

# Emma L. Strand

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## EDUCATION

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2018 – Current

**Doctor of Philosophy in Biological and Environmental Sciences**  
**University of Rhode Island (Kingston, USA)**

Specialty: Evolution and Marine Biology; GPA: 3.86/4.00

Advisor: Dr. Hollie Putnam

Dissertation: Acclimatization dynamics and mechanisms underlying stress tolerance in corals

2014 – 2018

**Bachelor of Science in Biology**

Loyola Marymount University (Los Angeles, California)

Advisor: Dr. Gretchen Goodbody-Gringley (BIOS)

Project: Using molecular techniques to characterizing Bermuda's baitfish populations to inform eco-based management and promote sustainable fisheries.

Advisor: Dr. Wesley Dowd (LMU)

Project: Mechanisms of Micro-scale Spatial Variation within Intertidal Populations

Advisors: Dr. Roy Houston (LMU; RIMS), Jennifer Keck, M.Sc. (RIMS)

Project: Effects of depth on differential phenotypes in reef-building coral in Roatán, Honduras.

## PEER-REVIEWED PUBLICATIONS

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1. Chille, E., **Strand, E.**, Neder, M., Schmidt, V., Sherman, M., Mass, T., & Putnam, H. (2021). Developmental series of gene expression clarifies maternal mRNA provisioning and maternal-to-zygotic transition in a reef-building coral. *BMC genomics*, 22(1), 1-17.
2. Goodbody-Gringley, G., **Strand, E.**, & Pitt, J. M. (2019). Molecular characterization of nearshore baitfish populations in Bermuda to inform management. *PeerJ*, 7, e7244.
3. Gleason, L. U., **Strand, E. L.**, Hizon, B. J., & Dowd, W. W. (2018). Plasticity of thermal tolerance and its relationship with growth rate in juvenile mussels (*Mytilus californianus*). *Proceedings. Biological sciences*, 285(1877).

## PUBLICATIONS IN REVIEW AND PREPARATION

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- Stephens, T., **Strand, E.**, Mohamed, A., Williams, A., Chiles, E., Su, X., Bhattacharya, D., Putnam, H. Divergent life history strategies and response to stress in two sympatric Hawaiian coral species. *In review*.
- Chille, E., **Strand, E.**, Scucchia, F., Schmidt, V., Neder, M., Sherman, M., Mass, T., and Putnam, H. Energetics, but not development, is impacted in coral embryos exposed to ocean acidification. *In review*.
- Strand, E.**, Farraj, A., Gray, S., Wong, K., Putnam, H. Acclimatization dynamics of two Hawaiian dominant reef corals, *M. capitata* and *P. acuta*, under thermal and ocean acidification stress. *Planned submission Spring 2022*.
- Becker, D., **Strand, E.**, Silbiger, N., Putnam, H. Molecular Underpinnings of Enhanced Thermal Performance due to Chronic Low Nutrient Enrichment. *Projected submission 2022*.
- Strand, E.**, Wong, K., Putnam, H. Molecular mechanisms of acclimatization dynamics under thermal and ocean acidification stress in *M. capitata* and *P. acuta*. *Projected submission 2022*.
- Strand, E.**, Barrot, K., Putnam, H. Epigenetic mechanisms and symbiont communities underlying tolerant and non-tolerant phenotypes of *M. capitata*. *Projected submission 2022*.

## AWARDS

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- 2020 – 2022 University of Rhode Island Dean's Travel Award (2x)
- 2018 – 2020 University of Rhode Island Research & Teaching Assistantships (x8)
- 2019 Academy of Underwater Arts and Sciences: Zale Parry Scholar
- 2019 Association for the Sciences of Limnology and Oceanography Multicultural Program Scholarship
- 2018 Alan R. Seydoux Memorial Award in Marine and Field Biology
- 2017 National Science Foundation: Research Experience for Undergraduates (NSF REU)

2016 – 2017 Howard Towner Research Scholarship Recipient, LMU Department of Biology (x2)  
2017 Summer Undergraduate Research Program Scholarship, Loyola Marymount University  
2014 – 2018 Loyola Marymount Merit Scholarship Recipient (x8)

#### RESEARCH POSITIONS

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2018 – Current Graduate Research Assistant at the University of Rhode Island  
2017 NSF Undergraduate Research Fellow (REU) at Bermuda Institute of Ocean Sciences  
2017 Coral Reef Research Intern at Roatán Institute for Marine Sciences  
2015 – 2017 Rains Research Assistant at Loyola Marymount University  
2015 – 2017 Marine Ecophysiology Research Assistant at Loyola Marymount University

#### TEACHING ASSISTANTSHIPS

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2019 – 2020 BIO 201: General Animal Physiology; University of Rhode Island (2x)  
2019 BIO 345: Marine Environmental Physiology; University of Rhode Island

#### SCUBA DIVING EXPERIENCE AND POSITIONS

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2020 – Current URI Diving Control Board Student Representative  
2019 – Current URI AAUS Scientific Research Diver  
2019 – 2021 Partnership with Aqualung, Henderson Wetsuits, and Bob's Sea and Ski  
2020 PADI Dry Suit Diving Certification; Seattle, WA  
2019 AAUS Scientific Diver Certification; University of Rhode Island  
2019 SDI Rescue Diver, Computer Nitrox Diver; University of Rhode Island  
2016 – 2017 Scuba Diving Club Executive Board; Loyola Marymount University  
2015 NAUI Advanced Diver Certification; Roatán, Honduras  
2015 Bay Islands Lionfish Spearing License; Roatán, Honduras  
2015 PADI Open Water Diver Certification; Seattle, WA

#### INVITED PRESENTATIONS

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2022 Guest Speaker: Marine Biology; Eastlake High School  
2021 Guest Speaker: Santa Barbara Museum of Natural History  
2019 – 2021 Guest Speaker: University House Issaquah Speaker Series (x2)  
2020 Guest Speaker: University of Rhode Island Seminar Series; Dr. Robert Literman  
2019 Guest Speaker: Diving into Your Imagination with Annie Crawley  
2019 Biology Department Seminar Speaker; Loyola Marymount University  
2018 – 2019 Guest Lecture: IB Biology II; Skyline High School (x2)  
2018 Guest Lecture: Principles of Ecology, BIOL 318, Dr. Ron Rozar; Loyola Marymount University  
2015 – 2018 Lightning Talk, Seattle Aquarium (x3)

#### ORAL PRESENTATIONS

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2022 **Strand, E.,** Farraj, A., Gray, S., Wong, K., Putnam, H. Holobiont acclimatization dynamics of *Pocillopora acuta* and *Montipora capitata* in response to warming and acidification. Benthic Ecology Meeting, Portsmouth, New Hampshire.  
2019 **Strand E.,** Goodbody-Gringley, G. Molecular characterization of Bermuda's baitfish populations to improve management and fishery sustainability. 2019 ASLO Aquatic Sciences Meeting. San Juan, Puerto Rico.  
2018 **Strand E.,** Goodbody-Gringley, G. Molecular characterization of Bermuda's baitfish populations to improve management and fishery sustainability. 2018 TriBeta National Biological Honor Society Research Conference. Irvine, California.  
2018 **Strand E.,** Goodbody-Gringley, G. Molecular characterization of Bermuda's baitfish populations to improve management and fishery sustainability. 2018 Loyola Marymount University Research Symposium. Irvine, California.

## POSTER PRESENTATIONS

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- 2020 **Strand, E.**, Putnam HM. Holobiont acclimatization dynamics of *Pocillopora acuta* and *Montipora capitata* in response to warming and acidification. Ocean Sciences Meeting. San Diego, California.
- 2018 **Strand E.**, Mummert, M., Keck, J., Houston, R. Color variation and its relationship with depth in *Montastraea cavernosa*. Loyola Marymount University Research Symposium; Los Angeles, California.
- 2018 **Strand E.**, Gleason L., Dowd W. Plasticity of thermal tolerance and its relationship with the accumulation of taurine in juvenile mussels (*Mytilus californianus*). Loyola Marymount University Research Symposium; Los Angeles, California.
- 2017 **Strand E.**, Hizon B., Gleason L., Dowd W. Plasticity of thermal tolerance and growth rates in juvenile mussels (*Mytilus californianus*). Society for Integrative and Comparative Biology; New Orleans, Louisiana.
- 2017 **Strand E.**, Hizon B., Gleason L., Dowd W. Plasticity of thermal tolerance and growth rates in juvenile mussels (*Mytilus californianus*). Loyola Marymount University Research Symposium; Los Angeles, California.
- 2017 Hizon B., **Strand E.**, Alves S., Lane J., Denny M., Dowd W. Effects of chronic and acute salinity changes on thermal tolerance in the tidepool copepod (*Tigriopus californicus*). Society for Integrative and Comparative Biology; New Orleans, Louisiana.
- 2016 Dallmer J., **Strand E.**, Dugay C., Drolshagen H., Gleason L., Dowd W. Lipid Peroxidation Recovery after an Acute Thermal Challenge in a Marine Intertidal Mussel (*Mytilus californianus*). Loyola Marymount University Research Symposium; Los Angeles, California.

## MENTORING

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- 2022 – Current Kristen Doyle, University of Rhode Island Undergraduate
- 2022 – Current Danielle Mazlish, New York High School Student
- 2021 – Current Molly Santaniello, Rhode Island High School Student
- 2020 – 2021 Erin Magliano, University of Rhode Island Undergraduate
- 2019 – 2021 Sierra Gray, University of Rhode Island Undergraduate
- 2019 – 2020 Alexandra Farraj, University of Rhode Island Undergraduate
- 2019 – 2020 Ana McMenamin, University of Rhode Island Undergraduate
- 2019 – 2020 Emma Ferrante, University of Rhode Island Undergraduate
- 2018 – 2019 Chris Suchocki, Hawaii Institute of Marine Biology Volunteer
- 2019 Elliott Chinn, University of Washington Undergraduate
- 2019 Nathan Streams, Washington State University Undergraduate
- 2018 Madeleine Sherman, University of Rhode Island Undergraduate
- 2018 Adam Helbig, Hawaii Pacific University Undergraduate
- 2018 Valeria Schmidt, Princeton University Undergraduate

## TECHNICAL EXPERIENCE

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- Completed field work projects:
- 1.) 4-month multi-stressor (temperature and pCO<sub>2</sub>) time series with 12 tanks, 4 treatments, and 900 coral fragments at Hawaii Institute of Marine Biology in Oahu, Hawai'i.
  - 2.) Two, 2-week long coral collection, sampling, and physiology assay processing trips for a time series project at GUMP Research Station in Mo'orea, French Polynesia.
  - 3.) 2-month increased pCO<sub>2</sub> conditions and larval recruitment response at Hawaii Institute of Marine Biology in Oahu, Hawai'i.
  - 4.) 2-month reciprocal transplant experiment of juvenile mussels at Hopkins Marine Station in Monterey, California.
  - 5.) 1-month coral reef ecology monitoring and restoration project maintenance at Roatán Institute for Marine Sciences in Roatán, Honduras.

- Field work skills:
- Coral collection, tank construction and maintenance for both manipulated pCO<sub>2</sub> and temperature conditions, experimental treatment monitoring with an APEX system and handheld temperature, pH, salinity, and light probes, coral sampling, coral physiology in-field measurements like respiration and photosynthetic rates, buoyant weight sampling,

thermal performance curves, photosynthetic irradiance curves, behavior observations, imaging for color score, total alkalinity titrations, and survivorship tracking and LT50s

Physiology Lab Work:	Airbrushing coral fragments, surface area with wax-dipping, chlorophyll concentration, ash-free dry weight, total antioxidant capacity, total and soluble protein, endosymbiont density, oxidative damage
Molecular Lab Work:	DNA/RNA extractions, PCR protocols, gel electrophoresis, metabarcoding and amplicon sequencing for COI, 16S rRNA, ITS2, and mtORF, RNASeq and TagSeq sequencing preparation, Whole Genome Bisulfite Sequencing library preparation with Pico Methyl-seq
Data Analysis skills:	Proficient in R, Markdown, Linux, HPC computing systems, Github, multi-variate statistical methods, mixed effect models, principal components analysis (PCA), non-metric multi-dimensional scaling analysis (NMDS), 16S amplicon analysis (QIIME2, Mothur), ITS2 analysis (SymPortal), Methyl-seq analysis (nf-core), phylogenetic analyses
Reproducible Science:	Open Lab Notebook: <a href="https://emmastrand.github.io/EmmaStrand_Notebook/">https://emmastrand.github.io/EmmaStrand_Notebook/</a> Github Profile: <a href="https://github.com/emmastrand">https://github.com/emmastrand</a> Comprehensive Exam Study Guide in Bookdown: <a href="https://bookdown.org/emma_strand/comps-study-guide/">https://bookdown.org/emma_strand/comps-study-guide/</a>

## OUTREACH AND EDUCATION

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2018 – Current	Skype a Scientist Volunteer Scientist
2018 – Current	Science Infographic Designer and Creator ( <a href="http://emmastrand.weebly.com/infographics">emmastrand.weebly.com/infographics</a> )
2018 – 2022	International Coral Reef Society: Student and Early Career Chapter Steering Committee Member
2019 – 2020	Letters to a Pre-Scientist Volunteer
2018	Chasing Coral Documentary Showing and Discussion Host: University House, Seattle, WA; LMU
2014	Nature Seekers Program, Leatherback Sea Turtle Research Volunteer: Trinidad & Tobago
2012 – 2014	Seattle Aquarium Puget Sound Youth Campaign Volunteer & Exhibit Interpreter

## PRESS AND RESEARCH FEATURES

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2019	“Looking out for the Little Guys”: BIOS Currents <a href="http://www.bios.edu/currents/looking-out-for-the-little-guys">http://www.bios.edu/currents/looking-out-for-the-little-guys</a>
2019	“The Female Scientist: Portrait Feature; Emma Strand”: The Female Scientist <a href="https://thefemalescientist.com/portrait/emma-strand/2178/meet-emma-strand-a-phd-student-studying-acclimatization-of-coral-and-passionate-about-science-outreach/">https://thefemalescientist.com/portrait/emma-strand/2178/meet-emma-strand-a-phd-student-studying-acclimatization-of-coral-and-passionate-about-science-outreach/</a>
2019	“International Society for Coral Reef Studies, Featured Friday: Emma Strand”: ICRS ReefBites <a href="https://reefbites.com/2019/01/04/featured-fridays-emma-strand/">https://reefbites.com/2019/01/04/featured-fridays-emma-strand/</a>
2018	“URI professor leading U.S., Israeli probe into adaptability of coral reefs”: URI News <a href="https://www.uri.edu/news/2018/09/uri-professor-leading-u-s-israeli-probe-into-adaptability-of-coral-reefs/">https://www.uri.edu/news/2018/09/uri-professor-leading-u-s-israeli-probe-into-adaptability-of-coral-reefs/</a>
2018	“Three Months in Bermuda: A Springboard to Success.”: BIOS Currents <a href="http://www.bios.edu/currents/three-months-in-bermuda-a-springboard-to-success">http://www.bios.edu/currents/three-months-in-bermuda-a-springboard-to-success</a>
2018	Behind the Science: “Early life history traits and reproductive ecology of brooding coral across depth gradient”: Mesophotic.org’s Behind the Science Blog Photography in: <a href="http://www.mesophotic.org/posts/early-life-history-traits-and-reproductive-ecology-of-brooding-coral-across-depth-gradient">http://www.mesophotic.org/posts/early-life-history-traits-and-reproductive-ecology-of-brooding-coral-across-depth-gradient</a>
2017	“BIOS Set to Welcome REU Students This Fall”: BIOS Currents <a href="http://www.bios.edu/currents/bios-set-to-welcome-reu-students-this-fall">http://www.bios.edu/currents/bios-set-to-welcome-reu-students-this-fall</a>
2017	“Emma Strand: Living Abroad Round 3”: LMU Study Abroad Blog <a href="http://lionsabroad.lmu.edu/emma-strand-living-abroad-round-3/">http://lionsabroad.lmu.edu/emma-strand-living-abroad-round-3/</a>

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