

Elizabeth McDaniel, Ph.D.

Microbial Ecology, Microbiome Engineering, Multi-Omics
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Education

University of Wisconsin – Madison

Aug. 2016-Aug. 2021

Ph.D., Microbiology Doctoral Training Program

- Laboratory of Dr. Katherine McMahon, Departments of Bacteriology and Civil and Environmental Engineering
- Dissertation: Ecology and Evolution of Enrichment Microbial Communities Performing Biological Nutrient Removal

University of Arkansas – Fayetteville

Aug. 2012-May 2016

Bachelor of Science in Biology with Statistics Minor, Cum Laude Honors

- GPA: 3.71/4.0
- Honors Thesis: Natural Variation of the Ena1p Sodium Pump in *S. cerevisiae*

Research Experience

Postdoctoral Research Fellow

Nov. 2021

Ziels and Hallam Labs - Departments of Civil Engineering and Microbiology and Immunology, University of British Columbia, Vancouver, BC, CA

- Exploring the composition and metabolic activity of microbial communities underlying anaerobic digestion systems using metagenomic, metaproteomic, stable-isotope probing, and imaging techniques

Graduate Research Assistant

Jan. 2017 - Aug. 2021

McMahon Lab – Departments of Bacteriology and Civil & Environmental Engineering, University of Wisconsin – Madison, Madison WI

- Dissertation project on bacterial communities of engineered wastewater systems using a combination of genome-resolved metagenomics approaches and enrichment culture techniques
- Developed computational workflows and approaches for high-throughput assembly and analysis of freshwater lake metagenomes
- Lab data and systems administrator for storing large-scale metagenomic data and associated metadata

Undergraduate Research Assistant

Aug. 2013-Aug. 2016

Lewis Lab – Department of Biological Sciences, University of Arkansas, Fayetteville, AR

- Studied the natural variation of stress defense mechanisms in the budding yeast *S. cerevisiae*
- Developed a protocol for creating transposon deletion libraries in wild strains of *S. cerevisiae*

Summer Undergraduate Research Intern

May-Aug. 2014

Broach Lab – Department of Biochemistry and Molecular Biology, Penn State Hershey, Hershey, PA

- Investigated interactions of chromosomes during quiescence in the budding yeast *S. cerevisiae* using fluorescence microscopy

Peer-Reviewed Publications

denotes equal contribution

6. McDaniel E.A., Wahl S.A., Ishii S., Pinto A., Ziels R., Nielsen P.H., McMahon K.D., Williams R.B.H.

Prospects for Multi-omics in the Microbial Ecology of Water Engineering. *Water Research*. Oct 2021.

DOI: 10.1016/j.watres.2021.117608

5. McDaniel E.A.#, Moya-Flores F.#, Keene Beach N., Camejo P.Y., Oyserman B.O., Kizaric M., Khor E.H., Noguera D.R., McMahon K.D. Metabolic differentiation of co-occurring *Accumulibacter* clades revealed through genome-resolved metatranscriptomics. *mSystems*. Aug 2021, 6 (4) e00474-21; DOI:

10.1128/mSystems.00474-21

4. McDaniel E.A., Wever R., Oyserman B.O., Noguera D.R., McMahon K.D. **Genome-Resolved Metagenomics of a Photosynthetic Bioreactor Performing Biological Nutrient Removal.** *Microbiology Resource Announcements*. May 2021, 10 (18) e00244-21; DOI: 10.1128/MRA.00244-21

3. Peterson B.D., McDaniel E.A., Schmidt A.G., Lepak R.F., Tran P.Q., Marick R.A., Ogorek J.M., DeWild J.F., Krabbenhoft D.P., McMahon K.D. **Mercury methylation genes identified across diverse anaerobic microbial guilds in a eutrophic sulfate-enriched lake.** *Environmental Science and Technology*. Nov. 2020, 54 (24), 15840-15851; DOI: 10.1021/acs.est.0c05435

2. McDaniel E.A., Peterson B., Stevens S.L.R., Tran P.Q., Anantharaman K., McMahon K.D. **Expanded Phylogenetic Diversity and Metabolic Flexibility of Mercury-Methylating Microorganisms.** *mSystems*. Aug 2020, 5 (4) e00299-20; DOI: 10.1128/mSystems.00299-20

1. McDaniel E.A., Stuecker T.N., Veluvolu M., Gasch A.P., Lewis J.A. **Independent Mechanisms for Acquired Salt Tolerance versus Growth Resumption Induced by Mild Ethanol Pretreatment in *Saccharomyces cerevisiae*.** *mSphere. Editor's Pick*. Nov 2018, 3 (6) e0057418; DOI: 10.1128/mSphere.00574-18

Preprints and Submissions

1. McDaniel E.A., Anantharaman, K., McMahon K.D. **metabolisHMM: Phylogenomic analysis for exploration of microbial phylogenies and metabolic pathways.** Dec. 2019. *bioRxiv*. DOI: 10.1101/2019.12.20.884627.

Teaching Resources and Editorials

2. Eren A.M., Kiefl E., Shaiber A., Veseli I., Miller S.E., Schechter M.S., Fink I., Pan J.N., Yousef M., Fogarty E.C., Trigodet F., Watson A.R., Esen O.C., Moore R.M., Clayssen Q., Lee M.D., Kivenson V., Graham E.D., Merrill B.D., Karkman A., Blankenberg D., Eppley J.M., Sjoden A., Scott J.J., Vazquez-Campos X., McKay L.J., McDaniel E.A., Stevens S.L.R., Anderson R., Fuessel J., Fernandez-Guerra A., Maignien L., Delmont T.O., Willis A.D. **Community-led, integrated, reproducible multi-omics with anvi'o. Jan. 2021, 6, 3-6. *Nature Microbiology (Commentary)*. DOI: 10.1038/s41564-020-00834-3.**

1. McDaniel E.A. Analyzing 16S Amplicon Data in R Course (version 1.0). July 2020. DOI: 10.5281/zenodo.3942708. Course website at <http://elizabethmcd.github.io/R-amplicons/>.

Research Grants and Funding

USDA NIFA Predoctoral Fellowship (*awarded but declined to pursue postdoctoral studies*) - \$160,00 April 2021

Illuminating the Microbiology of Biological Phosphorus Removal Between Lab-Scale Models of Domestic and Dairy Wastewater Systems

UW-Madison O.N. Allen Soil and Environmental Microbiology Small Grants Award - \$3,290 Aug. 2019
Investigating Microbial Interactions Underpinning Fluctuating Dynamics in an Engineered Ecosystem

Honors and Awards

Department of Bacteriology Sigrid Leirimo Memorial Service Award	May 2021
Civil and Environmental Engineering Becker Travel Supplement Award - \$500	Nov. 2019
Department of Bacteriology Betley-Allen Fellowship Award	May 2019
University of Wisconsin-Madison Student Travel Grant - \$600	April 2019
Microbiology Doctoral Training Program Travel Award - \$1000	May 2018
Department of Bacteriology Travel Award - \$1000	May 2018
Southeastern Regional Yeast Meeting Travel Award - \$250	Mar. 2016
University of Arkansas Honors College Research Grant - \$1200	Jan. 2016
University of Arkansas Honors College Travel Grant - \$1200	Aug. 2015
Southeastern Regional Yeast Meeting Travel Award - \$250	Mar. 2015
University of Arkansas Honors College Research Grant - \$2500	Jan. 2015

University of Arkansas Academic Scholarship - \$2500	2014-2015
ASM South Central Branch Meeting 2 nd Place Poster Award	Sept. 2014
University of Arkansas Academic Scholarship - \$1000	2013-2014
University of Arkansas Symphony Orchestra Scholarship - \$1000	2012-2016
University of Arkansas New Arkansan Non-Resident Tuition Award - \$39,040	2012-2016

Oral Presentations

Invited Talks and Plenary Sessions

6. Characterizing Microbial Traits and Putative Interactions of Engineered Bioreactor Communities. Hallam and Ziels Lab Groups Seminar. **University of British Columbia**. Vancouver, BC, Canada. *April 2021. Virtual.*

5. Examining Long-Term Microbial Population Dynamics At Multiple Scales Using Enrichment Bioreactors As Model Ecosystems. **Microbial Ecology and Water Engineering (MEWE) conference**. Hiroshima, Japan. *Nov. 2019.*

4. Expanded Phylogenetic Diversity and Metabolic Flexibility of Microbial Mercury Methylation. Evolution Series Seminar. **University of Wisconsin – Madison JF Crow Institute for the Study of Evolution**. *Sept. 2019.*

3. Integrating Anvi'o Tools into your Workflow: Insights from a Biological Nutrient Removal (BNR) System. **Resolving Microbial Communities at Strain-Level Symposium**. Penryn, UK. *Aug. 2018.*

2. Natural Variation in Yeast Uncovers Novel Regulation of the Ena1p Sodium Pump. **Southeastern Regional Yeast Meeting**. Tuscaloosa, AL. *March 2016.*

1. Natural Variation in Yeast Uncovers Novel Regulation of the Ena1p Sodium Pump. **Southeastern Regional Yeast Meeting**. Little Rock, AR. *March 2015.*

Internal Seminars

5. Investigating Microbial Interactions Underpinning Fluctuating Dynamics in an Engineered Ecosystem. **O.N. Allen Soil and Environmental Microbiology Small Grants Program Symposium**. University of Wisconsin – Madison. *May 2021. Virtual.*

4. Characterizing Ecological Roles and Interactions of '*Candidatus Accumulibacter phosphatis*' in Engineered Bioreactors. **Microbiology Doctoral Training Program**. University of Wisconsin – Madison. *Sept. 2020. Virtual.*

3. "Best" Practices in Metagenomic Binning and Annotation. **Computational Biology, Ecology, and Evolution (ComBEE) 'Omics Study Group session**. University of Wisconsin – Madison. ComBEE 'Omics Study Group Session. *Dec. 2019.*

2. Eco-systems biology of a Microbial Community Performing Enhanced Biological Phosphorus Removal. **Microbiology Doctoral Training Program Seminar**. University of Wisconsin – Madison. *Nov. 2018.*

1. Bacterial Communities of Lab-Scale Wastewater Enrichments. **UW-Madison Bioscience Opportunities Preview Weekend Lightning Talk**. *Sept. 2018.*

Virtual Seminars and Plenary Sessions

2. Characterizing Ecological Roles and Interactions of '*Candidatus Accumulibacter phosphatis*' in Wastewater Systems. **MicroSeminar**. *August 2020*. Recording available at <https://bit.ly/2Q5NCzb>

1. Applying Genome-Resolved Metagenomics to Elucidate the Microbial "Black Box" in Model Wisconsin Lakes. **Incorporating Data Science and Open Science Techniques in Limnology and Oceanography Virtual Summit**. *July 2020*. Recording available at <https://bit.ly/2BAOSGC>

Poster Presentations

7. ComBEE: Computational Biology, Ecology, and Evolution: Enhancing computational literacy in the life sciences through peer-led study groups. Presented at **UW-Madison Data Science Hub Data Science Research Bazaar** and **Wisconsin Institute for Discovery “Illuminating Discovery”** events. *Jan. & Feb. 2020.* (Poster constructed and presented on behalf of ComBEE Team)
6. Microbiomes of Freshwater Lakes and Engineered Wastewater Systems. **Water @ UW Symposium.** Madison, WI. *Oct. 2018.* (Poster constructed and presented on behalf of McMahon Lab)
5. Expanded Phylogenetic and Metabolic Diversity of Microbial Mercury Methylation. Presented at **International Society of Microbial Ecology Meeting.** Leipzig, Germany. *Aug. 2018.*, and **Department of Bacteriology Raper Symposium.** Madison, WI. *Sept. 2018.*
4. Long-Term Population Dynamics of ‘*Candidatus Accumulibacter phosphatis*’ in Enhanced Biological Phosphorus Removal Sequencing-Batch Reactors. **Population, Evolutionary, Quantitative Genetics Conference.** Madison, WI. *May 2018.*
3. Comparative Genomics of Microbial Methylmercury Production. Presented at **Joint Genome Institute User Meeting: Genomics of Energy and Environment.** San Francisco, CA. *Mar. 2018,* and **Madison Microbiome Meeting.** Madison, WI. *April 2018.*
2. Natural Variation in Yeast Uncovers Novel Regulation of the Ena1p Sodium Pump. Presented at **South Central Branch of the American Society for Microbiology Joint Meeting.** Fayetteville, AR. *Sept. 2014,* **27th International Conference on Yeast Genetics and Molecular Biology.** Levico, Terme, Trentino, Italy. *Sept. 2015,* **Arkansas IDEa Network of Biomedical Research Excellence Meeting.** Fayetteville, AR. *Nov. 2015.*
1. Chromosome Interactions in Quiescent Yeast. **Penn State Hershey Summer Undergraduate Research Internship Programs Symposium.** Hershey, PA. *Aug. 2014.*

Teaching, Mentoring, and Service

Bioinformatics Workshops (Helper/Teaching Assistant/Instructor/Course Development) Certified Carpentries Instructor as of June 2019

Virtual Software Carpentry Workshop; <i>Helper</i>	<i>Aug. 2020</i>
Amplicon Analysis in R Workshop; <i>Instructor and Developer</i>	<i>April 2020</i>
Virtual Software Carpentry Mini-Workshop; <i>Helper</i>	<i>April 2020</i>
Research Bazaar Software Carpentry Workshop; <i>Helper</i>	<i>Jan. 2020</i>
Carpentries Genomics Introduction to R; <i>Instructor</i>	<i>Aug. 2019</i>
Data Carpentry Workshop Introduction to R; <i>Instructor</i>	<i>June 2019</i>
Software Carpentry Workshop; <i>Helper</i>	<i>June 2019</i>
Microbiome & Data Science Hubs Git/Github Pages Workshop; <i>Instructor and Developer</i>	<i>Mar. 2019</i>
Resolving Microbial Communities at Strain-Level Resolution Symposium; <i>Teaching Assistant</i>	<i>Aug. 2018</i>
ComBEE Git/Github Pages Workshop; <i>Instructor and Developer</i>	<i>Sept. 2017</i>
ComBEE Anvi'o Workshop; <i>Teaching Assistant</i>	<i>May 2017</i>
ComBEE Git Workshop; <i>Teaching Assistant</i>	<i>Mar. 2017</i>
ComBEE R Study Group Introduction to R; <i>Instructor and Developer</i>	<i>Sp. 2017</i>

Computational Biology, Ecology, and Evolution (ComBEE) Study Group Co-Chair *Jan. 2017-Aug. 2021*

ComBEE is a peer-led group for computational biology researchers on the UW-Madison campus. We hold study groups on the R and python programming languages, current topics in genomics, and host seminars from graduate students, postdocs, and professors on topics broadly ranging in ecology and evolution. Website at combe-uw-madison.github.io.

McMahon Lab Mentoring

2017-2021

Graduate Student Mentor for Undergraduate Students, and Master's Students carrying out independent projects and/or routine maintenance and sampling.

- **EBPR Bioreactor Maintenance Team** (Hourly Undergraduate Students): Mentored to date 5 **undergraduate** students performing routine maintenance and sampling of lab-scale bioreactors simulating Enhanced Biological Phosphorus Removal (EBPR). *Fa. 2018-Summer 2021*
- **Diana Mendez** (Master's Thesis Mentee): Protocol for seeding and operating Enhanced Biological Phosphorus Removal (EBPR) laboratory-scale sequencing batch reactors to obtain *Candidatus Accumulibacter phosphatis* enrichment. *Fa. 2019-Summer 2021*
- **Coty Weathersby** (Master's Thesis Mentee): Characterization of the Microbial Community in a Lab-Scale Sequencing Batch Reactor Operating Enhanced Biological Phosphorus Removal. *Sp. 2020-Summer 2021*
- **William Dunn** (Undergraduate Student Mentee for BIO152): Ecophysiology of *Thermoleophilia*. *Fa. 2020.*
- **Matthew Wolff** (Undergraduate Research Student Mentee) : Metagenomics of Freshwater Lake and Engineered Wastewater Microbial Communities. *Sp.-Fa. 2018*
- **Kali Denis** (Undergraduate Student Mentee for BIO152): Time-Series Analysis of Under-Ice Freshwater Bacterial Communities. *Sp. 2018*
- **Kaela Amundson** (Undergraduate Research Student Mentee): Characterization and Enrichment of Microorganisms Capable of Extracellular Electron Transfer. *Fa. 2017-Sp. 2018.*

Ad-hoc Journal Reviewer: ISMEJ (1), mSystems (1), mSphere (2), Env Micro (3), Limnology and Oceanography (1)

2017-present

Northeastern University Environmental Biological Processes Guest Lecturer

Sp. 2021

O.N. Allen Soil and Environmental Microbiology Small Grants Review Panel

Sp. 2021

Microbiology 551: Senior Capstone Guest Lecturer on 16S Workflows and Bioinformatics

Sp. 2020

UW-Madison Topics in Biotechnology Guest Lecturer

Sp. 2020

MEWE Multi-Omics Methods for Water Engineering Workshop Developer and Assistant

Nov. 2019

Microbiology Doctoral Training Program Admissions Committee

Fa. 2019

Data Science Hub Research Bazaar Planning Committee

Fa. 2019

Microbiology 304: Biology of Microorganisms Laboratory Teaching Assistant

Sp. 2018

BIOL 2323: General Genetics Drill Instructor

Sp. 2015

University of Arkansas Office of Admissions Ambassador

Aug. 2013-Dec. 2015

Professional Development

Google Career Readiness Data Analyst Challenge

Summer 2020

- Google Cloud Essentials Quest Badge

- From Data to Insights with Google Cloud Platform Specialization

DELTA Research Mentor Training

Summer 2019

Carpentries Instructor Training and Certification

April 2019

IMG Microbial Genomics and Metagenomics Workshop, FISABIO

June 2017

Anvi'o Workshop, University of Chicago

April 2017

Data Carpentry Workshop, University of Wisconsin-Madison

Jan. 2017

Professional Society Memberships

Association of Environmental Engineering and Science Professors

2021-current

American Society for Microbiology

2021-current

Association for the Sciences of Limnology and Oceanography

2020-2021

Genetics Society of America

2018-2021