**MELISSA B. DUHAIME**
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## EDUCATION

PhD Max Planck Institute for Marine Microbiology, Bremen, Germany, 2010; *with distinction*
*"Exploring the Marine Virosphere: From Genome Context to Content"*

MSc Max Planck Institute for Marine Microbiology, Bremen, Germany, 2007
*"Marine Virus Population Dynamics and Genomics: Lessons from the North Atlantic and North Sea"*

BA Cornell University (Microbiology), Ithaca, NY, 2005

## PROFESSIONAL APPOINTMENTS

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|---|---|
| 2017 – present | Assistant Professor, Ecology and Evolutionary Biology, University of Michigan |
| 2012 – present | Faculty Affiliate, Center for Computational Medicine and Bioinformatics, University of Michigan |
| 2012 – 2016 | Assistant Research Scientist, Ecology and Evolutionary Biology, University of Michigan |
| 2010 – 2011 | Post-doctoral fellow, Ecology and Evolutionary Biology, University of Arizona |
| 2005 | Research Fellow, Woods Hole Oceanographic Research Institute (WHOI) |
| 2004 | Research Intern, Max Planck Institute for Marine Microbiology |
| 2003 | Research Intern, Monterey Bay Aquarium Research Institute (MBARI) |

## RESEARCH PUBLICATIONS *Citations: 675; h-index: 13 (15 March 2018)*

**Duhaime MB**, Solonenko N, Roux S, Verberkmoes NC, Wichels A, Sullivan MB. 2017. Comparative omics and trait analyses of marine *Pseudoalteromonas* phages advance the phage OTU concept. *Frontiers in Microbiology*. 8:1241.

Cable RN, Beletsky D, Beletsky R, Wigginton K, Locke BW, **Duhaime MB**. Distribution and modeled transport of plastic pollution in the Great Lakes, the world's largest freshwater resource. *Frontiers in Environmental Science*. 5, 45.

Berry MA, Davis TW, Cory RM, **Duhaime MB**, Johengen TH, Kling GW, Marino JA, Den Uyl PA, Gossiaux D, Dick GJ, Denef VJ. 2017. Cyanobacterial harmful algal blooms are a biological disturbance to western Lake Erie bacterial communities. *Environmental Microbiology*. 19(3), 1149-1162.

Roux S, Brum JR, Dutlih BE, Sunagawa S, **Duhaime MB**, Poulus PT, Solonenko N, Lara E, Poulain J, Pesant S, Kandels-Lewis S, Dimier C, Picheral M, Searson S, Cruaud C, Alberti A, Duarte CM, Gasol JM, Vaque D, Tara Oceans Coordinators, Bork P, Acinas SA, Wincker P, Sullivan MB. Ecogenomics and potential biogeochemical impacts of globally abundant ocean viruses. *Nature*, 537 (7622), 689.

Michielssen MR*, Michielssen ER*, Ni J*, **Duhaime MB**. (2016) Fate of microplastics and other small anthropogenic litter (SAL) in wastewater treatment plants depends on unit processes employed. Environmental Science: Water Research & Technology. 2(6), 1064-1073. **** high school co-authors***

Oberbeckmann S, Osborn M, **Duhaime MB**. (2016) Microbes on a bottle: substrate, season and geography influence community composition of microbes colonizing marine plastic debris. *PLoS One*. PLoS One 11(8), e0159289.

**Duhaime MB**, Wichels A, Sullivan MB. Six *Pseudoalteromonas* Strains Isolated from Surface Waters of Kabeltonne, Offshore Helgoland, North Sea. *genomeA*, *in press*.

Hankett J, Collin WR, Yang P, Chen Z*, **Duhaime MB***. 2016. Low-v**o**latility Model Demonstrates Humidity Affects Environmental Toxin Deposition on Plastics at a Molecular Level. *Environmental Science & Technology*. DOI: 10.1021/acs.est.5b05598 * joint corresponding authors

Syberg K, Khan SR, Selck H, Palmqvist A, Banta G, Daley J, Sano L, **Duhaime MB**. 2015. Microplastics: Addressing Ecological Risk Through Lessons Learned. *Environmental Toxicology and Chemistry*. DOI: 10.1002/etc.2914

Voorhies AA, Eisenlord SD, Marcus DN, **Duhaime MB**, Cavalcoli JD, Dick GJ. 2015. Ecological and genetic interactions between cyanobacteria and viruses in low-oxygen mat community inferred through metagenomics and metatranscriptomics. *Environmental Microbiology*. DOI:10.111/1462-2920.12756

Anantharaman K, **Duhaime M**, Toner BM, Breier JA, Dick GJ. 2014. Sulfur oxidation genes in diverse deep-sea viruses. *Science*. 344(6185): 757-760.

Buttigieg PL, Hankeln W, Kostadinov I, Kottmann R, Yilmaz P, **Duhaime MB**, Glöckner FO. 2013. Ecogenomic Perspectives on Domains of Unknown Function: Correlation-based Exploration of Marine Metagenomes. *PLoS One.* 8(3): e50869. DOI:10.1371/journal.pone.0050869.

Allers E, Moraru C, **Duhaime MB**, Beneze E, Solonenko N, Canosa JB, Amann R, MB Sullivan. 2012. phageFISH: Single-cell and population level viral infection dynamics revealed by phageFISH, a method to visualize intracellular and free viruses. *Environmental Microbiology*. 15: 2306–2318.

**Duhaime MB** and Sullivan MB. 2012. Ocean viruses: Rigorously evaluating the metagenomic sample-to-sequence pipeline. *Virology*, *434*(2), 181-6.

**Duhaime MB**, Deng L, Poulos BP, Sullivan MB. 2012. Towards quantitative metagenomics of wild viruses and other ultra-low concentration DNA samples: a rigorous assessment and optimization of the linker amplification method. *Environmental Microbiology*. *14*(9), 2526-37.

**Duhaime MB**, Wichels A, Waldmann J, Teeling H, Glöckner FO. 2011. Ecogenomics and Genome Landscapes of Marine Pseudoalteromonas Phage H105/1. *ISME Journal*. 5(1):107-21.

**Duhaime MB**, Kottmann R, Field D, Glöckner FO. 2011. Enriching public descriptions of marine phages using the Genomic Standards Consortium MIGS standard. *Standards in Genome Sciences*.

Kottmann R, Kostadinov I, **Duhaime MB**, Buttigieg P, Yilmaz P, Hankeln W, Glöckner FO. 2010. Megx.net: Integrated database resource for marine ecological genomics. *Nucleic Acids Res*. 38: 391-395.

Richter M, Lombardot T, Kostadinov I, Kottmann R, **Duhaime MB**, Peplies J, Glockner FO. 2008. JCoast - A biologist-centric software tool for data mining and comparison of prokaryotic (meta)genomes. *BMC Bioinformatics*. 9:177.

Vrijenhoek RC, **Duhaime M**, Jones WJ (2007) Subtype variation among bacterial endosymbionts of tubeworms (Annelida: Siboglinidae) from the Gulf of California. *Biological Bulletin.* 212(3): 180-184.

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## RESEARCH GRANTS AND AWARDS

| RESEARCH GRANTS | | *Funding to date (as lead PI): $493,165* |
|---|---|---|
| 2017 | $150,000 | Department of the Interior (contracted with the National Park Service; jointly with Denef Lab)<br>*Identifying microbiological factors driving botulism outbreaks at Sleeping Bear Dunes National Lakeshore* |
| 2016 | $60,328 | Swiss Polar Institute, Lead PI Christel Hassler (Antarctic Circumpolar Expedition)<br>*Biodiversity and isolation of bacteria and viruses in contrasted regions of the Southern Ocean* |
| 2016 | $40,000 | Gordon and Betty Moore Foundation (contracted with the San Francisco Estuary Institute)<br>*Nanoplastic pollution in aquatic ecosystems* |
| 2015 | $15,000 | University of Michigan MCubed<br>*The Role of the Virome in Cystic Fibrosis;* Schloss P, Duhaime M, LiPuma J |
| 2015 | $148,962 (PI) | Department of Energy JGI-EMSL Cooperative Science Initiative<br>*Building the phage-host-environment interaction data to scale from genes-to-ecosystems: Towards predictive modeling of wild microbial and viral community dynamics;* Duhaime M, Sullivan MB |
| 2015 | $14,915 (PI) | University of Michigan Office of Research<br>*The Ocean Plastic Microbiome: Ecosystem-level impacts of microbial biofilms on ocean plastic debris* |
| 2013 | $274,463 (PI) | University of Michigan Water Center<br>*Microplastics in the Great Lakes: Towards establishing a long-term multidisciplinary research platform to assess the impact of microplastics on Laurentian Great Lakes ecosystem health*; Duhaime M**,** Wigginton KR, Beletsky D, Rios Mendoza, L, Chen Z, Beletsky R, Sano L, Burton A |
| 2013 | $14, 825 (PI) | Elizabeth C. Crosby Award, University of Michigan ADVANCE Program |
| 2013 | $249,485 | University of Michigan Water Center<br>*Building capacity for freshwater science: Integrating microbial genomics, environmental chemistry, and ecosystem processes to understand harmful algal blooms;* Dick G, Johengen T, Denef, V, Duhaime M, Sherman D, Cory R, Kling G, Fahnenstiel G, Ruberg S, James T, Davis, T |
| 2013 | *services* | Pacific Northwest National Lab (transcriptomics sequencing) |

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| | | *Bringing the viral "unknown" to light through wild community and model system characterization;* Coleman M, Duhaime M, Holmfeldt K, Sullivan M |
| 2010 | *services* | Broad Institute Marine Virus Initiative (PI), 454 sequencing for two virus metagenomes |

AWARDS AND HONORS

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|---|---|
| 2013 | Selected participant *Women Evolving* the *Biological Sciences* (WEBS), NSF ADVANCE |
| 2010 | Teaching award, Max Planck Institute Graduate School (Bioinformatics course) |
| 2007-10 | Marie Curie Early Stage Training Ph.D. fellowship |
| 2009 | Poster Prize, Gordon Research Conference Applied and Environmental Microbiology |

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## TEACHING EXPERIENCE

INSTRUCTOR

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|---|---|
| 2017 | EEB 401 Advanced Environmental Microbiology Laboratory -- Field Course at UMBS (new course development through Third Century Initiative grant to UMBS) |
| 2017 | EEB 401 Advanced Environmental Microbiology Laboratory -- Lab Course on campus (new course development through Third Century Initiative grant to UMBS) |
| 2016 | M-Sci project instructor, *"Microcystis Viruses: Hunting the Natural Born Killers of Lake Erie's Harmful Algal Blooms"* |
| 2008 - 2009 | Bioinformatics graduate course, MPI Marine Microbiology (teaching award) |
| 2008 - 2009 | Molecular Ecology graduate course, MPI Marine Microbiology |

GUEST LECTURER

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| 2014 | Topics in Culture and Environment, SNRE, University of Michigan (Instructor: Jacqueline Courteau) |
| 2013 | Microbial Diversity, LSA, University of Michigan (Instructor: Paul Dunlap) |

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## INVITED SPEAKING ENGAGEMENTS

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| 2018 | Madison Microbe Meeting, Madison, WI. |
| 2018 | Kid Tech University**, Bowling Green State University, OH. "*Global Change Microbiology: The microscopic organisms that fuel our planet.*" **invited* keynote for outreach program |
| 2016 | Marine Debris Training Workshop, GLERL, Ann Arbor, MI. "*Great Lakes Microplastics Across Scales: From Surface Interactions to Basin-wide Transport Models*" |
| 2015 | Freshwater Summit, invited panelist, Traverse City, MI |
| 2015 | Sierra Club Huron Valley: "*Plastics! Plastic Debris and Ecosystem Health of our Great Lakes*" |
| 2015 | Bowling Green State, Bowling Green, OH: "*The Aquatic Plastic Debris Microbiome: From the applied to the theoretical, lessons learned to better understand ecosystem impacts*" |
| 2014 | University Research Corridor, *Blue Economy*; invited panelist, press conference, Muskegon, MI |
| 2014 | Great Lakes Restoration Conference, *Healing Our Waters*, invited panelist, Grand Rapids, MI |
| 2014 | Water Center Annual Meeting, Graham Sustainability Institute, Ann Arbor, MI: "*Great Lakes Microplastics: Establishing an ecosystem-level understanding*" |

2014 Annis Water Resources Institute (AWRI), Muskegon, MI: "*Aquatic viruses: Implications for microbial community structure and function*"
2013 Environmental Virology Workshop, Biosphere2 Oracle, AZ: "*phageFISH: visualizing intracellular and free viruses for single-cell and population-level viral infection dynamics*"
2013 Environmental Virology Workshop, Biosphere2 Oracle, AZ: "*Sample-to-Sequence: the virus metagenome process-line*"
2010 Phages in Interaction III, Leuven, Belgium: "*Painting the Genome Landscape of a Marine Phage*"
2008 Metagenomics 2008, San Diego, CA: "*Megx.net*" (tutorial session).
2008 ISME 12, Cairns, Australia: "*Insights into the Genome of H105/1, a marine lysogenic phage with a* Pseudoalteromonas *host from the North Sea*"

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## ADVISING AND MENTORSHIP

PRIMARY ADVISING

2017 - current Morgan Lindback, EEB Pre-candidate (exp. grad. date 2022)
2017 - current Anthony (AJ) Wing, EEB Pre-candidate (exp. grad. date 2022)
2016 - current Eric Bastien, Biology Honors Program and UROP, University of Michigan; *viral genomics*
2013 - current Alexi Schnur, M-Bio / UROP, University of Michigan; *HABs viruses*

THESIS COMMITTEES AND SECONDARY ADVISING

2017 - current Kathryn Langenfeld (secondary advisor, PhD pre-candidate, Civil and Environmental Engineering
2014 - current Jillian Meyer (committee member), PhD pre-candidate, Univ. of Michigan; *mycoviruses*
2015 - 2017 Sierra McClain (research advisor), MSc student, Eastern Michigan University, *high-resolution virus microscopy*
2014 - 2016 Joy Jeyaratnam (secondary advisor, PhD pre-candidate, Civil and Environmental Engineering

FORMER STUDENT ADVISEES

2016 - 2017 Aaron Adiwijaja, UROP, University of Michigan; *HABs viruses*
2016 - 2017 Yi Qiu, UROP, University of Michigan; *HABs viruses*
2016 - 2017 Andrew Wong, UROP, University of Michigan; *environmental nanoplastic pollution*
2016 - 2017 Kaitelyn Benedek, EEB minor, University of Michigan; *environmental plastic pollution*
2016 - 2017 Payton Watt, EEB major, University of Michigan; *environmental plastic pollution*
2013 - 2016 Greg Boehm, UROP (Senior), University of Michigan; *microplastic ingestion by* Daphnia
2014 - 2016 Kathryn Wiles, MSc student, Univ. of Michigan; *community ecology of plastic microbiome*
2015 Paulina Devlin (Senior), University of Michigan; *HABs viruses; currently MSc student in physiology, University of Michigan*
2015 Shubhum Sidhar (Senior), University of Michigan; *Great Lakes plastics*
2015 Naomi Huntley (Senior), University of Michigan; *Great Lakes plastics*
2014 - 2015 Sarah Halperin*; currently MSc student, Bren School of Environmental Science and Management, University of California Santa Barbara*
2013 - 2014 Melissa Freeland; *currently lab technician School of Public Health, University of Michigan*
2013 - 2014 Bridget Vial, *undergraduate; University of Michigan*
2014 Vinnie Gupta, *undergraduate; University of Michigan*
2014 Emma Borjigin-Wang, *undergraduate; Harvard University*

2013 - 2014 Gabriel Vargas*, currently PhD student in viral ecology and genomics; University of Chicago*
2013 - 2014 Nicole Dear*, MSc. graduate School of Public Health, University of Michigan*
2011 Ryan Schenk, *currently graduate student marine virology, University of South Florida*
2010 Ian McGill, *MSc graduate, Applied Biosciences, University of Arizona*

STUDENT ADVISEE AWARDS
2015 Alexi Schnur, American Society Microbiology Undergraduate Research Fellowship (ASM-URF)
2013 Nicole Dear, American Society Microbiology Undergraduate Research Fellowship (ASM-URF; declined for internship at NEON—*National Ecological Observatory Network*)

STUDENT PRESENTATIONS * *and underline denote undergraduate*
Schnur A*, Devlin P*, Berry M, Dick GJ, Duhaime MB. *Microcystis* Viruses: Hunting the Killers of Erie's Algal Blooms (poster presentation). 2016 ASM Microbe Meeting, Boston, MA

Duhaime MB, Berry M, Schnur A*, Devlin P*, Dick GJ. Lake Erie Viruses: 'Viromic' Approaches to Track the Killers of Erie's Blooming Microbes (oral presentation). 2016 IAGLR Annual Meeting, Guelph, Ontario

Boehm G*, Vial BS*, Halperin SE*, Duhaime MB, Cable R. Great Lakes' microplastics: Developing novel methods of microplastic extraction and quantification (poster presentation). 2015 IAGLR Annual Meeting, Burlington, VT
https://dudelabadventures.wordpress.com/2015/05/30/lab-presents-at-iaglr-2015-burlington-vt/

Boehm G*, Oberbeckmann S, Duhaime MB. The Ocean Plastic Microbiome: Biofilm Community Dynamics and Microbe-Plastic Interface (poster presentation). 2013 UROP Symposium, University of Michigan

Schnur A*, Duhaime MB. The Great Ocean Virus Hunt: Isolating Novel Marine Phages (poster presentation). 2013 MBio Symposium, University of Michigan

FORMER POSTDOCS
Cody Sheik *Assistant Professor, University of Wisconsin-Duluth, Large Lakes Observatory*

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## PUBLIC OUTREACH AND EDUCATION

RESEARCH AND LAB MEDIA COVERAGE
Consortium for Ocean Leadership, "Senate Navigates Growing Marine Debris Problem" 31 Jul 2017: http://oceanleadership.org/senate-navigates-growing-marine-debris-problem/
The Scientist, "Ocean Viruses Cataloged." 21 September 2016: http://www.the-scientist.com/?articles.view/articleNo/47086/title/Ocean-Viruses-Cataloged/
U-M press release. "Scientists triple known types of viruses in world's oceans." 21 Sept 2016: http://ns.umich.edu/new/releases/24203-scientists-triple-known-types-of-viruses-in-world-s-oceans
*Interviewed by Carl Zimmer for Quanta Magazine.* "Scientists Map 5,000 New Ocean Viruses." 21 May 2015: https://www.quantamagazine.org/20150521-ocean-viruses/
WILS Morning Wake-Up with Dave Akerly (live interview), 16 March 2015

*WMUK, Michigan NPR (interview, radio cast)*, "Michigan to Consider Microbead Ban." 7 March 2015: http://wmuk.org/post/michigan-consider-microbead-ban

*WKAR, Current State (live interview, Michigan Radio)*, "UM researcher says microplastics could threaten Great Lakes fish." 3 March 2015: http://wkar.org/post/um-researcher-says-microplastics-could-threaten-great-lakes-fish#stream/0

*Port Stanley News*, "Research field station docks in Port Stanley." 29 July 2014

*Great Lakes Echo*, "Researchers troll for plastic on Great Lakes fishing boat." 16 July 2014: http://greatlakesecho.org/2014/07/16/researchers-troll-for-plastic-aboard-converted-great-lakes-fishing-boat/

*Lake Scientist*, "Microplastics Pollution in the Great Lakes Ecosystem." 16 July 2014: http://www.lakescientist.com/microplastics-pollution-great-lakes-ecosystem-summary-presentations-iaglr-2014/

*MIRS, Michigan's Capitol Coverage*, "Tiny Plastics Register on States' Policy Radar." 26 July 2014: http://www-personal.umich.edu/~duhaimem/mirs_article.html

*UM News*, "Viruses hijack deep-sea bacteria at hydrothermal vents." 1 May 2014: http://ns.umich.edu/new/releases/22158-viruses-hijack-deep-sea-bacteria-at-hydrothermal-vents

*Michigan Radio, Environment Report*, "Hunting for Plastic Pollution in the Great Lakes." 29 August 2013: http://michiganradio.org/post/hunting-plastic-pollution-great-lakes

EDUCATIONAL OUTREACH

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| 2016 | A lead science ship of *eXXpedition Great Lakes* (all female crew on day of largest simultaneous plastic sampling event on record) |
| 2016 | *Great Lakes vs Plastic*. Duhaime Lab plastic pollution awareness outreach event at Belle Isle Aquarium in downtown Detroit, in concert with *eXXpedition Great Lakes* |
| 2015 | Hosted Grand Rapids LEGO Team Research Experience (15 students, ages 8-10) introduced concepts and hands on experience studying plastic debris in Great Lakes watershed https://dudelabadventures.wordpress.com/2015/10/19/a-visit-from-the-grand-rapids-first-lego-league-team |
| 2014 | Ann Arbor middle school (STEAM) session on plastic debris in our watersheds |
| 2014 | Duhaime Lab led Windward Bound summer field camp sailing Lake Huron for 2 weeks, instructing 10-14 year olds on microplastics sampling, lab analyses, environmental stewardship |
| 2013 | Dundee middle school session on marine plastic debris and the "path of a STEM girl" |
| 2012 – 2013 | Training of ~30 STEM teachers (grades 3-6), 15 tour guides and installation of educational posters at Biosphere2 Ocean (Oracle, AZ) |
| 2012 | Year-long interaction with students at multiple schools in France to teach about the effects of plastic pollution on marine ecosystems |

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## FIELD PROGRAMS

Cumulative 74 days (Duhaime) and 177 days (including all Duhaime Lab members) aboard oceanographic and large lakes research vessels sampling microbes, viruses, and microplastics

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| 2017 | Antarctic Circumpolar Navigation (ACE), 3 months at sea |
| 2014-current | weekly sampling on Lake Erie to study toxic harmful algal blooms |

2014 Tara Mediterranean (Duhaime Lab efforts represented by R. Cable), Algeria to France
http://oceans.taraexpeditions.org/en/m/science/news/interview-of-rachel-cable/
2014 NOAA vessel and R/V Nancy K, Laurentian Great Lakes
2011 Tara Oceans Expedition, Chile to Easter Island, Southern Pacific
2008 McMurdo Station, Antarctica
2007 R/V Maria S. Merian, Iceland to Portugal, Northern Atlantic
2003 R/V Tiburon to whale falls with Monterey Bay Aquarium Research Institute, Monterey Canyon, Pacific

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## SERVICE ACTIVITIES

SOCIETY INVOLVEMENT

2017 Invited contributor to Microbial Ecology and Evolution Retreat, ASM Headquarters, Washington D.C.

*Society Memberships*: American Society for Microbiology (ASM), Association for the Sciences of Limnology and Oceanography (ASLO)

JOURNAL PEER-REVIEW

Science, International Society for Microbial Ecology Journal (ISMEJ, Nature Publishing Group), Applied and Environmental Microbiology, Microbiome, Environmental Chemistry, Environmental Science & Technology

GRANT PEER-REVIEW

NSF Biological Oceanography, European Research Council, Sea Grant of Michigan, Sea Grant of Wisconsin, Sea Grant of New York

DISCIPLINE SERVICE

2017 Submitted oral and written testimony to the U.S. Senate sub-committee hearing on marine debris (July 2017)
2017 Invited contributor to CIFAR-GBMF Workshop: Marine Viruses -- Continuum of Persistence (Portugal)
2016 International Joint Commission—Microplastics Workshop, Windsor, Canada
2015 Hosted session at International Association for Great Lakes Annual Meeting (Burlington, VT) to discuss current state-of-the art and strategic planning for microplastics research in Great Lakes
2013-present NOAA Marine Debris Action Plan: member of core science advisory team working with regional/national stakeholders to assess and reduce the threat of plastics to Great Lakes health

LEADERSHIP

2014 – 2016 Executive board member *Tara Mediterranean*—international research consortium of 20+ research groups studying impacts of plastic debris on Mediterranean ecosystem. Duhaime lab leads microbial analyses of interdisciplinary project (field sampling 2014, R. Cable).

2008 – 2009 Spokesperson Max Planck Society PhDnet: led body representing ~5000 PhD students of the Max Planck Society to the governing body of the society, the German government, the public.

*Published during tenure as spokesperson*:
**Duhaime MB**, Alsheimer S, Angelova R, FitzPatrick I. 2008. In defense of Max Planck. *Science* 320(5878): 872.

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## ADVISORS, MENTORS, AND REFERENCES

Post-doctoral Mentor: Dr. Matthew B. Sullivan, Microbiology, The Ohio State University
PhD Advisor: Dr. Frank Oliver Glöckner, Bioinformatics Group, Max Planck Institute for Marine Microbiology
Dr. Megan Duffy, Ecology and Evolutionary Biology, University of Michigan
Dr. Gregory Dick, Earth and Environmental Sciences, University of Michigan
Dr. Lutgarde Raskin, Civil and Environmental Engineering, University of Michigan