

Elizabeth McDaniel, PhD

Microbial Ecology, Multi-Omics, Microbiome Engineering
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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 - present

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

7. Petriglieri F., Singleton C.M., Kondrotaitė Z., Dueholm M.S., **McDaniel E.A.**, McMahon K.D., Nielsen P.H.
Re-evaluation of the phylogenetic diversity and global distribution of the lineage *Candidatus* *Accumulibacter*. April 2022. *mSystems*. In Press

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

denotes equal contribution

4. Olmsted C.N., Ort R., Tran P.Q., McDaniel E.A., Roden E.E., Bond D.R., He S., McMahon K.D. **Environmental predictors of electroactive bacterioplankton in small boreal lakes.** Mar 2022. *bioRxiv*. DOI: 10.1101/2022.03.26.485925. *Submitted*.

3. McDaniel E.A.#, van Steenbrugge J.J.M.#, Noguera D.R., McMahon K.D., Raaijmakers J.M., Medema M.H., Oyserman B.O. **TbasCO: Trait-based Comparative 'Omics Identifies Ecosystem-Level and Niche-Differentiating Adaptations of an Engineered Microbiome.** Dec. 2021. *bioRxiv*. DOI: 10.1101/2021.12.04.471239. *Under Review*.

2. Tran P.Q.#, Bachand S.C.#, Hotvedt J.C.#, Kieft K., **McDaniel E.A.,** McMahon K.D., Anantharaman K. **Microbial cysteine production is a source of hydrogen sulfide in oxic freshwater lakes.** Dec. 2021. *bioRxiv*. DOI: 10.1101/2021.11.30.467465

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.

Editorials and Teaching Resources

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 postdoc*) - \$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
University of Arkansas Honors College Research Grant - \$1,200 Jan. 2016
Natural Variation in Yeast Uncovers Novel Role in the Ena1p Sodium Pump

University of Arkansas Honors College Research Grant - \$2,500 Jan. 2015
Natural Variation in the Ena1p Sodium Pump Expression in Yeast

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

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.*

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 combee-uw-madison.github.io.

Ad-hoc Journal Reviewer: ISMEJ (1), mSystems (1), mSphere (2), Env Micro (3), Limnology and Oceanography (1)	2017-present
Data Carpentry Genomics Curriculum Advisory Committee, Secretary	Sp. 2022
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

Honors and Awards

Department of Bacteriology Sigrid Leirmo 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 Travel Grant - \$1200	Aug. 2015
Southeastern Regional Yeast Meeting Travel Award - \$250	Mar. 2015
University of Arkansas Academic Scholarship - \$2500	2014-2015
ASM South Central Branch Meeting 2nd 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.

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
Carpentries Instructor Training and Certification
IMG Microbial Genomics and Metagenomics Workshop, FISABIO
Anvi'o Workshop, University of Chicago
Data Carpentry Workshop, University of Wisconsin-Madison

Summer 2019
April 2019
June 2017
April 2017
Jan. 2017

Professional Society Memberships

Association of Environmental Engineering and Science Professors
American Society for Microbiology
Association for the Sciences of Limnology and Oceanography
Genetics Society of America

2021-current
2021-current
2020-2021
2018-2021