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Harriet Alexander

Education

2016 **PhD, Biological Oceanography**, *Massachusetts Institute of Technology – Woods Hole Oceanographic Joint Program*, Cambridge / Woods Hole, MA.

2010 **BA, Biological Sciences**, *Wellesley College*, Wellesley, MA, *cum laude*.
Departmental Honors in Biological Sciences, Minor in Mathematics

Professional Appointments

2018–*present* **Assistant Scientist, Biology Department**, *Woods Hole Oceanographic Institution*, Woods Hole, MA.

2016–2018 **Postdoctoral Fellow**, *University of California, Davis*, Davis, CA.
Advisor: Dr. C. Titus Brown

2016 **Postdoctoral Research Scientist**, *Lamont-Doherty Earth Observatory, Columbia University*, Palisades, NY.
Advisor: Dr. Sonya Dyhrman

Selected Awards and Fellowships

2018 GigaScience Paper Prize ICG13

2016 EMBL Travel Award

2015 NSF ECOGEO Workshop Travel Award

2015 OCB Trait-based Ecology Conference Travel Award

2014–2015 Ocean Life Institute Fellowship

2014 OCB Scoping Workshop Travel Award

2011–2014 National Defense Science and Engineering Fellowship

2011 National Science Foundation Graduate Research Fellowship *declined*

2010–2011 MIT Presidential Fellowship

2010 Lucy Allen Branch Prize in Natural History

2010 Jane Harris Schneider Prize in Sculpture

Publications

Peer-reviewed

Alexander H, Rouco M, Haley ST, Dyhrman ST. (2020). Transcriptional response of *Emiliania huxleyi* under changing nutrient environments in the North Pacific Subtropical Gyre. *Environmental Microbiology*. doi:doi:10.1111/1462-2920.14942.

Johnson WM, **Alexander H**, Bier RL, Miller DR, Muscarella ME, Pitz KJ, Smith H. (2020). Auxotrophic interactions: A stabilizing attribute of aquatic microbial communities? *FEMS Microbiology Ecology*. doi:10.1093/femsec/fiaa115.

Choi C, Jimenez V, Needham D, Poirier C, Bachy C, **Alexander H**, Wilken S, Chavez F, Sudek S, Giovannoni S, Worden AZ. (in press). Seasonal and geographical transitions in eukaryotic phytoplankton community structure in the Atlantic and Pacific Oceans. *Frontiers in Microbiology*.

Bolyen E, et al. (2019). Reproducible, interactive, scalable and extensible microbiome data science using QIIME 2. *Nature Biotechnology* 37:852–857. doi:10.1038/s41587-019-0209-9.

Wurch LL, **Alexander H**, Frischkorn KR, Haley ST, Gobler CJ, Dyhrman ST. (2019). Transcriptional shifts highlight the role of nutrients in harmful brown tide dynamics. *Frontiers in Microbiology* 10:136. doi:10.3389/fmicb.2019.00136.

Alexander H, Johnson LK, Brown CT. (2018). Keeping it light: (Re)analyzing community-wide datasets without major infrastructure. *GigaScience*. doi:10.1093/gigascience/giy159.

Johnson LK, **Alexander H**, Brown CT. (2018). Re-assembly, quality evaluation, and annotation of 678 microbial eukaryotic reference transcriptomes. *GigaScience*. doi:10.1093/gigascience/giy158.

Hu SK, Liu Z, **Alexander H**, Campbell V, Connell PE, Dyhrman ST, Heidelberg KB, Caron DA. (2018). Shifting metabolic priorities among key protistan taxa within and below the euphotic zone. *Environmental Microbiology*. doi:10.1111/1462-2920.14259.

Rouco M, Frischkorn KR, Haley ST, **Alexander H**, Dyhrman ST. (2018). Transcriptional patterns identify resource controls on the diazotroph *Trichodesmium* in the Atlantic and Pacific oceans. *The ISME Journal* 12:1486–1495. doi:10.1038/s41396-018-0087-z.

Haley ST, **Alexander H**, Juhl AR, Dyhrman ST. (2017). Transcriptional response of the harmful raphidophyte *Heterosigma akashiwo* to nitrate and phosphate stress. *Harmful Algae* 68:258–270. doi:10.1016/j.hal.2017.07.001.

Harke MJ, Juhl AR, Haley ST, **Alexander H**, Dyhrman ST. (2017). Conserved transcriptional responses to nutrient stress in bloom-forming algae. *Frontiers in Microbiology* 8. doi:10.3389/fmicb.2017.01279.

Moniruzzaman M, Wurch LL, **Alexander H**, Dyhrman ST, Gobler CJ, Wilhelm SW. (2017). Virus-host relationships of marine single-celled eukaryotes resolved from metatranscriptomics. *Nature Communications* 8:16054. doi:10.1038/ncomms16054.

Kujawinski EB, Longnecker K, **Alexander H**, Dyhrman ST, Fiore CL, Haley ST, Johnson WM. (2017). Phosphorus availability regulates intracellular nucleotides in marine eukaryotic phytoplankton. *Limnology and Oceanography Letters* 2:119–129.

Guy-Haim T, **Alexander H**, Bell TW, Bier RL, Bortolotti LE, Briseño-Avena C, Dong X, Flanagan AM, Grosse J, Grossmann L, Hasnain S, Hovel R, Johnston CA, Miller DR, Muscarella M, Noto AE, Reisinger AJ, Smith HJ, Stamieszkin K. (2017). What are the type, direction, and strength of species, community, and ecosystem responses to warming in aquatic mesocosm studies and their dependency on experimental characteristics? A

systematic review protocol. *Environmental Evidence* 6:6. doi:10.1186/s13750-017-0084-0.

Durden J, Luo J, **Alexander H**, Flanagan A, Grossmann L. (2017). Integrating "big data" into aquatic ecology: Challenges and opportunities. *Limnology and Oceanography Bulletin*. doi:10.1002/lob.10213.

Caron DA, **Alexander H**, Allen AE, Archibald JM, Armbrust EV, Bachy C, Bell CJ, Bharti A, Dyhrman ST, Guida SM, Heidelberg KB, Kaye JZ, Metzner J, Smith SR, Worden AZ. (2016). Probing the evolution, ecology and physiology of marine protists using transcriptomics. *Nature Reviews Microbiology* 15:6–20. doi:10.1038/nrmicro.2016.160.

Rouco M, Haley ST, **Alexander H**, Wilson ST, Karl DM, Dyhrman ST. (2016). Variable depth distribution of *Trichodesmium* clades in the North Pacific Ocean. *Environmental Microbiology Reports*. doi:10.1111/1758-2229.12488.

Alexander H, Rouco M, Haley ST, Wilson ST, Karl DM, Dyhrman ST. (2015). Functional group-specific traits drive phytoplankton dynamics in the oligotrophic ocean. *Proceedings of the National Academy of Sciences* 112:E5972–E5979. doi:10.1073/pnas.1518165112.

Alexander H, Jenkins BD, Rynearson TA, Dyhrman ST. (2015). Metatranscriptome analyses indicate resource partitioning between diatoms in the field. *Proceedings of the National Academy of Sciences* 112:E2182–E2190. doi:10.1073/pnas.1421993112.

Fischer A, Moberg E, **Alexander H**, Brownlee E, Hunter-Cevera K, Pitz K, Rosengard S, Sosik H. (2014). Sixty Years of Sverdrup: A Retrospective of Progress in the Study of Phytoplankton Blooms. *Oceanography* 27:222–235. doi:10.5670/oceanog.2014.26.

Alexander H, Jenkins BD, Rynearson TA, Saito MA, Mercier ML, Dyhrman ST. (2012). Identifying reference genes with stable expression from high throughput sequence data. *Frontiers in Microbiology* 3:385. doi:10.3389/fmicb.2012.00385.

Dyhrman ST, Jenkins BD, Rynearson TA, Saito MA, Mercier ML, **Alexander H**, Whitney LP, Drzewianowski A, Bulygin VV, Bertrand EM, Wu Z, Benitez-Nelson C, Heithoff A. (2012). The transcriptome and proteome of the diatom *Thalassiosira pseudonana* reveal a diverse phosphorus stress response. *PloS one* 7:e33768. doi:10.1371/journal.pone.0033768.

Invited Presentations

Alexander H. A eukaryotic heist: scalable and autoated approaches for the discovery of eukaryotic genomes. Simons Foundation CBIOMES Meeting, Online. June 2020.

Alexander H. Bioinformatics in light of intercalibration. OCB NA Omics Standardization and Intercalibration Workshop, Chapel Hill, NC. January 2020.

Alexander H. Computational approaches to the study of marine protists. Biology Seminar, Graduate School of Oceanography, University of Rhode Island, Narragansett, RI. May 2019.

Alexander H. Computational approaches to the study of marine protists. Parsons Microbial Systems Seminar, Massachusetts Institute of Technology, Cambridge, MA. April 2019.

Alexander H. The role of intra-specific diversity on the physiological ecology of phytoplankton. Marine Science Department, Old Dominion University, Norfolk, VA. March 2019.

Alexander H. Combining in situ and culture-based approaches to characterize the physiological ecology of blooming and sinking diatoms. The Molecular Life of Diatoms, Kobe, Japan. July 2017.

Alexander H. The role of intra-specific diversity on the physiological ecology of phytoplankton. Interdepartmental Graduate Program in Marine Science, University of California, Santa Barbra, Santa Barbra, CA. May 2017.

Alexander H. Strain variation and transcriptional resposne of the *Emiliania huxleyi* species complex under changing nutrient environments. ASLO, Honolulu, HI. February 2017.

Selected Abstracts

Alexander H, Hu S. Eukaryotic genome discovery: Scalable and automated retrieval of eukaryotic metagenome assembled genomes (MAGs) from a global-scale dataset. Ocean Sciences, San Diego, CA. February 2020.

Blum L, Pachiadaki M, **Alexander H**. Microbial drivers of nitrogen metabolism: Searching Tara Oceans metagenomes. Ocean Sciences, San Diego, CA. February 2020.

Alexander H, Phillips J, Thomas M, Chisholm C, Craft K, Galindo V, Neveu M, Laney S, Karenz D, Manahan D. Antarctic Biology Training II: Automatic image classification and colony morphology of Phaeocystis antarctica. Polar Marine Science GRC, Lucca, Italy. March 2019.

Alexander H, Brown CT. Reference- and assembly-independent, scalable discovery of shared content between metagenomic datasets. Ocean Sciences, Portland, OR. February 2018.

Alexander H, Durkin C, Dyhrman ST. Combining *in situ* and culture-based 'omic and biogeochemical measures to identify the physiological ecology of a blooming diatom in the Amazon River Plume. Ocean Sciences, New Orleans, LA. February 2016.

Kujawinski E, Longnecker K, **Alexander H**, Dyhrman S, Jenkins B, Rynearson T. Multi-omics profiling of phytoplankton community metabolism: linking metatranscriptomics and metabolomics to elucidate phytoplankton physiology in a model coastal system. Ocean Sciences, New Orleans, LA. February 2016.

Rosengard SZ, **Alexander H**, Cramer C. SUBMERGE! Bringing the ocean closer to New York City. Ocean Sciences, New Orleans, LA. February 2016.

Alexander H, Dyhrman ST. Nutrient pulses uniquely drive physiological ecology of cosmopolitan phytoplankton strains. A New Age of Discovery for Aquatic Microeukaryotes, Heidelberg, Germany. January 2016.

Alexander H, Rouco M, Haley ST, Wilson ST, Karl DM, Dyhrman ST. Functional group-specific traits drive phytoplankton dynamics in the oligotrophic ocean. Trait-based Approaches to Ocean Life, Waterville, NH. October 2015.

Alexander H, Jenkins BD, Rynearson TA, Dyhrman ST. Metatranscriptome analyses indicate resource partitioning between diatoms in the field. The Molecular Life of Diatoms, Seattle, WA. July 2015.

Alexander H, Rouco M, Haley ST, Dyhrman ST. Eukaryotic metatranscriptome profiling identifies the unique response of phytoplankton functional groups to deep water upwelling at Station ALOHA. ASLO, Granada, Spain. February 2015.

Alexander H. Sixty years of Sverdrup. Wellesley College, Wellesley, MA. June 2014. *Invited talk*.

Alexander H, Jenkins BD, Rynearson TA, Dyhrman ST. Eukaryotic metatranscriptomics reveals niche differentiation between two diatoms in Narragansett Bay,. Marine Microbes Gordon Research Conference, Waltham, MA. June 2014.

Alexander H, Rouco M, Haley ST, Dyhrman ST. Eukaryotic metatranscriptomics illuminates physiological response of phytoplankton to nutrient pulses at Station ALOHA. Ocean Carbon and Biogeochemistry Summer Workshop, Woods Hole, MA. July 2013.

Alexander H, Jenkins B, Rynearson T, Saito M, Mercier M, Dyhrman S. Identifying reference genes with stable expression from high throughput sequence data. ASLO, New Orleans, LA. February 2013.

Alexander H, Dyhrman S. Assessing patterns in expression from transcriptome data. Town Hall: Marine Microbial Transcriptome Project, ASLO, New Orleans, LA. February 2013. *Invited talk*.

Alexander H, Monier A, McRose D, Wilcox H, Worden A. Prasinophyte phylogenetic characterization along a transect from Monterey Bay to oligotrophic waters. Rhulman Conference, Wellesley, MA. April 2010.

Alexander H, Monier A, McRose D, Wilcox H, Worden A. Prasionphytae phylogenetic characterization along a transect from Monterey Bay to oligotrophic waters and application to 454-TAG sequence analysis. Ocean Sciences, Portland, OR. February 2010.

Teaching Experience

June 2020 **Instructor**, *Software Carpentry Workshop*, Woods Hole Oceanographic Institution.
Organized and taught Software Carpentry course for WHOI SSFs and incoming JP students, teaching introductory UNIX shell scripting, Python programming, and Git versioning.

Fall 2019 **Instructor**, *12.756, Environmental Bioinformatics*, MIT-WHOI Joint Program.
Co-created and instructed 12-credit graduate course on environmental and non-model bioinformatic approaches with M. Pachiadaki and C. Tepolt.

July 2017 **Lead Instructor**, *Environmental Metagenomics Workshop*, Data Intensive Biology Summer Institute.
Organized and taught workshop on environmental metagenomic data analysis and interpretation.

April 2017 **Instructor**, *Metagenomic Workshop*, University of California, Santa Cruz.
Co-taught workshop on metagenomic data analysis and interpretation.

Sept. 2016 **Co-instructor**, *Metagenomic Workshop*, Scripps Institute of Oceanography.
Co-taught workshop on metagenomic data analysis and interpretation.

Sept. 2015 **Instructor**, *Software Carpentry Workshop*, Woods Hole Oceanographic Institution.
Organized and taught Software Carpentry course at WHOI, teaching introductory UNIX shell scripting, Python programming, and Git versioning.

2014 **Teaching Assistant**, *Biological Oceanography course*, MIT-WHOI Joint Program.
Conducted recitation sections, wrote and graded tests, problem sets, and daily assignments, advised professors on student performance.

2014 **Guest Lecturer**, *Biological Oceanography course*, MIT-WHOI Joint Program.
Designed and presented lecture on application of molecular techniques to biological oceanography.

2007-2010 **Writing Tutor**, *Pforzheimer Learning and Teaching Center*, Wellesley College, Wellesley, MA.

2009-2010 **Tutor and Grader**, *Mathematics Department*, Wellesley College, Wellesley, MA.

Research Cruises

2019 **UNOLS Chief Scientist Training Cruise; KN19-10**, *R/V Kilo Moana*, 14 June - 23 June, Station ALOHA.

2014 **Seasonal Trophic Roles of *Euphasia superba* STRES; NBP14-10**, *R/V Nathaniel B. Palmer*, 30 November - 29 December, West Antarctic Peninsula.
Chief Scientist: Edward Durbin

2013 **Deep Dissolved Organic Matter (DeepDOM; KN210-04)**, *R/V Knorr*, 25 March - 9 May, Montevideo, Uruguay to Bridgetown, Barbados.
Chief Scientist: Elizabeth Kujawinski

2012 **Hawaii Ocean Experiment - Dynamics of Light and Nutrients (HOE-DYLAN 9; KM12-19)**, *R/V Kilo Moana*, 21 August - 11 September, Station ALOHA.
Chief Scientist: Sam Wilson

2012 **Hawaii Ocean Experiment - Dynamics of Light and Nutrients (HOE-DYLAN 7; KM12-17)**, *R/V Kilo Moana*, 4 -14 August, Station ALOHA.
Chief Scientist: Sonya Dyhrman

Academic Service

Conferences

2017 Co-chair of session entitled "Molecular Insights into Adaptive Microbial Physiology" at ASLO Meeting, Honolulu, HI.

2016 Co-chair of mini-symposium on "Computational Reproducibility" at SciPy, Austin, TX.

Reviewer

Manuscripts *ISME Journal*, *Environmental Microbiology*, *Limnology and Oceanography*, *Journal of Phycology*, *GigaScience*

Grants NSF, NDSEG, NSF GRFP, Moore Foundation

Outreach

2018-present **Skype a Scientist** Skyped directly with various elementary - high school age classrooms to talk about research and what it is like being a scientist.

2014 **Submerge!** New York City marine science festival. Designed and manned booth of hands-on activities focused cycle for WHOI. Estimated more than 4000 people in attendance.

2014 **Women in Ocean Engineering.** Volunteered weekends to work with middle school age girls, introducing them to engineering concepts in a marine environment.

2011-2014 **Artistic Oceanographer Program.** Used a program that combines science and art to help communicate concepts.

2011-2013 **Falmouth Public School Science Fair.** Judged science fair projects for middle and high school aged children.

2012 **STEM for Girls at the New England Aquarium.** Mentored and volunteered for a program designed to encourage girls from underrepresented minorities to pursue math and science.

Professional Development and Workshop Participation

2019 Participant, UNOLS Chief Scientist Training Cruise, Honolulu, HI.

2018 Invited Participant, BioGeoScapes Scoping Workshop, Woods Hole, MA.

2016 Participant, National Academies Keck Futures Initiative (NAKFI): Discovering the Deep Blue Sea, Irvine, CA.

2016 Participant, National Academies Keck Futures Initiative (NAKFI): Discovering the Deep Blue Sea, Irvine, CA.

2016 Participant, EcoDAS XII: Ecological Dissertations in the Aquatic Sciences, Honolulu, HI.

2016 Invited Participant, Plant Science Research Network Scenario Modeling Workshop, Chevy Chase, MD.

2015 Participant, OCB Scoping Workshop: Trait-based approaches to ocean life, Waterville Valley, NH.

2014 Participant, OCB Scoping Workshop: Improving predictive biogeochemical models through single cell-based analyses of marine plankton physiological plasticity, genetic diversity and evolutionary processes, Boothbay, ME.

Skills and Certifications

Certifications PADI SCUBA Open Water, Software Carpentry Instructor Training

Computation Python (language of choice), Matlab, R, shell script

Languages English, French