

Postbaccalaureate IRTA Research Fellow

2012-2014

National Institute on Aging: Neuroplasticity and Behavior Unit

PI: Dr. Henriette van Praag

Tracing impacts of exercise on neuronal integration of adult-born hippocampal neurons

- Performed stereotaxic surgeries, perfusions, and immunohistochemical staining
- Used two-photon microscope to analyze tracings and expression of neurotransmitter receptors and chloride transporters
- Conducted animal behavior experiments
- Developed protocol to trace initial stages of neuronal integration by adult-born hippocampal cells

Undergraduate Research Assistant

2009-2012

State University of New York at Geneseo: Biology Department

PI: Dr. George Briggs

Characterization of a Novel Specifier Protein in the Glucosinolate-Myrosinase Pathway in *Brassica rapa*

- Identified novel protein in the glucosinolate-myrosinase pathway in *B. rapa* and cloned it into *E. coli* for characterization
- Designed a gas chromatography/mass spectroscopy protocol to identify the effect of the putative specifier protein on the products of the glucosinolate-myrosinase pathway
- Analyzed isothiocyanate production of *B. rapa* under conditions of stress

Summer Undergraduate Research Assistant

Summer 2011

University of Buffalo: Department of Biological Sciences

PI: Dr. Denise Ferkey

Impact of G-protein coupled signaling receptors on chemosensation of quinine in *C. elegans*

- Used behavioral assays to identify TRPV channel necessary for chemosensation of quinine
- Used SNP mapping to identify location of TRPV channel gene

Peer-reviewed publications

* indicates co-first authorship

** indicates undergraduate student I mentored

1. Lepak, RF, Tate MT, Ogorek JM, DeWild JF, **Peterson BD**, Hurley JP, and Krabbenhoft DP. "Aqueous Elemental Mercury Production versus Mercury Inventories in the Lake Michigan Airshed: Deciphering the Spatial and Diel Controls of Mercury Gradients in Air and Water." ACS ES&T Water, December 30, 2020, acsestwater.0c00187. <https://doi.org/10.1021/acsestwater.0c00187>.
2. **Peterson, B.D.**, McDaniel EA, **Schmidt AG, Lepak RF, Janssen SE, Tran PQ, **Marick RA, et al. "Mercury Methylation Genes Identified across Diverse Anaerobic Microbial Guilds in a Eutrophic Sulfate-Enriched Lake." Environmental Science & Technology, November 23, 2020, acs.est.0c05435. <https://doi.org/10.1021/acs.est.0c05435>.
3. McDaniel, E.A., **Peterson, B.D.**, Stevens, S.L.R., Tran, P.Q., Anantharaman, K., McMahon, K.D., 2020. "Expanded Phylogenetic Diversity and Metabolic Flexibility of Mercury-Methylating Organisms". mSystems 5 (4), <https://doi.org/10.1128/mSystems.00299-20>
4. Mohammad, H., Marchisella, F., Ortega-Martinez, S., Hollos, P., Eerola, K., Komulainen, E., Kuleskaya, N., Freemantle, E., Fagerholm, V., Savontous, E., Rauvala, H., **Peterson, B.D.**, van

- Praag, H., Coffey, E.T., 2018. "JNK1 controls adult hippocampal neurogenesis and imposes cell-autonomous control of anxiety behaviour from the neurogenic niche." *Mol Psychiatry* 23, 362–374. <https://doi.org/10.1038/mp.2016.203>
5. Sah, N., ***Peterson, B.D.**, Lubejko, S.T., Vivar, C., van Praag, H., 2017. "Running reorganizes the circuitry of one-week-old adult-born hippocampal neurons." *Sci Rep* 7, 10903. <https://doi.org/10.1038/s41598-017-11268-z>
 6. Vivar, C., **Peterson, B.D.**, van Praag, H., 2016. "Running rewires the neuronal network of adult-born dentate granule cells." *NeuroImage* 131, 29–41. <https://doi.org/10.1016/j.neuroimage.2015.11.031>

Oral presentations

Contributed talks

1. Potential role of PVC microbes in mercury methylation in freshwater lakes. **Webinar on Planctomycetes, Verrucomicrobia, and Chlamydiae**. Virtual conference. *April 2021*
2. Identification of Mercury Methylating Organisms along a Trophic Gradient. **Greater Everglades Ecosystem Restoration Conference**. Virtual conference. *April 2021*
3. Identification of Mercury Methylating Organisms along a Trophic Gradient in the Florida Everglades. **International Symposium on the Biogeochemistry of Wetlands Conference**. Virtual conference. *March 2021*
4. Identification of Mercury Methylating Organisms along a Trophic Gradient. **Society for Environmental Toxicology and Chemistry**. Virtual conference. *November 2020*
5. Novel hgcA+ organisms dominate mercury-methylating community in water column of sulfate-enriched lake. **International Conference on Mercury as a Global Pollutant**. Krakow, Poland. *September 2019*
6. Mercury-methylating organisms in Lake Mendota. **American Water Resources Association Wisconsin Section Annual Meeting**. Delavan, WI. *March 2019*

Internal Seminars

1. Investigating the microbial influence on mercury methylation in the Florida Everglades. **Center for Limnology Weekly Seminar**, University of Wisconsin - Madison, virtual presentation. *April 2021*
2. Investigating the microbial influence on mercury methylation in the Florida Everglades. **Environmental Chemistry and Technology Weekly Seminar**, University of Wisconsin - Madison, virtual presentation. *February 2021*
3. Identification and activity of mercury-methylating microbes in Lake Mendota. **NTL-LTER Early Career Scientist Meeting**, University of Wisconsin - Madison, virtual presentation. *April 2020*
4. Identification and activity of mercury-methylating microbes in Lake Mendota. **Environmental Chemistry and Technology Seminar**, University of Wisconsin - Madison. *March 2020*
5. Mercury-methylating organisms in Lake Mendota. **Environmental Chemistry and Technology Seminar**, University of Wisconsin - Madison. *April 2019*
6. Mercury-methylating organisms in Lake Mendota. **Center for Limnology Weekly Seminar**. University of Wisconsin - Madison. *May 2019*
7. Distribution of mercury-methylating microbes along spatial and temporal redox gradients in a freshwater lake. **Environmental Chemistry and Technology Seminar**, University of Wisconsin - Madison. *April 2018*

8. Meta-omics, microbes, and freshwater biogeochemistry! Oh My! **Environmental Chemistry and Technology Seminar**, University of Wisconsin - Madison. *April 2017*

Poster Presentations

1. Distribution of mercury-methylating microbes along spatial and temporal redox gradients in a freshwater lake. **International Society for Microbial Ecology Conference**. Leipzig, Germany. *August 2018*
2. Distribution of mercury-methylating microbes along spatial and temporal redox gradients in a freshwater lake. **SETAC Young Environmental Scientist Meeting**. University of Wisconsin - Madison. *March 2018*
3. Distribution of mercury-methylating microbes along spatial and temporal redox gradients in a freshwater lake. **International Conference on Mercury as a Global Pollutant**. Providence, RI. *July 2017*
4. Spatial distribution of ultramicrobacteria along Lake Erie. **IAGLR's Conference on Great Lakes Research**. Detroit, MI. *May 2017*
5. Vertical distribution of microbial communities during late stratification in a eutrophic, dimictic lake. **International Society for Microbial Ecology Conference**. Montreal, Canada *September 2016*

Teaching and Mentoring

Omic's Study Group lead: Fall 2019

- Metagenomic Assembly study group lead
- Phylogenetic Analysis and Tree-Thinking study group lead

Volunteer Teaching Assistant: Environmental Microbiology: Spring 2019, Spring 2021

- Assisted with curriculum development
- Designed new course module on freshwater microbiology with emphasis on hypolimnetic anoxia and impact on methylmercury production
- Delivered lectures
- Graded homework
- Provided assistance during in-class group work
- Led mock review panel through peer review of fellow classmates' research proposals for final project

Undergraduate Mentor in McMahon Lab

2015-present

- **Anna Schwendinger** - Assisting with routine mercury sampling. *Fa. 2019-Sp. 2020*
- **Robert Marick** - Spatial and temporal dynamics of microbial communities along strong redox gradients in Lake Mendota. Manuscript in prep. *Su. 2018-Sp. 2020*
- **Anna Grace Schmidt** - Zooplankton-associated microbiome in Lake Mendota. Lead undergrad for Microbial Observatory sampling. Manuscript in prep. *Su. 2017-Sp. 2020*
 - UW-Madison College of Agricultural and Life Sciences Research Award 2018
 - ASM-Undergraduate Research Fellowship 2018
 - UW-Madison Sophomore Research Fellowship Award 2018
- **Diana Mendez** - Impact of zebra mussel feeding on planktonic microbial community *Su-Fa 2017*

- **Ariel Sorg** - Metagenomic characterization of methylotrophic freshwater Betaproteobacteria in Wisconsin, USA. *Su. 2017*
- **Mykala Sobieck** - Assisted with routine mercury sampling program *Su.-Fa. 2016*
- **North Temperate Lakes Microbial Observatory Team** - Led team of 2-4 undergraduates per year in maintaining 20+ year time series. *Su. 2017-current*

Organic Chemistry Tutor and Grader: Chemistry Department, SUNY-Geneseo 2010-2012

- Held office hours and set up private tutoring lessons
- Helped set up curriculum and provided feedback on class progress

Service

Journal Reviewer: Environmental Science and Technology (2), Environmental Science and Pollution Research (1), Frontiers in Microbiology (1).

Water at UW Graduate Student Representative 2018-2019

SETAC Young Environmental Scientist meeting: Organizer 2018

- Organized 1-day science communication workshop

O.N. Allan Soil and Environmental Microbiology Small Grants Review Panelist 2018

Postbac IRTA Representative: National Institute on Aging 2013-2015

Geneseo Presidential Scholar: SUNY-Geneseo 2011-2012

Grants, Honors, and Awards

Roland L. Girolami Fellowship Award - UW-Madison Dept. of Bacteriology 2020

Student Research Travel Grants - Conference: \$1500 2018

Anna Grant Birge Memorial Scholarship: \$1942 2018

Anna Grant Birge Memorial Scholarship: \$1917 2017

NSF Graduate Research Fellowship Program 2016-2021

Anna Grant Birge Memorial Scholarship: \$2000 2016

Becker Travel Award: \$200-250 2016, 2018, 2020

Phi Beta Kappa 2012

Ulmer-Jackson Biochemistry Award 2012

Goldwater Scholar 2011

CRC Award to the Best Overall Student in Introductory Chemistry 2009

Geneseo Dean's List 7 semesters

Assisted writing:

Professional Development

DELTA Teaching in the College Classroom Spring 2019

Anvi'o Workshop, University of Chicago April 2017

Data Carpentry Workshop Fall 2016

DELTA Research Mentorship Training Summer 2016

EDAMAME bioinformatics workshop Summer 2016

Society Memberships

Association for the Sciences of Limnology and Oceanography 2020-current

International Society of Microbial Ecology 2018