**Elizabeth McDaniel, PhD**

Microbial Ecology, Multi-Omics, Microbiome Engineering

[elizabethmcd93@gmail.com](mailto:emcdaniel@wisc.edu) | <https://elizabethmcd.github.io>

**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**

**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.waterres.2021.117608

**5. McDaniel E.A.#,** Moya-Flores F.#, Keene Beach N., Camejo P.Y., Oyserman B.O., KizaricM., 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.** Petriglieri F., Singleton C.M., Kondrotaite 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.** Dec. 2021. *bioRxiv.* **DOI:** 10.1101/2021.12.20473458**.** *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**.** *Submitted.*

**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., Schecter 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; *Helper Aug. 2020*

Amplicon Analysis in R Workshop; *Instructor and Developer* *April 2020*

Virtual Software Carpentry Mini-Workshop; *Helper* *April 2020*

Research Bazaar Software Carpentry Workshop; *Helper* *Jan. 2020*

Carpentries Genomics Introduction to R; *Instructor* *Aug. 2019*

Data Carpentry Workshop Introduction to R; *Instructor* *June 2019*

Software Carpentry Workshop; *Helper* *June 2019*

Microbiome & Data Science Hubs Git/Github Pages Workshop; *Instructor and Developer* *Mar. 2019*

Resolving Microbial Communities at Strain-Level Resolution Symposium; *Teaching Assistant Aug. 2018*

ComBEE Git/Github Pages Workshop; *Instructor and Developer* *Sept. 2017*

ComBEE Anvi’o Workshop; *Teaching Assistant* *May 2017*

ComBEE Git Workshop; *Teaching Assistant*  *Mar. 2017*

ComBEE R Study Group Introduction to R; *Instructor and Developer* *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** *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*