

ALLISON H. KERWIN

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MARINE SYMBIOSIS ECOLOGIST

Investigate microbial ecological questions that incorporate environmental interaction and impacts through a combination of biostatistics and experimental techniques using a variety of marine symbioses. Mentor and coach numerous students, stressing the importance of undergraduate research opportunities and encouraging students to pursue science careers.

Research Interests: Host-microbe and microbe-microbe interactions in marine symbioses, bacterial genomics, environmental interactions and impacts on symbiotic microbial communities and organisms, microbial physiology

EDUCATION

University of Connecticut

Storrs, CT

Ph.D. in Molecular and Cell Biology, August 2017

- Field of Study: Microbiology
- Dissertation: Stability, development, and function of a symbiotic bacterial community associated with the reproductive system of the Hawaiian bobtail squid, *Euprymna scolopes*.

Northeastern University Three Seas Professional Master's Program

Nahant, MA

M.S. in Marine Biology, December 2010

- Intensive marine biology coursework in three diverse ecosystems:
 - NEU Marine Science Center in Nahant, MA
 - Gump Marine Station in Moorea, French Polynesia
 - Friday Harbor Laboratories in Friday Harbor, WA
- Internship at the New England Aquarium/Ocean Genome Legacy
- Thesis: The influence of *Symbiodinium* on the diversity of coral-associated bacteria and archaea in the temperate coral *Astrangia poculata*.

Smith College

Northampton, MA

B.A. in Biology, May 2005

- Dean's List Fall 2002 – Spring 2005
- University of Geneva and Associated Institutions, Junior Year Abroad, 2003 – 2004, Switzerland

EMPLOYMENT/RESEARCH EXPERIENCE

McDaniel College

September 2019 – present

Westminster, MD

Assistant Professor of Biology

- Researching the functional mechanisms behind marine cnidarian symbioses, and the effects of environmental changes on symbiotic systems.
- Courses include Principles of Biology, Symbiosis, and Microbiology.

Pennsylvania State University

December 2017 – June 2018

University Park, PA

Postdoctoral Fellow

Dr. Mónica Medina

- Determined the impact of symbiosis onset and developmental progression on the bacterial community associated with the upside-down jellyfish, *Cassiopea xamachana*, using 16S amplicon sequencing, metatranscriptomics, and microscopy.
- Studied the bacterial diversity and bacterial genomic potential associated with a range of coral species as part of the Global Coral Microbiome Project, in addition to the bacterial community associated with the coral symbiont, *Symbiodiniaceae*.

University of Connecticut

September 2011 – November 2017

Storrs, CT

Ph.D.

Dr. Spencer V. Nyholm

- Investigated the symbiotic bacterial consortium found in a reproductive organ (ANG) and the eggs of female Hawaiian bobtail squid, *Euprymna scolopes*, to determine the diversity, function, and development of the community.

New England Aquarium
/Ocean Genome Legacy
Master's Thesis

June 2010 – August 2011

Boston, MA
Dr. Randi Rotjan
Dr. Koty Sharp

- Examined variation in coral-associated bacterial/archaeal assemblages in symbiotic/asymbiotic colonies of the temperate coral *Astrangia poculata* (16S rRNA gene libraries and fluorescence *in situ* hybridization).

Agricultural Research Services

March – August 2009

Beltsville, MD

National Germplasm Resources Laboratory: Plant Disease Research Unit
Laboratory Technician

Dr. Ruhui Li

- Completed genetic testing for seven plant diseases not found in the United States on imported stone fruit trees, *Prunus* spp., to determine the current prevalence and distribution of these diseases.

American Museum of Natural History

August 2005 – August 2008

New York, NY

Genomics Technician

Dr. Susan Perkins

Dr. Lorenzo Prendini

- Conducted seasonal study of the lizard malaria parasite, *Plasmodium floridense*, to determine intensity of infections over time using whole mitochondrial genome sequencing and parasitemia counts.
- Contributed to the Global Survey and Inventory of Solifugae (an order of arachnids) by sequencing and analyzing 12S, 28S, 16S, 18S and CoI regions of hundreds of species of scorpions.

Geneva Botanical Garden

December 2003 – June 2004

Geneva, Switzerland

Researcher

Dr. Michelle Price

- Studied development of the moss *Dicranoweisia cirrata* by comparing germination rates of spores and foliar gemmae, initiating *in situ* study of establishment success, and completing extensive drawings of protonemata at varying stages.

PUBLICATIONS

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- **Kerwin, A.H.**, S.M. Gromek, A.M. Suria, D.J. Deoss*, K. O'Donnell, S. Frasca Jr., D.A. Sutton, N.P. Wiederhold, M.J. Balunas, and S.V. Nyholm. 2018. Shielding the next generation: symbiotic bacteria from a reproductive organ use chemical defense to protect eggs from fungal fouling. *In revisions*. *Undergraduate researcher.
 - McAnulty, S.J.[†], **A.H. Kerwin**[†], E. Koch, B. Nutall, A.M. Suria, A.J. Collins, T.R. Schleicher, B.A. Rader, M. McFall-Ngai, and S.V. Nyholm. Squid accessory nidamental gland development requires an environmental cue. *In revisions*. [†]Contributed equally to manuscript.
 - **Kerwin, A.H.**, and S.V. Nyholm. 2018. Reproductive system symbiotic bacteria are conserved between two populations of *Euprymna scolopes* from Oahu, Hawaii. *mSphere* 3(2): e00531-17.
 - Article featured for journal cover image.
 - Sharp, K.H., Z.A. Pratte, **A.H. Kerwin**, R.D. Rotjan, and F.J. Stewart. 2017. Season, but not symbiont state, drives microbiome structure in the temperate coral *Astrangia poculata*. *Microbiome* 5:120.
 - **Kerwin, A.H.** and S.V. Nyholm. 2017. Symbiotic bacteria associated with a bobtail squid reproductive system are detectable in the environment, and stable in the host and developing eggs. *Environmental Microbiology* 19(4):1463-1475.
 - Article featured for journal cover image.
 - Dimond, J.L., **A.H. Kerwin**, R. Rotjan, K. Sharp, F.J. Stewart, and D.J. Thornhill. 2013. A simple temperature-based model predicts the upper latitudinal limit of the temperate coral *Astrangia poculata*. *Coral Reefs* 32(2):401-409.
 - Perkins, S.L., **A.S. Kerwin**, and A.D. Rothschild. 2009. Patterns of infection of the lizard malaria parasite, *Plasmodium floridense*, in invasive brown anoles (*Anolis sagrei*) in Southwestern Florida. *Parasitology Research* 104(5):1191-1196.

PUBLICATIONS in PREPARATION

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- **A.H. Kerwin**, S. Smith, V. Avila Magana, L. Johnson*, A. Echeandia*, and M. Medina. Genomic analysis of bacterial isolates associated with *Symbiodiniaceae* cultures and the coral *Orbicella faveolata*. *In prep*. *Undergraduate researcher.

- **A.H. Kerwin**, V. Sharp, F.J. Pollock, A. Weinheimer*, T. LaJeunesse, and M. Medina. Characterization of the bacteria associated with *Symbiodiniaceae* cultures over varying growth stages. *In prep.*
*Undergraduate researcher.
- **Kerwin, A.H.**, S.J. McAnulty, and S.V. Nyholm. Development of the ANG and associated bacterial community over the course of female *Euprymna scolopes* maturation. *In prep.*
- **A.H. Kerwin** and S.V. Nyholm. The history of a squid reproductive symbiosis. *In prep.*

SERVICE

Penn State Microbiome Center Postdoctoral Planning Committee

- Assisted in determining the Microbiome Center seminar schedule and in inviting internal and external speakers to Penn State to give seminars and workshops. 2017-2018.

Women Scientists on Wikipedia Initiative

- Involved in an initiative at Penn State to write Wikipedia entries for female scientists on campus.

Journal Reviewer

- ISME J | Communications Biology | Frontiers in Microbiology | Journal of Phycology | Microbial Ecology

Conference Organizer

- Molecular Investigation of Microbe-Host Interaction XXVI Meeting at University of Connecticut. 2014.

Invited Speaker

- Undergraduate Research Society. Pennsylvania State University. Fall 2018.
- Undergraduate Research in Science and Engineering (URISE). Pennsylvania State University. Spring 2018.

TEACHING/MENTORING EXPERIENCE

McDaniel College

2019-Present

Westminster, MD

Assistant Professor

- Principles of Biology (BIO 1111)
- Symbiosis (BIO 3T01)
- Symbiosis Laboratory (BIO 3T01)

Pennsylvania State University

2017-2019

State College, PA

Mentor

- NSF INCLUDES Bridge to the PhD program for University of Virgin Islands master's students. Planned and executed assorted modules on bacterial isolate testing and 16S data analysis, also assisted in outreach activities.
- Mentored five undergraduate students in developing research projects which will lead to publications.
- Assisted four graduate students in planning experiments, troubleshooting, and data analysis.

University of Connecticut

2011-2017

Storrs, CT

Instructor

- Characterization of Microbial Communities by 16S rRNA Gene Sequencing (MCB 5671-02)

Teaching Assistant

- Pathogenic Microbiology Laboratory (MCB 3633)
- Fundamentals of Microbiology Laboratory (MCB 2610)
- Principles of Biology I Laboratory (BIOL 1107)

Guest Lecturer

- Pathogenic Microbiology (MCB 3633)
- Fundamentals of Microbiology (MCB 2610)
- Research Literature in Molecular and Cell Biology, Symbiosis (MCB 3841W)

Mentor

- Directed Dister Joseph Deoss in his master's research project.
- Led two undergraduates, Jessica Bertenshaw and Gregory Thompson, in research for Honor's Thesis.
- Mentored 21 additional undergraduates in general lab techniques.

Roger Williams University

Spring 2016

Bristol, RI

Invited Speaker

- Science and Mathematics Seminar Series

Guest Lecturer

- Marine Science Senior Seminar: Chemical Ecology of Benthic Environments (MS410)

Northeastern University

Fall 2010

Boston, MA

Teaching Assistant

- Genetics and Molecular Biology Laboratory (BIOL 2302)

Boston University

Fall 2010

Boston, MA

Guest Lecturer

- Marine Megafaunal Ecology: Stellwagon Bank National Marine Sanctuary & Surrounding Waters (BI 546)

AWARDS/FELLOWSHIPS

Pennsylvania State University

2017-2018

University Park, PA

- Penn State Office of Postdoctoral Affairs Travel Grant (Spring 2019)
- Penn State Student Engagement Network Grant to Leslie Johnson (undergraduate mentee, Fall 2018)
- Penn State Science Engagement Research Grant to Kate Karlen (undergraduate mentee, Fall 2018)

University of Connecticut

2011-2017

Storrs, CT

- Animal-Microbe Symbioses Gordon Research Conference Award for Best Posters (June 2017)
- Summer Undergraduate Research Fund Award to Jessica Bertenshaw (undergraduate mentee, May 2017)
- University of Connecticut Doctoral Dissertation Fellowship (Fall 2016)
- Antonio H. & Marjorie J. Romano Graduate Education Fellowship (Summer 2016)
- University of Connecticut Graduate Research Award for Student Presentation (March 2016)
- University of Connecticut Predoctoral Fellowship (Spring 2016)
- University of Connecticut 2015 Graduate Travel Award (Summer 2015)
- University of Connecticut Predoctoral Fellowship (Summer 2015)
- Eighth Congress of the International Symbiosis Society Conference Travel Grant (Spring 2015)
- University of Connecticut Predoctoral Fellowship (Summer 2014)
- American Society for Microbiology Student Travel Award (Spring 2014)
- University of Connecticut Predoctoral Fellowship (Summer 2013)
- University of Connecticut Molecular and Cell Biology First Year Graduate Student Fellowship (May 2012)

PROFESSIONAL PRESENTATIONS

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- **Kerwin, A.H.**, V. Avila Magana, A. Ohdera, K. Karlen*, and M. Medina. 2019. Bacterial gene expression changes during upside-down jellyfish metamorphosis. Talk: 2019 *Astrangia* Workshop. *Undergraduate researcher.
 - **Kerwin, A.H.**, V. Avila Magana, A. Ohdera, K. Karlen*, and M. Medina. 2019. Changes in bacterial gene expression during *Cassiopea xamachana* strobilation. Talk: 3rd International *Cassiopea* Workshop. *Undergraduate researcher.
 - **Kerwin, A.H.**, F.J. Pollock, A. Weinheimer*, T. LaJeunesse, and M. Medina. 2018. Characterizing the *Symbiodinium* microbiome. Poster: PSU Microbiome Center Annual Networking Event. *Undergraduate researcher.
 - **Kerwin, A.H.** and M. Medina. 2018. Approaches to microbiome exploration in cnidarian hosts. Talk: 2018 *Astrangia* Working Group Workshop.
 - **Kerwin, A.H.**, F.J. Pollock, A. Weinheimer*, T. LaJeunesse, and M. Medina. 2018. Characterizing the *Symbiodinium* microbiome. Poster: 21st Penn State Plant Biology Symposium: Wild and Tamed Phytobiomes. *Undergraduate researcher.
 - **Kerwin, A.H.**, A. Ohdera, and M. Medina. 2018. *Cassiopea xamachana* microbiome exploration: What is the non-*Symbiodinium* microbiome composition of *C. xamachana*? Talk: 2nd International *Cassiopea* Workshop.
 - **Kerwin, A.H.** and S. V. Nyholm. 2018. Composition, development, and function of the Hawaiian bobtail squid ANG symbiosis. Talk: Penn State Microbiome Center Seminar Series.

- **Kerwin, A.H.**, S.V. Nyholm, and M. Medina. 2018. A tale of two symbioses: the Hawaiian bobtail squid and the upside-down jellyfish. Talk: Reef Microbiome Workshop.
- **Kerwin, A.H.**, S. Gromek, M. Balunas, and S.V. Nyholm. 2017. Development and function of symbiotic bacteria associated with the female reproductive system of *Euprymna scolopes*. Poster: Animal-Microbe Symbioses Gordon Research Conference and Gordon Research Seminar.
- **Kerwin, A.H.**, S. Gromek, A.M. Suria, M. Balunas, and S.V. Nyholm. 2017. Symbiotic squid egg bacteria protect developing embryos from fungal fouling. Talk: 6th CT Symbiosis Symposium.
- **Kerwin, A.H.**, S. Gromek, M. Balunas, and S.V. Nyholm. 2016. Symbiotic bacteria from the reproductive system of *Euprymna scolopes* contribute to egg defense and the prevention of fungal biofilms. Talk: 6th ASM Conference on Beneficial Microbes.
- **Kerwin, A.H.** and S.V. Nyholm. 2016. Characterizing the female Hawaiian bobtail squid reproductive system symbiosis. Talk: 2016 *Astrangia* Working Group Workshop.
- **Kerwin, A.H.**, S. Gromek, M. Balunas, and S.V. Nyholm. 2016. Symbiotic reproductive tract community protects *Euprymna scolopes* eggs from biofouling. Talk: Molecular Investigation of Microbe-Host Interaction XXVIII Meeting.
- **Kerwin, A.H.**, S. Gromek, M. Balunas, and S.V. Nyholm. 2016. Symbiotic reproductive tract bacteria contribute to egg protection in the squid, *Euprymna scolopes*. Talk: 45th Benthic Ecology Meeting.
- Sharp, K.H., Z.A. Pratte, **A.H. Kerwin**, R.D. Rotjan, and F.J. Stewart. 2016. New hypotheses about the influence of *Symbiodinium psygrophilum* on the microbiome of the coral *Astrangia poculata*. Talk: 16th International Symposium on Microbial Ecology.
- **Kerwin, A.H.** 2015. Functional characterization of the bacterial community associated with a reproductive gland of the Hawaiian bobtail squid, *Euprymna scolopes*. Talk: 8th Congress of the International Symbiosis Society.
- **Kerwin, A.H.** and S.V. Nyholm. 2014. Characterization of the variability and diversity of bacterial communities from the accessory nidamental gland and egg jelly coat of the Hawaiian bobtail squid, *Euprymna scolopes*. Poster: 2014 ASM Beneficial Microbes Conference.
- **Kerwin, A.H.** and S.V. Nyholm. 2014. Characterization of the bacterial communities found in the female *Euprymna scolopes* reproductive system. Talk: Molecular Investigation of Microbe-Host Interaction XXVI Meeting.
- **Kerwin, A.H.**, and S.V. Nyholm. 2014. Characterization of the variability and diversity of bacterial communities from the accessory nidamental gland and egg jelly coat of the Hawaiian bobtail squid, *Euprymna scolopes*. Poster: 2014 ASM General Conference.
- **Kerwin, A.H.** and S.V. Nyholm. 2013. Characterizing the role of a bacterial consortium in the reproduction of the model symbiotic squid, *Euprymna scolopes*. Poster: 48th Annual Region I Meeting ASM.
- **Kerwin, A.H.**, S. Frasca, K. O'Donnell, D.A. Sutton, and S.V. Nyholm. 2012. Characterizing the role of a bacterial consortium in the reproduction of the model symbiotic squid, *Euprymna scolopes*. Poster: 2012 ASM Beneficial Microbes Conference.
- **Kerwin, A.H.**, R. Rotjan, J. Dimond, D. Thornhill, F. Stewart, D. Distal, and K. Sharp. 2011. Variation in bacterial assemblages associated with symbiotic and asymbiotic states of the coral, *Astrangia poculata*. Poster: 2011 Boston Bacterial Meeting.
- **Kerwin, A.H.**, R. Rotjan, J. Dimond, D. Thornhill, F. Stewart, D. Distal, and K. Sharp. 2011. Variation in bacteria and archaea associated with different symbiotic states of the facultatively symbiotic coral, *Astrangia poculata*. Poster: 40th Benthic Ecology Meeting.
- **Kerwin, A.H.** 2010. The impact of *Symbiodinium* on the bacterial and archaeal communities associated with the temperate coral, *Astrangia poculata*. Talk: New England Aquarium seminar series.

ADDITIONAL SKILLS

Laboratory and Field Work Skills

- Mastered DNA and RNA extraction techniques, PCR and RT-PCR amplification, next generation Illumina MiSeq sequencing, Sanger sequencing, sequence editing, transmission electron microscopy, compound and confocal microscopy techniques, reconditioning PCR, PCR clean-up, gel electrophoresis, spectrophotometry, and general microbiology techniques.
- Knowledgeable in dsRNA isolation, plasmid growth, microsatellite development and analysis, primer development, cloning, FISH, and PAM fluorometry.

- Experienced in maintaining aquaria, adult squid and jellyfish, raising juvenile squid, waterpiking coral colonies, and *Symbiodiniaceae* density counts.
- Utilized plant culture techniques and grew and maintained plants in a greenhouse.
- Skilled in maintenance of ABI 3730xl Sequencer and Biomek FX robot and routinely ordered laboratory supplies and ensured general lab organization and upkeep.
- Proficient in qualitative/quantitative survey techniques on intertidal shorelines and subtidal environments.
- Counted fish species and coral cover along transects, conducted marine vertebrate surveys via research vessel, and collected tropical and temperate coral colony mucus and tissue samples while SCUBA diving.
- Boat U.S. certified motorboat operator.

Computer Skills

- Utilized QIIME, R, R Studio, Sequencher, Geneious, MEGA, PaupUp, TreeView, FigTree, ModelTest, GenAlEx, LSM image browser, BLAST, GenBank, and the NCBI and RDP websites.
- Trained in PRISM, Microsoft Office, Adobe Acrobat, Adobe Creative Suite, JMP, and KaleidoGraph.

Certified SCUBA Diver

- AAUS Scientific Diver and PADI Advanced Open Water Diver.

Languages

- Proficient in French.