MEGAN E DUFFY, PhD

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EDUCATION

University of Washington School of Oceanography - Seattle, WA
Ph.D, Oceanography, December 2021

Advisor: Dr. Richard Keil

Dissertation: *Linking amino acid sequences to sources and fates of organic matter in aquatic systems*

University of Washington School of Oceanography - Seattle, WA
M.S., Oceanography, 2018

Advisor: Dr. Richard Keil

Thesis: *De novo-assisted protein sequencing reveals degradation patterns in marine organic matter*

Reed College - Portland, OR
B.A., Chemistry, 2012

Advisors: Drs. Arthur Glasfeld and Martina Ralle

Thesis: *Effects of Copper Exposure on Intracellular Calcium Distribution in a Wilson and Menkes Disease Human Fibroblast Cell Model*

EXPERIENCE

Graduate Research Assistant

School of Oceanography, University of Washington, September 2015-present

Investigating carbon and nitrogen transformation and preservation in aquatic organic matter on a protein/peptide level along with biogeochemical tools and data.

Research Assistant II

Department of Molecular and Medical Genetics, Oregon Health and Sciences University, 2012-15

Explored the roles of transition metals in neurodegenerative disorders using synchrotron-based X-ray fluorescence, LC-MS/MS, live-cell confocal microscopy, and molecular biological techniques. Prepared and analyzed a wide variety of biological, environmental, and industrial samples with an Agilent 7700x inductively coupled mass spectrometer (ICP-MS) as part of work for the Elemental Analysis Core.

Research Assistant

Department of Chemistry, University of Tennessee, April-June 2015

Designed iron nanoparticle-tagged antibody-based probes for live-cell fluorescent imaging of organellular targets. Developed protocols for synthesis and validation for all probe components using oxygen-free organic synthetic techniques. Mentored a summer REU student to assist with nanoparticle synthesis.

Undergraduate Research Assistant

Department of Biochemistry, Oregon Health and Sciences University, 2011-12

Used two human cells lines for copper metabolism disorder research. Developed protocols for cell fractionation and metals analysis, as well as live-cell imaging using fluorescent tags. Research part of a year-long B.A. thesis project under the guidance of Dr. Ralle and Dr. Arthur Glasfeld (Reed College).

HONORS AND AWARDS

Department of Energy Office of Science Graduate Student Research Fellowship, 2021

NSF Graduate Research Fellowship, 2017-2020

University of Washington eScience Institute Student Cloud Computing grant, $1000

Merit Fellowship, University of Washington School of Oceanography, 2015-2016

Reed College Student Initiative Grant, 2011

TEACHING

Co-instructor, Ocean 295: Chemistry of Marine Organic Carbon, Winter 2020

Teaching assistant, Ocean 295: Chemistry of Marine Organic Carbon, Winter 2018

ACTIVITIES

Community Science Fellow, AGU Thriving Earth Exchange, April 2021-present

Program coordinator, University of Washington Aquatic Organic Geochemistry High School Summer Internship, Summers 2016 - 2019

Mentor, Earth Sciences Mentor Match program, 2020-2022

Committee Chair, John Hedges Honorary Visiting Scholar in Chemical Oceanography program, 2018-2019

Student Mentor, Partnership for Scientific Inquiry, Oregon Health and Science University, 2015

Volunteer Lab Instructor, Lewis and Clark College Department of Chemistry, 2013-14

Volunteer Instructor, Reed College Chemistry Outreach, 2009-12

Coordinator, Reed College Green Chemistry Group, 2009-12

FIELD EXPERIENCE

Clayoquot Sound, British Columbia - *R/V Clifford A. Barnes*, Sep. 2015

Eastern Tropical North Pacific - *R/V Sikuliaq, Dec. 2016* - Jan. 2017

Eastern Tropical North Pacific - *R/V Roger Revelle*, Apr. - May, 2018

Lower Amazon River - *B/M Mirage*, Apr., 2019

Eastern Tropical North Pacific - *R/V Kilo Moana*, Oct. - Nov. 2019

SPECIAL SKILLS AND TRAINING

Laboratory

Extensive experience with LC-MS/MS-based proteomics and metaproteomics in environmental and biomedical contexts; ICP-MS, GC-MS. Limited experience with 1D and 2D NMR, X-ray diffraction, IR spectroscopy, IRMS, synchrotron-based X-ray fluorescence, X-ray absorbance near-edge spectroscopy, transmission electron microscopy, and mammalian cell culture.

Computational

Python, R, Git & Github, Google Earth Engine.

Language

French, fluent written and spoken; American Field Service Student Ambassador to Belgium, 2006-2007; Spanish, intermediate written and spoken; English, native.

PUBLICATIONS

Megan E. Duffy, Clara A. Fuchsman, Khadijah K. Homolka, Jacquelyn A. Neibauer, Allan H. Devol, Richard G. Keil. 'High-resolution marine flux and in situ N2 production rate determinations in the eastern tropical north pacific oxygen deficient zone', *in prep.*

Megan E. Duffy, Nicolas D. Ward, Khadijah K. Homolka, Jacquelyn A. Neibauer, Richard G. Keil, Jeffrey E. Richey. 'A peptidomic view into organic matter processing in the lower Amazon River', *in prep.*

Megan E. Duffy, Cheyenne Adams, Khadijah K. Homolka, Jacquelyn A. Neibauer, Lawrence M. Mayer, Richard G. Keil. 'Tracking peptide-level changes during microbial degradation of marine diatom protein in seawater', *Frontiers in Marine Science*, 2022.

Jacob Cram, Clara A. Fuchsman, **Megan E. Duffy**, Jessica L. Pretty, Rachel M. Lekanoff, Jacquelyn A. Neibauer, Shirley W. Leung, Klaus B. Huebert, Thomas S. Weber, Daniele Bianchi, Natalya Evans, Allan H. Devol, Richard G. Keil, Andrew M.P. McDonnell. 'Efficient flux transfer throughout the Eastern Tropical North Pacific Oxygen Deficient Zone is due to slow particle remineralization rather than suppressed disaggregation', *Global Biogeochemical Cycles*, 2022.

Megan E. Duffy, Jacquelyn A. Neibauer, Jamee Adams, Rachel A. Lundeen, Clara A. Fuchsman, Anitra E. Ingalls, Gabrielle Rocap, Richard G. Keil. 'Protein cycling in the eastern tropical North Pacific oxygen deficient zone: a de novo-discovery peptidomic approach', *Limnology and Oceanography*, 2022.

Clara A. Fuchsman, Hilary I. Palevsky, Brittany Widner, **Megan E. Duffy**, Michael C.G. Carlson, Jacquelyn A. Neibauer, Margaret R. Mulholland, Richard G. Keil, Allan H. Devol, Gabrielle Rocap. 'Cyanobacteria and cyanophage contributions to carbon and nitrogen cycling in an oligotrophic oxygen-deficient zone' *The ISME Journal*, 2019.

Mak A. Saito, Erin M. Bertrand, **Megan E. Duffy**, David A. Gaylord, Noelle A. Held, William Judson Hervey, Robert L. Hettich, Pratik Jagtap, Michael G. Janech, Danie B. Kinkade, Dasha Leary, Matthew McIlvin, Eli Moore, Robert Morris, Benjamin A. Neely, Brook Nunn, Jaclyn K. Saunders, Adam Shepherd, Nicholas Symmonds, David Walsh. 'Progress and Challenges in Ocean Metaproteomics and Proposed Best Practices for Data Sharing' *Journal of Proteome Research*, 2019.

Ashima Bhattacharjee, Haojun Yang, **Megan E. Duffy**, Emily Robinson, Arianrhod Conrad-Antoville, Ya-Wen Lu, Tony Capps, Lelita Braiterman, Michael Wolfgang, Michael P Murphy, Ling Yi, Stephen G Kaler, Svetlana Lutsenko, Martina Ralle. 'The activity of Menkes disease protein ATP7A is essential for redox balance in mitochondria' *Journal of Biological Chemistry*, 2016.

Mathilde L. Bonnemaison, **Megan E. Duffy**, Martina Ralle, Richard E. Mains, and Betty A. Eipper. 'Copper, Zinc and Calcium: three metals needed by one anterior pituitary secretory granule enzyme' *Metallomics*, 2016.

Mathilde L. Bonnemaison, Nils Bäck, **Megan E. Duffy**, Martina Ralle, Richard E. Mains, and Betty A. Eipper. 'Adaptor Protein-1 Complex Affects the Endocytic Trafficking and Function of Peptidylglycine α-Amidating Monooxygenase, a Luminal Cuproenzyme' *The Journal of Biological Chemistry*, 2015.

Savannah Tallino, **Megan E. Duffy**, Martina Ralle, María Paz Cortés, Mauricio Latorre, and Jason L. Burkhead. 'Nutrigenomics Analysis Reveals That Copper Deficiency and Dietary Sucrose up-Regulate Inflammation, Fibrosis and Lipogenic Pathways in a Mature Rat Model of Nonalcoholic Fatty Liver Disease' *The Journal of Nutritional Biochemistry*, 2015.

Kellen Voss, Christopher Harris, Martina Ralle, **Megan Duffy**, Charles Murchison, and Joseph F. Quinn. 'Modulation of Tau Phosphorylation by Environmental Copper' *Translational Neurodegeneration*, 2014.

POSTERS AND PRESENTATIONS

Megan E. Duffy, Cheyenne Adams, Khadijah K. Homolka, Jacquelyn A. Neibauer, Lawrence M. Mayer, Richard G. Keil. 'Tracking peptide-level changes during microbial degradation of marine diatom protein in seawater', Virtual oral presentation at ASLO 2021 Aquatic Sciences Meeting, Palma (June 2021).

Jacquelyn A. Neibauer, **Megan E. Duffy (presenting author)**, Clara A. Fuchsman, Jamee Adams, Khadijah K. Homolka, Wendi Ruef, Allan H. Devol, Richard G. Keil. *High-resolution marine flux measurements, in situ respiration rate determinations, and meta-omic surveys of sinking particulate matter in the ocean's three primary oxygen deficient zones.* Oral presentation at Ocean Sciences Meeting, San Diego, CA (February 2020).

Megan E. Duffy, Jacquelyn A. Neibauer, Jamee Adams, Clara A. Fuchsman, and Richard G. Keil. *De novo-assisted peptidomics helps in the study of marine carbon flux and protein degradation.* Lightning talk at Ocean Sciences Meeting, San Diego, CA (February 2020).

Megan E. Duffy, Clara A. Fuchsman, Jacquelyn A. Neibauer, Jamee Adams, Khadijah K. Homolka, Wendi Ruef, Allan H. Devol, Richard G. Keil. *High-resolution marine flux measurements and in situ respiration rate determinations in the ocean's three primary oxygen deficient zones.* Poster presented at Marine Particles and Phycospheres Meeting in Ascona, Switzerland (May 2019).

Megan E. Duffy, Cheyenne Adams, Kathleen Thornton, Jaqui Neibauer, Jamee Adams, Lawrence Mayer, Rick Keil. *De novo-assisted protein sequencing reveals degradation patterns in marine organic matter.* Talk presented at Cascadia Proteomics Symposium in Seattle, WA (July 2018).

Megan E. Duffy, Cheyenne Adams, Kathleen Thornton, Jaqui Neibauer, Jamee Adams, Lawrence Mayer, Rick Keil. *De novo-assisted protein sequencing reveals degradation patterns in marine organic matter.* Poster presented at Ocean Sciences Meeting in Portland, OR (February 2018).

Megan E. Duffy, Jacquelyn A. Neibauer, Jamee Adams, Clara A. Fuchsman, Richard G. Keil. *De novo-assisted protein sequencing shows peptide preservation in marine systems.* Poster presented at the Gordon Research Conference in New London, CT (August 2017).

Megan E. Duffy, Tony R. Capps, Amelia Munson, Charlotte S. Gleber, David Vine, Stefan Vogt, and Martina Ralle. *Characterizing Copper Resistance in Primary Astrocytes.* Poster presented at the International Copper Meeting, Vico Equense, Italy (October 2014).