

## Curriculum Vitae

Ryan Christopher McMinds

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### Research Interests

I study the evolution of host-microbe symbioses. In the milieu of the host-associated microbiome, there are many distinct patterns by which groups form their associations. Some are strict, obligate symbionts, some are facultative, and others are simply passersby. This forms a spectrum of consistency with which various microbial groups are found, and creates complex interactions with environmental factors and the phylogeny of both hosts and symbionts. My focus has been to disentangle these complex interactions using occurrence patterns, in order to create better hypotheses regarding the functional significance of each group.

### Education

PhD. candidate in the Department of Microbiology at Oregon State University. Expected defense date: June 2018.  
B.S. in Marine Science and Biology at the University of Miami's Rosenstiel School of Marine and Atmospheric Science. Minors in Anthropology and Chemistry. Degree completed May 2012.  
Overall GPA: 3.636; GPA in Marine Science/Biology: 3.63  
Graduate of South Albany High School in Albany, Oregon, 2008

### Awards and Honors

Middlekauf Graduate Achievement in Microbiology recipient, Oregon State University (2017)  
East Asia and Pacific Summer Institutes Fellow, National Science Foundation (2014)  
Provost's Distinguished Graduate Fellow, Oregon State University (2013-2014)  
Foote Fellow, University of Miami (2008-2012)  
Singer Scholar, University of Miami (2008-2012)

### Publications:

Pollock FJ, **McMinds R**, Smith S, Bourne DG, Willis BL, Medina M, Vega Thurber R, Zaneveld JR.  
(*submitted*) Coral microbiomes reflect host phylogeny and disease susceptibility. *Nat Com*  
Zaneveld JRR, **McMinds R**, Vega Thurber R. (2017) Stress and Stability: applying the Anna Karenina Principle to animal microbiomes. *Nat Microbiol* 2:17121. doi:10.1038/nmicrobiol.2017.121  
Welsh RM, Rosales SM, Zaneveld JRR, Payet JP, **McMinds R**, Hubbs ST, Vega Thurber R. (2017) Alien vs. predator: bacterial challenge alters coral microbiomes unless controlled by *Halobacteriovorax* predators. *PeerJ* 5(6):e3315. doi:10.7717/peerj.3315

- Shaver EC, Shantz AA, **McMinds R**, Burkepile D, Vega Thurber R, Silliman BR. (2017) Effects of predation and nutrient enrichment on the success and microbiome of a foundational coral. *Ecology* 98:830–839.
- Zaneveld JRR, Burkepile D, Shantz AA, Pritchard CE, **McMinds R**, Payet JP, Welsh R, Correa AMS, Lemoine NP, Rosales SM, Fuchs C, Maynard JA, Vega Thurber R. (2016) Overfishing and nutrient pollution interact with temperature to disrupt coral reefs down to microbial scales. *Nat Com* 7:11833.
- Payet JP, **McMinds R**, Burkepile D, Vega Thurber R (2014) Unprecedented evidence for high viral abundance and lytic activity in coral reef waters of the South Pacific Ocean. *Front Microbiol* 5:493. doi: 10.3389/fmicb.2014.00493
- Vega Thurber RL, Burkepile DE, Fuchs C, Shantz AA, **McMinds R**, Zaneveld JR (2014) Chronic nutrient enrichment increases prevalence and severity of coral disease and bleaching. *Glob Change Biol* 20(2):544-554. doi:10.1111/gcb.12450

#### Software and coding experience

Data analysis packages: QIIME, VSEARCH, BEAST, MCMCglmm, phyloseq, vegan.

Coding languages: Extensive experience with R, BASH, AWK, and TCSH. Limited experience with Python, Perl, HTML, and PHP.

Modeling languages: JAGS, Stan.

#### Teaching Experience

Instructor, Oregon State University Microbiome Initiative's inaugural Microbiome Informatics Workshop, 2017.

Graduate Teaching Assistant, BI213 Principle of Biology. Oregon State University Department of Integrative Biology, Spring 2017.

#### Presentations:

**McMinds R**. Preprocessing CGRB sequencing data using QIIME. Oregon State University Microbiome Initiative, Microbiome Informatics Workshop. May 2017, Corvallis, Oregon. Presentation/Lecture.

**McMinds R**. Searching for codivergence among corals and bacteria with the global coral microbiome project. 13<sup>th</sup> International Coral Reef Symposium. June 2016, Honolulu, Hawaii. Presentation.

**McMinds R**. Nutrient enrichment and algal competition destabilize the coral mucus and tissue microbiome. Association of Marine Laboratories of the Caribbean: Biannual Conference. May 2015, Willemstad, Curacao. Poster.

**McMinds R**. Nutrient enrichment and algal competition destabilize the coral mucus and tissue microbiome. Animal-Microbe Symbioses Gordon Research Conference. June 2015, Waterville Valley, NH USA. Poster.

**McMinds R**, Wilson ACC. 2012. Genes of the Nitrate Assimilation Pathway of *Arabidopsis thaliana* are Differentially Expressed in Response to Infestation by the Aphid *Myzus persicae*. Poster for the Undergraduate Research, Creativity, and Innovation Forum at the University of Miami.

**McMinds RC.** 2007. Hop Pathogen Identification Using Genetic Techniques. Poster and presentation at ASE Symposium, Portland State University.

### Research Experience

TARA Pacific Expedition. Scientist aboard Panama transect and Australia/New Caledonia transect; Chief Scientist aboard Indonesia/Palau transect. July-August 2016, August-October 2017, and December 2017-January 2018.

Oregon State University. PhD Candidate/Graduate Research Assistant. Member of the Global Coral Microbiome Project and the TARA Pacific Expedition. August 2013 - present.

Oregon State University. Faculty Research Assistant to Dr. Rebecca Vega-Thurber of the Department of Microbiology studying molecular ecology of coral-associated microbial communities. 40 hours per week, June 2012 - August 2013.

*Administrative lab duties including ordering and processing lab supplies, assisting grad students and postdocs, training undergrads, etc.*

**Mo'orea:** 12 dives <60 ft. collecting coral fragments and performing nutrient manipulation study. Work published in Payet et al. 2014.

**USVI Project:** 5 dives <30 ft. in St. Thomas and St. John, USVI collecting coral fragments and performing viral infection experiments. Work acknowledged in reference (5)

**HERBVRE Project:** 165 dives mostly <30 ft. in the Florida Keys maintaining long-term enclosures, setting up and performing coral-algal interaction experiments, collecting coral mucus and algae samples, catching parrotfish, performing surveys, etc. Labwork in Oregon preparing samples for multiplex 454 sequencing. QIIME data analysis of 16S sequence data. Work published in Zaneveld et al. 2016.

University of Miami. Class project for Dr. Peter Glynn to find and describe a new species of benthic ctenophore in association with certain octocorals. 10 hours per week, January 2012-May 2012.

*2 dives <20 ft collecting coral samples, identification of octocorals to species, observation of putative new species of ctenophore. Work acknowledged in reference (4)*

University of Miami. Lab assistant to Dr. Alex Wilson studying aphid-*Buchnera* symbiosis and effects of aphid herbivory on gene expression of *Arabidopsis*. 40+ hours per week (Summer), 20+ hours per week (Fall-Spring), June 2010-May 2012.

**Arabidopsis project:** Developed equipment and protocol for controlled hydroponic growth of *Arabidopsis* and containment of aphids; designed, tested, and optimized qPCR primers and reaction protocol; isolated and purified RNA, created cDNA, and carried out experimental qPCR; prepared plant tissue for stable isotope analysis.

**Transporters & RNAi project:** Selected gene targets for RNAi trials, designed primers with modified *E. coli* expression factors and restriction enzyme target sites, isolated, amplified, and sequenced mRNA transcripts, designed and created plasmid vectors, transformed *E. coli*, extracted RNA and created gene-specific dsRNA, performed RNAi trials on aphids via artificial diets. Work acknowledged in reference (10).

AAUS volunteer diver for graduate student Mark Hartman of the University of Southern Florida studying coral damage caused by mini-season divers near Key West. July 2011.

*33 dives <30 ft counting freshly damaged coral and abundance of Panulirus argus. Work acknowledged in reference (8).*

Field assistant to Ph.D. student Nathan Dappen of the University of Miami studying speciation of Ibiza Wall Lizards of the Balearic Islands in Formentera, Spain. April-June 2011

*Studied behavioral responses of wild lizards to various stimuli, used clay models to quantify relative predation rates between color morphs and identify predators, collected tissue samples for microsatellite analysis, etc. Helped create NESCent Evolution Film Festival-winning short film about the research (6,11).*

University of Miami field course in underwater archaeology at Little Salt Spring (North Port, Florida) with Dr. John Gifford. January 2011.

*13 dives <30 ft. preparing site and excavating artifacts*

AAUS volunteer diver for Ph.D. student Remy Okazaki of the University of Miami studying controlled coral growth rates in the Florida Keys. April 2010

*3 dives <20 ft manipulating water chemistry of individual corals. Work acknowledged in reference (7)*

Oregon State University, Apprenticeships in Science and Engineering. Lab assistant to Dr. David Gent of the USDA – Agricultural Research Service researching techniques for genetic identification of the hop pathogen *Pseudoperonospora humuli*. 40 hours per week, June – August 2007

*Extracted DNA from environmental samples, designed species-specific primers, and prepared samples for sequencing. Work acknowledged in reference (12)*

## Outreach

Invited speaker to answer audience questions following a Union of Concerned Scientists screening of the documentary film *Chasing Coral*, 2017.

Invited speaker at the 2017 Portland EcoFilm Festival, to answer audience questions following a screening of the documentary film *Chasing Coral*.

Contributor to extensive video materials explaining the GCMP and the background natural history.

Founder, author, and editor of *The Cnidae Gritty*, a blog dedicated to communicating science in an accessible way as it's happening

## Certifications / Authorizations

PADI Rescue Diver (2017)

Fédération Française d'Études et de Sports Sous-Marins license holder (2015)

Queensland Recreational Boating license holder (2014)

National Association of State Boating Law Administrators (NASBLA) approved motorboat operator (Oregon State Marine Board, 2013)

NSS Cavern Diver (2012)

PADI Nitrox Diver (2012)

PADI Advanced Open Water Diver (2012)

DAN Diving First Aid for Professional Divers (Provider, 2012)

AAUS Scientific Diving Authorization

Cavern, 60 ft. authorizations (Oregon State University, 2012)

Nitrox, Night, 30 ft. authorizations (University of Miami, 2009)

## Other Notable Experience:

Moderate Spanish speaking ability

>500 logged dives

>400 scientific dives by AAUS Standards

8 logged cold water dives at the Oregon Coast

Extensive fieldwork / travel experience.

TARA Pacific Expedition member

Two weeks on the boat in Panama establishing the expedition's protocols

Fieldwork for the GCMP in Australia, Curacao, Saudi Arabia, Reunion Island, Moorea, and Hawaii.

Waitt Institute Montserrat Expedition 2015 member

Two weeks conducting benthic and fish surveys, using drop cameras, and interacting with local schools.

One month in Mo'orea, French Polynesia, as field assistant to Dr. Jerome Payet and Dr. Rebecca Vega Thurber studying local viral biogeography and performing coral nutrient manipulation experiments

One month in St. Thomas, USVI, as a field assistant to Nitzan Soffer and Dr. Rebecca Vega Thurber studying viruses associated with coral white plague disease (2012)

Three months in Key Largo, Florida as a diver and field assistant to Drs. Rebecca Vega Thurber and Deron Burkepille studying interaction of corals and algae (2012)

Six weeks on the island of Formentera, Spain, as a field assistant studying lizard speciation with University of Miami Ph.D. student Nathan Dappen (2011)

Three months in the Galapagos Islands of Ecuador studying marine science with the University of Miami. (2011)

One month in Bali, Indonesia with Dr. Sarah Meltzoff studying cultural anthropology through the University of Miami. (2010)

Five weeks in China and Vietnam studying water quality with Dr. Daniel Suman through the University of Miami. (2009)

Work acknowledged in:

1. Love MI, Anders S, Huber W. (2017) Analyzing RNA-seq data with DESeq2. (R package reference manual)
2. Rosales S. (2016) The use of omics for disease evaluation in the brains of marine mammals. (PhD Dissertation, Oregon State University)
3. Welsh RM. (2015) Bacterial predation in host microbiomes. (PhD Dissertation, Oregon State University)
4. Glynn PW, Bayer FM, Renegar DA (2014) *Coeloplana waltoni*, a new species of minute benthic ctenophore (Ctenophora: Platyctenida) from south Florida. Proc Biol Soc Wash 127(2):423-436.
5. Soffer N, Zaneveld J, Vega Thurber RL (2014) Phage-bacteria network analysis and its implication for the understanding of coral disease. Environ Microbiol doi:10.1111/1462-2920.12553
6. Dappen N, Losin N, Perez-Mellado V (2013) The Symbol: Wall Lizards of Ibiza and Formentera. Day's Edge Productions. (Book)
7. Okazaki RR. (2013) Responses of Stress-Tolerant Corals to Ocean Acidification. (PhD Dissertation, University of Miami)
8. Dappen N. (2012) Intralocus sexual conflict, ontogenetic conflict, and color evolution in the Ibiza Wall Lizard, *Podarcis pityusensis*. (PhD Dissertation, University of Miami)
9. Hartman ML (2012) Assessment of diver impact during the spiny lobster sport season, Florida Keys, USA. (Master's Thesis, University of Central Florida)
10. Price DR, Duncan RP, Shigenobu S, Wilson ACC (2011) Genome expansion and differential expression of amino acid transporters at the aphid/*Buchnera* symbiotic interface. Mol Biol Evol 28:3113–3126.
11. Dappen N, van Alphen J, dirs. (2011) Cold-blooded cannibals: Extreme adaptations to island life. Day's Edge Productions. <http://vimeo.com/24918263> (Short film)
12. Mitchell MN. (2010) Addressing the relationship between *Pseudoperonospora cubensis* and *P. humuli* using phylogenetic analyses and host specificity assays. (Master's Thesis, Oregon State University)