

## ALEXANDRA ZOE WORDEN

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Josephine Bay Paul Center for Comparative Molecular Biology & Evolution

Marine Biological Laboratory (MBL)

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<https://www.wordenlab.org>

Department of Geophysical Sciences

University of Chicago

Chicago, IL, USA

Parental leaves 2010 2011, 2012

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### *EDUCATION AND POSTDOCTORAL TRAINING*

Scripps Institution of Oceanography	Postdoctoral Fellow	2000 – 2003
	Advisors: Farooq Azam, Brian Palenik	
University of Georgia	Ph.D. in Ecology (Odum School of Ecology)	2000
	Mentor: Brian J. Binder	



- 2024 Freilich MA, [Poirier C](#), Dever M, Alou Font E, Allen J, Cabornero A, [Sudek L](#), [Choi C J](#), Ruiz S, Pascual A, Farrar JT, Shaun Johnston TM, D'Asaro E, [Worden AZ\\*](#) & A Mahadevan\*. 3D intrusions transport active surface microbial assemblages to the dark ocean. *Proceedings of the National Academy of Sciences USA*. In press. \*co corresponding.
- 2024 [Harbeitner RC](#), [Wittmers F](#), [Yung CM](#), [Eckmann C](#), [Hehenberger E](#), Blum M, [Needham DM](#) & [AZ Worden](#). Gradients of bacteria in the oceanic water column reveal finely resolved vertical distributions. *PLoS One*. In press.
- 2024 Deng H, He C, [Worden AZ](#) & J Gong. A triple metabarcoding strategy for discriminating active, dormant, and dead microbes in environmental samples. Vol 26: e16615. doi: 10.1111/1462 2920.16615.
- 2024 [Grone J](#), [Poirier C](#), [Abbott K](#), [Wittmers F](#), [Spiro Jaeger G](#), [Mahadevan A](#) & [AZ Worden](#). A single *Prochlorococcus* ecotype dominates the tropical Bay of Bengal with ultradian growth. *Environmental Microbiology*. Vol 26: e16605. doi: 10.1111/1462 2920.16605.
- 2024 [Henderson LC](#), [Wittmers F](#), [Carlson CA](#), [Worden AZ](#) & HG Close. Variable carbon isotope fractionation of photosynthetic communities over depth in an open ocean euphotic zone. *Proceedings of the National Academy of Sciences USA*. Vol 121: e2304613121
- 2023 [Hehenberger E](#), [Guo J](#), [Wilken S](#), [Hoadley K](#), [Sudek L](#), [Poirier C](#), [Dannebaum R](#), [Susko E](#) & [AZ Worden](#). Phosphate limitation responses in marine green algae are linked to reprogramming of the tRNA epitranscriptome and codon usage bias. *Molecular Biology and Evolution*. Vol 40: <https://doi.org/10.1093/molbev/msad251>.
- 2023 [Strauss J](#), [Deng L](#), [Gao S](#), [Toseland A](#), [Bachy C](#), [Kirkham A](#), [Hopes A](#), [Utting R](#), [Tagliabue A](#), [L w C](#), [Worden AZ](#), [Nagel G](#) & [Mock T](#). Plastid localized xanthorhodopsin increases diatom biomass and ecosystem productivity in iron limited surface oceans. *Nature Microbiology*. Vol 8:2050–2066.
- 2023 [Wilken S](#), [Yung CCM](#), [Poirier C](#), [Massana R](#), [Jimenez V](#) & [AZ Worden](#). Choanoflagellates alongside diverse uncultured predatory protists consume the abundant open ocean cyanobacterium *Prochlorococcus* *Proceedings of the National Academy of Sciences USA*. Vol 120: e2302388120.
- 2023 [Plummer A](#), [Freilich M](#), [Benzi R](#), [Choi CJ](#), [Sudek L](#), [Worden AZ](#), [Toschi F](#) & A Mahadevan. Oceanic frontal divergence alters phytoplankton competition and distribution. *Journal of Geophysical Research*. Vol 128 <https://doi.org/10.1029/2023JC019902>.
- 2023 [Eckmann CA](#), [Eberle JS](#), [Wittmers F](#), [Wilken S](#), [Bergauer K](#), [Poirier C](#), [Blum M](#), [Makareviciute K](#), [Jimenez V](#), [Bachy C](#), [Vermeij MJ](#) & [AZ Worden](#). Eukaryotic algal community composition of tropical environments from solar salterns to the open sea. *Frontiers in Marine Microbiology*. Vol 10, Art. Nr. 1131351.
- 2023 [Strauss J](#), [Choi CJ](#), [Grone J](#), [Wittmers F](#), [Jimenez V](#), [Makareviciute Fichtner K](#), [Bachy C](#), [Spiro Jaeger G](#), [Poirier C](#), [Eckmann CA](#), [Spezzano R](#), [L scher CR](#), [Sarma VVSS](#), [Mahadevan A](#) & [AZ Worden](#). The Bay of Bengal exposes abundant photosynthetic picoplankton and newfound diversity along salinity driven gradients. *Environmental Microbiology*. Vol 25:2118 2141. <https://doi.org/10.1111/1462 2920.16431>.
- 2023 [Min MA](#), [Needham DM](#), [Sudek S](#), [Truelove NK](#), [Pitz K](#), [Chavez GM](#), [Poirier C](#), [Gardeler B](#), [von der Esch E](#), [Ludwig A](#), [Riebesell U](#), [Worden AZ](#) & FP Chavez. Ecological divergence of a mesocosm in an eastern boundary upwelling system assessed with multi marker DNA metabarcoding. *Biogeosciences*. <https://doi.org/10.5194/bg 2022 212>.



Worden <sup>\*</sup>**AZ** & J Lukeš <sup>\*</sup>. Genetic tool development in marine protists: Emerging model organisms for experimental cell biology. *Nature Methods*. Vol 17:481–494. <sup>†</sup>Co first authors, <sup>\*</sup>Co correspond.

2020 Choi CJ, Jimenez V, Needham DM, Poirier C, Bachy C, Alexander H, Wilken S, Chavez FP, Sudek S,

2019



the Eastern North Pacific Ocean. *Applied & Environmental Microbiology*. Vol 82:1693-1705.  
2016 van Baren MJ, Bachy C, Reistetter EN, Purvine SO, Grimwood J, Sudek S, Yu H, Poirier C, Kuo A,



Eukaryotic algal phytochromes span the visible spectrum. *Proceedings of the National Academy of Sciences USA*. Vol 111:3871-3876.

2013 Read BA<sup>†</sup>, Kegel J, Klute MJ, Kuo A, Lefebvre SC, Maumus F, Mayer C, Miller J, Monier A, Salamov

*Sciences USA*. Vol 107:14679 14684.

2010 McDonald SM, Plant JN & **AZ Worden**. The mixed



2008 **Worden\* AZ** & F Not. Ecology and diversity of picoeukaryotes. In: Microbial Ecology of the Ocean, 2<sup>nd</sup> Edition. Ed. D Kirchman. Wiley. \*Corresponding author.

2006 **Worden\* AZ**, Cuvelier ML & DH Bartlett. In depth marine microbial community genomics. *Trends in Microbiology*. Vol 14:331-336. \*Corresponding author.

**Worden AZ**, Brock Biology of Microorganisms 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>, 13<sup>th</sup>, 14<sup>th</sup> & 15<sup>th</sup> Editions. Selected protist and cyanobacteria images.

**TEACHING AND MENTORING** (Mentees in Worden Lab only)

**Ph.D.advisor(CommitteeChair)**

Marie L Cuvelier, Ph.D. (current, Adjunct Professor, Nova Southeastern University, FL USA)	Marine Biology & Fisheries, RSMAS, UM	2004 2010
Melinda P Simmons, Ph.D. (current, Associate Professor, Jacksonville University, FL USA)	Ocean Sciences, UCSC	2007 2014
Valeria Jimenez, Ph.D. Fulbright Scholar (current, Postdoctoral Fellow, Station Biologique de Roscoff, FR)	Ocean Sciences, UCSC	2010 2016
Rachel Harbeitner, Ph.D. (current, Santa Cruz BioTech)	DoD Fellow/UC Chancellor's Fellow; Ocean Sciences, UCSC	2014 2019
Maria Hamilton (current, Postdoctoral Fellow, Moran Lab, University of Georgia)	Ocean Sciences, UCSC	2015 2021
Charlotte Eckmann, Robles Fellow (current, Postdoctoral Fellow, Worden Lab, MBL)	Ocean Sciences, UCSC	2016 2023
Fabian Wittmers	GEOMAR/University of Kiel	2021 pres
Rachele Spezanno	University of Chicago/MBL	2022 pres

**M.S.advisor:**

Joran Paap	GEOMAR/University of Kiel	2022 2024
Theo Kruger	GEOMAR/University of Kiel	2022 2024
Jonathan Grone (current, Ph.D. candidate, Switzerland)	GEOMAR/University of Kiel	2020 2023
Jessica Eberle	GEOMAR/University of Kiel	2019 2022
Fabian Wittmers (current, Ph.D. candidate, Worden Lab, CAU)	GEOMAR/University of Kiel	2019 2020
Darcy McRose (current, Assistant Professor, Massachusetts Institute of Technology)	Stanford University	2010 2011
Alexander J Limardo (current, Associate Scientist, Sequencing Operations at Ultima Genomics)	Ocean Sciences, UCSC	2012 2016

**Undergraduate honorsthesiadvisor(last updated 2016)** e.g. Jason Hilton (UM class of 2006, took UCSC Ph.D. position), Harriet A. (class of 2006, took UCSC Ph.D. position)

Nicole Damas (MBL) 2024 pres

**PostdoctoraFellowsAdvised(Past):**

Fabrice Not 2004 2005

(current, CNRS Director of Research, Station Biologique, Roscoff, FR)

Heike Moehlig 2006 2007

(current, Project Manager, Biotech Institut Virion\Serion GmbH, DE)

Sarah McDonald 2007 2008

(current, Scientist, Celdara Medical, USA)

Elif Demir Hilton 2007 2010

(moved to Research Associate, Environmental Sample Processor (ESP) Group, MBARI, USA)

Adam Monier 2009 2012

(current, Royal Society University Research Fellow, University of Exeter, UK)

Shuangchun "Jeremy" Yan, Ph.D., MBA 2011 2012

(current, Associate, Innosight Strategy and Innovation Consulting, USA)

Jian Guo 2013 2015

(current, Research Scientist, University of British Columbia, CA)

Amy E Zimmerman 2014 2016

(current, Research Scientist, Pacific Northwest National Laboratory, USA)

Charles Bachy 2013 2016

(moved to Marie Curie Fellow at Station Biologique de Roscoff, FR; now curator Roscoff)

Magdalena Gutowska 2014 2016

(current, Adjunct Professor, Middlebury Institute of International Studies at Monterey, USA)

Yun Chi Lin 2016 2017

(current, Assistant Professor, National Taiwan Ocean University)

Susanne Wilken 2013 2017

(current, Assistant Professor, University of Amsterdam, NL)

Mohammad Moniruzzaman 2017 2018

(current, Assistant Professor, RSMAS, University of Miami, USA)

Chang Jae Choi 2014 2019

(moved to Research Professor, Marine Science Institute, University of Texas, USA)

Cheuk Man "Charmaine" Yung 2016 2019

(current, Assistant Professor, Hong Kong University of Science and Technology, HK)

Kenneth Hoadley 2016 2019

(current, Assistant Professor, Dept. Biological Sciences, University of Alabama, USA)

Elisabeth Hehenberger 2017 2021

(current, Principal Investigator Czech Academy of Sciences Awarded by the Ministry of Education, Youth and Sports of the Czech Republic)

Alyssa Gehman (took Ph.D. position at Odum School of Ecology, University of

- 2016-2017 General Meeting Program Committee, 117<sup>th</sup> American Society for Microbiology Meeting (~8000 attendees).
- 2016-2017 Scientific Committee, 2017 Symposium

2006      Session Co Chair, Linking Ecology and Diversity of Aquatic



Other cruises with Worden Lab participation (Last updated 2019):

R/V Atlantic Explorer, AE1916, Sargasso Sea, Jul 2019 (postdoc Kristin Bergauer); R/V Tommy Thompson, MISO BOB, Bay of Bengal, Jun 2018 (support scientist Camille Poirier); R/V Atlantic Explorer, AE1819, Sargasso Sea, Jun 2018 (postdoc Kristin Bergauer, S Sudek); R/V Atlantic Explorer, AE1703, Sargasso Sea, May 2017 (Camille Poirier, S Sudek); KOSMOS Program, Peruvian Upwelling Mesocosms, Spring 2017 (postdoc David Needham, Camille Poirier); R/V Rachel Carson, Monterey Bay Time Series (multiple dates), Jan 2014 to 2016 (multiple lab members); R/V Western Flyer, CANON16, North Pacific, Sep Oct 2016 (Camille Poirier, Maria Hamilton, Susanne Wilken); R/V Atlantic Explorer, AE1406, Sargasso Sea, Apr 2014 (postdoc Amy Zimmerman); R/V Rachel Carson, CANON14, Monterey Bay, Sep 2014 (multiple lab members); R/V Western Flyer, CO912, North Pacific, Sep 2012 (multiple lab members); R/V Western Flyer, GOC2012, Gulf of California, Feb 2012 (masters student AJ Limardo); R/V Western Flyer, S410, North Pacific, Sep 2010 (multiple lab members); R/V Kilo Moana, KM0703, South Pacific, 2007 (technician Rory Welsh); R/V Western Flyer, CN207, North Pacific, Oct 2007 (multiple lab members); R/V Western Flyer, W007, North Pacific, Jul 2007 (multiple lab members); R/V Seward Johnson, SJ0609, Florida Cape Verde Barbados Tropical Atlantic Transect, 2006 (graduate student Marie Cuvelier, undergrad. G Engman, technician Rory Welsh); R/V Oceanus, OC413, Jun 2018 Bay, Apr 2018 Atlantic Bay

***INVITED TALKS, INTERNATIONAL MEETINGS***

- 2024 Invited Speaker, Gordon Research Conference on Photosensory receptors and signal transduction, Lucca, Italy.
- 2023 Distinguished Seminar, International Forum on Advanced Environmental Sciences and Technology, Virtual.
- 2023

- 2014 Invited Speaker, 15<sup>th</sup> International Symposium on Microbial Ecology, Seoul, Korea. With post doc Dr. Charles Bachy.
- 2014 **Keynote Speaker** Congress of the International Union of Microbiological Societies, Montreal, Canada. With postdoc Dr. Susanne Wilken.
- 2013 Invited Speaker, Comparative Genomics of Eukaryotic Microorganisms, European Molecular Biology Organization (EMBO) Conference, Sant Feliu de Guixols, ES.
- 2013 Invited Speaker, International Congress of Protistology XIV, Vancouver B.C., Canada.
- 2013 **Keynote Speaker** Annual Meeting of the Environmental Mutagenesis and Genomics Society, Monterey, California, USA.
- 2013 Invited Speaker, Joint Genome Institute Genomic Technologies Workshop/Genomics of Energy and the Environment Meeting. Walnut Creek, California, USA.
- 2013 Invited Speaker, Integrated Microbial Diversity Meeting, Whistler B.C., Canada.
- 2012 Invited Speaker, 14<sup>th</sup> International Symposium on Microbial Ecology, Copenhagen, Denmark.
- 2012 **Keynote Lecture** 8<sup>th</sup> International Chrysophyte Symposium,

- 2021 Invited Seminar, Department of Molecular and Cellular Biology, Harvard University, Cambridge, MA, USA.
- 2021 Invited Seminar, Royal Netherlands Institute for Sea Research (NIOZ), Texel, NL.
- 2021 Invited Seminar, Department of Geophysical Sciences, University of Chicago, Chicago IL, USA.
- 2021 Invited Talk, GENECO Summer Meeting, SE.
- 2021 Invited Seminar, Marine Biological Laboratory, USA
- 2020 Invited Seminar, Department of Microbiology, University of Massachusetts Amherst, MA, USA.
- 2020 Invited Seminar, Max Planck Institute for Evolutionary Biology, Plön, DE.
- 2020 Invited Seminar, School for Ocean and Earth Sciences, University of Southampton, Southamp., UK.
- 2020 Invited Speaker, BIOS SCOPE Meeting, San Diego, CA, USA.
- 2020 Invited Speaker, Azam Symposium, Scripps Institution of Oceanography, San Diego, CA, USA.
- 2018 Invited Speaker, Living Systems Symposium, Tübingen, DE.
- 2018 Invited Speaker, Science Philanthropy Alliance, San Francisco, CA, USA.
- 2017 Invited Seminar Speaker, Ecology Sem. Series, Scripps Institution of Oceanogr., San Diego, CA, USA.
- 2017 Invited Seminar Speaker, Max Planck Institute for Developmental Biology, Tübingen, DE.
- 2017 Invited Seminar Speaker, Dept. of Genetics, University of Seville, Seville, ES.
- 2017 Invited Seminar Speaker, Netherlands Institute for Sea Research (NIOZ), Texel, NL.
- 2016 Invited Seminar Speaker, Moss Landing Marine Labs, California State Universities, USA.
- 2016 Invited Seminar Speaker, GEOMAR Helmholtz Centre for Ocean Research, Kiel, DE.
- 2016 Invited Speaker, 11<sup>th</sup> Annual Science and Technology Week, Los Altos High School, CA, USA.
- 2016 Invited Speaker, Department of Civil and Environmental Engineering, MIT, Cambridge, MA, USA.
- 2016 Invited Seminar Speaker, Department of Ecology and Evolutionary Biology, Yale University, New Haven, Connecticut, USA.
- 2016 Invited Seminar Speaker, Earth System Science Department, Stanford University, CA, USA.
- 2015 Invited Seminar Speaker, Earth, Atmospheric and Planetary Sciences Department, MIT, Cambridge, Massachusetts, USA.
- 2015 Invited Speaker, Invitational Seminar Series, Max Planck Institute for Marine Microb., Bremen, DE.
- 2014 Invited Seminar Speaker, Ecology Department, University of California Santa Barbara, Santa Barbara, California, USA.
- 2014 Invited Seminar Speaker, SciLifeLab and University of Stockholm, Stockholm, Sweden.
- 2014 Invited Seminar Speaker, University of Copenhagen, Copenhagen, Denmark.
- 2014 Invited Seminar Speaker, Department of Biological Sciences, University of Southern California, Los Angeles, California, USA.
- 2013 Invited Seminar Speaker, Stazione Zoologica di Napoli, Italy.
- 2013 Invited Speaker, Department of Energy Genomic Science Meeting, Bethesda, Maryland, USA.
- 2013 Invited Seminar Speaker, Department of Microbiology, Oregon State University, Oregon, USA.
- 2012 Invited Speaker, Bay Area Biosystematists Meeting, San Jose, California, USA.
- 2012 Invited Speaker, Plant Sciences Seminar Series, UC Davis, Davis, California, USA.
- 2011 Invited Speaker, Microbial Diversity Institute Winter Symposium, Yale University, New Haven, CT, USA.
- 2011 Invited Speaker, Systematists Meeting, UC Davis, Davis, CA, USA.

- 2007 Invited Seminar Speaker, Ocean Sciences, University of California Santa Cruz, California, USA.
- 2007 Invited Speaker, Single Cell Alternatives to Metagenomics in Environmental Microbiology Workshop, Boothbay Harbor, Maine, USA.
- 2007 Invited Seminar Speaker, Institut de Ciències del Mar, CSIC, Barcelona, ES.
- 2007 Invited Seminar Speaker, University of Madras, Chennai, India.
- 2006 Invited Seminar, Monterey Bay Aquarium Research Institute, Moss Landing, California, USA.
- 2006 Invited Seminar, Department of Biology, University of Miami, Coral Gables, Florida, USA.
- 2006 Invited Seminar Speaker, Netherlands Institute of Ecology (NIOO), Yerseke, NL.
- 2006 Invited Seminar Speaker, Institute of Biodiversity and Ecosystem Dynamics, University of Amsterdam, Amsterdam, NL.
- 2006 Invited Talk, Azam Symposium: Status of Bacterioplankton Ecology, Scripps Institution of Oceanography, La Jolla, California, USA.
- 2006 Invited Lecturer, National Tropical Botanical Garden Physicians' Course, Florida, USA.
- 2005 Invited Speaker, Beckman Coulter BioPharma Invited Seminar Series, Kendall, Florida, USA.
- 2005 Invited Speaker, Oceans and Human Health Center 1<sup>st</sup> Annual Science Symposium, Miami, FL, USA.
- 2003 Invited Seminar Speaker, University of Southern California, Los Angeles, California, USA.
- 2003 Invited Seminar Speaker, University of Massachusetts, Boston, Massachusetts, USA.
- 2003 Invited Seminar Speaker, Rosenstiel School of Marine Science, Univ. of Miami, Miami, Florida, USA.
- 2003 Invited Seminar Speaker, Department of Microbiology, Univ. Tennessee, Knoxville, Tennessee, USA.
- 2002 Invited Seminar Speaker, Department of Microbiology, University of Hawaii, Honolulu, Hawaii, USA.
- 2002 Plenary Talk, Azam F & AZ Worden, Center for Marine Biodiversity and Conservation Annual Meeting, San Diego, California, USA.
- 2002 Invited Seminar, University of Georgia, Athens, Georgia, USA.