

Benjamin D. Peterson

Postdoctoral Research Assistant, McMahon Lab
1550 Linden Dr · Room 5525 · Madison, WI 53703
✉ bpeterson26@wisc.edu ☎ +1 410 980-4660

Education

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

Employment and Research Experience

Postdoctoral Research Assistant <i>McMahon Lab – Departments of Bacteriology</i> Microbial links between sulfate reduction and methylmercury production in a eutrophic freshwater lake	2021-current
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- 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 <i>McMahon Lab – Departments of Bacteriology and Civil & Environmental Engineering</i> Ecophysiology of mercury-methylating organisms in freshwater ecosystems	2015-2021
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- 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) <i>National Institute on Aging: Neuroplasticity and Behavior Unit</i> Impacts of running on initial integration of adult-born hippocampal neurons	2014-2015 PI: Dr. Henriette van Praag
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- 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., Kuleshkaya, 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

Invited talks

1. Identification of Mercury Methylating Organisms along a Trophic Gradient. **Greater Everglades Ecosystem Restoration Conference**. Coral Springs, Florida. *April 2019*

Contributed talks

1. 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 2020*
2. Mercury-methylating organisms in Lake Mendota. **American Water Resources Association Wisconsin Section Annual Meeting**. Delavan, WI. *March 2019*

Internal Seminars

1. Identification and activity of mercury-methylating microbes in Lake Mendota. **NTL-LTER Early Career Scientist Meeting**, University of Wisconsin - Madison. *April 2020*
2. Identification and activity of mercury-methylating microbes in Lake Mendota. **Environmental Chemistry and Technology Seminar**, University of Wisconsin - Madison. *March 2020*
3. Mercury-methylating organisms in Lake Mendota. **Environmental Chemistry and Technology Seminar**, University of Wisconsin - Madison. *April 2019*
4. Mercury-methylating organisms in Lake Mendota. **Center for Limnology Weekly Seminar**. University of Wisconsin - Madison. *May 2019*
5. 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*
6. 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

- Assisted with curriculum development
- Designed new course module on freshwater microbiology with emphasis on hypolimnetic anoxia. Delivered lectures for this portion
- Graded homework
- Provided assistance during in-class group work

Undergraduate Mentor in McMahon Lab

2015-present

- **Anna Schwendinger** - Assisting with routine mercury sampling. *Fa. 2019-current*
- **Robert Marick** - Spatial and temporal dynamics of microbial communities along strong redox gradients in Lake Mendota. *Su. 2018-current*
- **Anna Grace Schmidt** - Zooplankton-associated microbiome in Lake Mendota. Lead undergrad for Microbial Observatory sampling. *Su. 2017-current*
 - 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, Environmental Science and Pollution Research.

Water at UW Graduate Student Representative

2018-2019

SETAC Young Environmental Scientist meeting: Organizer	2018
- Organized 1-day science communication workshop	
Postbac IRTA Representative: National Institute on Aging	2013-2015
Geneseo Presidential Scholar: SUNY-Geneseo	2011-2012

Grants, Honors, and Awards

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

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