

## Vita for Ty Roach

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Department of Biology  
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### Education:

- **Valedictorian** 2009 North Carolina State University  
**Majors:** Biology (BS) Botany (BS) Chemistry (BA)  
**Minors:** genetics  
**GPA:** 4.0
- PhD candidate joint doctoral program in Cell and Molecular biology at San Diego State and University of California San Diego  
**GPA:** 4.0

### Funding:

- NSF Graduate Research Fellowship (2013-present)
- Aspen Center for Physics Travel Grant
- Joint Doctoral Program Travel Grant

### Presentations:

#### *Invited talks:*

- ETH Zurich, Swiss Federal Institute of Aquatic Science and Technology (EAWAG), Zurich Switzerland, seminar (*Multi-Scale Microbial Bioenergetics and Ecosystem Phase Shifts on Coral Reefs: From Micro-Scale Scale Dynamics to Global Change*)

#### *Talks at scientific meetings:*

- Energy Landscapes Conference, The Telluride Science Research Center, Telluride Colorado, oral presentation (*Entropy, Order, and the Tangled Nature Model*)
- Populations, Evolution, and Physics conference, Aspen Center for Physics, Aspen Colorado, oral presentation (*Non-equilibrium thermodynamics and coral-algal interactions*)
- Student Research Symposium, San Diego State University, San Diego California, oral presentation (*Microbial Bioenergetics of Coral-Algal Interactions*)
- Elands conference, Centre IGESA, Porquerolles, France, oral presentation (*Evolution: a Nonequilibrium Thermodynamic Perspective*)
- International Coral Reef Symposium, Honolulu, Hawaii, oral presentation (*The Power of Microbes: Microbial Bioenergetics of Coral-Algal Interactions*)
- Internatioal Society of Microbial Ecologists 2016, Montreal, Canada, oral presentation (*Microbially Mediated Bioenergetics of Competitive Benthic Interactions*) accepted

### Posters:

- Graduate Student Symposium, San Diego State University, San Diego California, poster presentation (*Microbial Community Metabolism in Coral-Algal Interactions*)

### Publications:

- Has... **Roach** et al. 2016. Global microbialization of coral reefs. *Nature Microbiology*. (Cover story)
- **Roach** et al. in review. The Power of Microbes: Microbial Bioenergetics of Coral-Algal Interactions. *Fems Microbial Ecology*.
- **Roach** et al. in prep. A Critical Review and Synthesis of the Thermodynamic Aspects of Biological Evolution. *Journal of Nonequilibrium Thermodynamics*. (invited review)
- **Roach** et al. in prep. Entropy, Order, and The Tangled Nature Model. *Journal of Nonequilibrium Thermodynamics*.

### Field Experience:

- November 1-22, 2015 (19days at sea). Blue Halo Initiative sponsored by the Waitte Institute and the Waitte Foundation. Location: Curacao and Klein Curacao. Activities: Circumnavigation of Curacao and Klein Curacao, water and coral mucus sampling by SCUBA diving, Coral Coring, and 3-D imaging on SCUBA, processing of water chemistry, metagenomics, and viromic sampling and processing.
- April 9-30, 2016 Microbial Biodiversity Initiative in collaboration with the Canadian Institute for Advanced Research. Activities: Land based exploration and diving to collect samples to characterize viral, bacterial, and protistan abundance, biomass, and diversity on different benthic substrates, Current profiling, Complete coral fragmenting for metagenomes, metatranscriptomes, metabolomes, viromes, electron microscopy, processing of water chemistry, 3-D imaging, and fluorescent imaging.
- June 7-13, 2016 Location: Coconut Island Field Station. Activities: Coral and Algal incubation, SpeDOM, Characterization of oxygen profiles across the coral algal interface, and deployment and pick up of Manta sensors.
- June 14-17, 2016 Location: Maui. Activities: Assessment of coral bleaching and recovery, conducting coral biopsies, and 3-D photo-mosaic imaging.

### Professional experience:

- Research Intern, University of North Carolina Institute of Marine Science 2011-2012
- Undergraduate Research Assistant, Xie Lab, North Carolina State University, 2007-2009
- Undergraduate teaching assistant, BIO450: Biochemistry, North Carolina State University 2007-2009
- Graduate Teaching Assistant, BIO352: Evolution and Genetics, San Diego State University 2012-2013

### Outreach:

- Science rap

- Ocean Discovery Institute STEM Speaker
- Fleet Science Center's Two Scientist Walk into a Bar

### **Awards, honors, scholarships:**

- Valedictorian NC State class of 2009
- NCAA academic All-American
- Dean's list Fall 2004-Spring 2009
- Caterpillar scholar athlete for 2004-2009: GPA and athletics
- Caterpillar scholar athlete of the month for October 2005
- Magna cum laude International Latin Exam
- National Dean's list 2004-2009
- Buddy Pelletier Surfing Foundation Scholarship
- NCAA wrestling scholarship
- Balanced Man Scholarship
- Phi Beta Kappa honors scholarship

### **Memberships:**

- National Society of Collegiate Scholars
- International Society for Reef Studies
- International Society of Microbial Ecologists
- Golden Key International Honour Society
- Phi Beta Kappa Honors Fraternity

### **Mentoring:**

- Alex Pirolo: 2015-present: Alex is currently working on his B.S. in general biology
- Joel Huckeba 2015-July 2016: Joel is now employed by the Growth International Volunteer Excursion (GIVE) doing coral reef restoration
- Jonathan Lyu 2013-2014: Jonathan is now enrolled in Midwestern University in a doctoral program for osteopathic medicine
- Glenna Stomackin 2013-2014: Glenna is now a research technician at the Loma Linda VA Hospital
- Victoria Hosford 2012-2014