

Daniel Tyler Pettay
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University of South Carolina Beaufort
Beaufort, SC 29902
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Professional website

EDUCATION

The Pennsylvania State University, State College, PA
Ph.D. in Biology 2011
Dissertation: “Diversity, Connectivity and Stability of Coral/Algal Symbioses over Various Spatial Scales”
Dissertation Advisor: Dr. Todd C. Lajeunesse

College of Charleston, Charleston, SC
M.S. in Marine Biology 2006
Thesis: “Effects of the Antifouling Algaecide, Irgarol 1051, on Cultured Zooxanthellae (Genus *Symbiodinium*)”
Thesis Advisor: Dr. Cheryl M. Woodley

Clemson University, Clemson, SC
B.S. in Biological Sciences 2000

RESEARCH INTERESTS

Acclimation/adaptation, algal biology, aquatic toxicology, biogeochemistry, biogeography, comparative physiology, cryptic species, ecology/evolution, environmental change, harmful algae, continuous environmental monitoring, introduced/invasive species, invertebrate/algal symbioses, microbial ecology, molecular ecology, photobiology, population genetics

PROFESSIONAL EXPERIENCE

University of South Carolina – Beaufort, Beaufort, SC
Assistant Professor 2019 - Present
Department Natural Sciences

University of Delaware, Lewes, DE
Assistant Research Professor 2019
School of Marine Science and Policy

University of Delaware, Lewes, DE
Postdoctoral Researcher – Biogeochemical Monitoring Lab 2016 - 2019
Advisor: Dr. William J. Ullman
Postdoctoral Researcher – Microbial Ecology Research Lab
Collaborator: Dr. Kathryn J. Coyne

University of Delaware, Lewes, DE
Research Scientist – UD’s Citizen Monitoring Program 2015 - 2016

University of Delaware, Lewes, DE
Postdoctoral Researcher – Algal Physiology Lab 2011 - 2015
Advisor: Dr. Mark E. Warner

The Pennsylvania State University, State College, PA
Research Assistant/Student – Dinoflagellate Symbiont Lab 2008 - 2011

Florida International University, Miami, FL
Research Assistant/Student – Dinoflagellate Symbiont Lab 2005 - 2007
Research Assistant – Forensic DNA Profiling Facility 2005

Hollings Marine Lab, NOAA/NOS, Charleston, SC
Research Assistant/Student – Coral Health and Disease Lab 2002 - 2004

TEACHING EXPERIENCE

University of South Carolina – Beaufort, Beaufort, SC
Lecture – Marine Ecology **Spring 2020**

Lecture/Lab – Cell and Molecular Biology **Spring 2020**

Lab – Bacteriology **Spring 2020**

Lecture/Lab – Oceans & Society **Fall 2019**

Lecture/Lab – Biology of Marine Organisms **Fall 2019**

University of Delaware, Lewes, DE
Lecturer – The Oceans **Spring 2019**

Invited Lecturer – Biological Oceanography **2017 & 2018**

Invited Lecturer – Physiology of Marine Organisms **2017 & 2018**

The Pennsylvania State University, State College, PA
Laboratory Instructor – General Biology **2010**

Laboratory Instructor – Invertebrate Zoology **2009**

Florida International University, Miami, FL
Laboratory Instructor – Invertebrate Zoology **2006 - 2007**

Laboratory Instructor – General Biology **2005 - 2007**

Laboratory Instructor – Environmental Sciences **2004 - 2005**

College of Charleston, Charleston, SC
Laboratory Instructor – General Biology **2001 - 2002**

AWARDS & FUNDING

- Delaware Sea Grant (\$5,000) – “Design and implementation of lost-cost, open-source environmental sensors” (2018).
- Delaware Sea Grant (\$105,992 + graduate student support) – “Phytoplankton dynamics and the role of *Heterosigma akashiwo* in promoting blooms of the toxic dinoflagellate, *Dinophysis acuminata*” (2018).
- Delaware Sea Grant (\$140,000 + graduate student support) – “Diversity within the harmful alga *Heterosigma akashiwo*: environmental drivers and strain toxicity” (2016).
- Tyge Christensen Prize - awarded by International Phycological Society for best paper of the year (2014).
- PADI Foundation Grant (\$2,075) – “Dispersal of thermally tolerant Clade D *Symbiodinium* in the Caribbean” (2010).

- Braddock Research Award (\$1,500) – The Pennsylvania State University, Department of Biology (2010).
- Braddock Award (\$2,000) – The Pennsylvania State University, Department of Biology (2008).
- C.V. Starr Scholarship Endowment – Bermuda Biological Station for Research, Marine Ecotoxicology Summer Course (2003).

PUBLICATIONS

- **Pettay, D.T.**, Gonski, S.F., Cai, W.J., Sommerfield, C.K., Ullman, W.J. (2020) The ebb and flow of protons: A novel approach for the assessment of estuarine and coastal acidification. *Estuarine, Coastal and Shelf Science* 236: 106627.
- Osman, E.O., Suggett, D.J., Voolstra, C.R., **Pettay, D.T.**, Clark, D.R., Pogoreutz, C., Sampayo, E.M., Warner, M.E., Smith, D.J. (2020) Coral microbiome composition along the northern Red Sea suggests high plasticity of bacterial and specificity of endosymbiotic dinoflagellate communities. *Microbiome* 8: 8 <https://doi.org/10.1186/s40168-019-0776-5>.
- Andres, A.S., Main, C.R., **Pettay, D.T.**, Ullman, W.J. (2019) Hydrophysical and hydrochemical controls of cyanobacterial blooms in Coursey Pond, Delaware (USA). *Journal of Environmental Quality* 48: 73-82.
- Main, C.R., Greenfield, D.I., Doll, C., Wang, Y., Whereat, E.B., Mortensen, R., **Pettay, D.T.**, Coyne, K.J. (2018) Critical comparison of molecular methods for detection and enumeration of the harmful algal species, *Heterosigma akashimo*, in environmental water samples. *Journal of Applied Phycology* 30: 2425-2434.
- Gonski, S.F., Cai, W., Ullman, W.J., Joesoef, A., Main, C.R., **Pettay, D.T.**, Martz, T.R. (2018) Assessment of suitability of ISFET sensors for pH measurements in dynamic estuarine environments. *Estuarine, Coastal and Shelf Science* 200: 152-168.
- Grottoli, A.G., Martins, P.D., Wilkins, M.J., Johnston, M.D., Warner, M.E., Cai, W.J., Melman, T.F., Hoadley, K.D., **Pettay, D.T.**, Levas, S., Schoepf, V. (2018) Coral physiology and microbiome dynamics under combined warming and ocean acidification. *PLoS ONE* 13: e0191156.
- Schoepf, V., Hu, X., Holcomb, M., Cai, W., Li, Q., Wang, Y., Xu, H., Warner, M., Melman, T., Hoadley, K., **Pettay, D.**, Matsui, Y., Baumann, J., Grottoli, A. (2017) Coral calcification under environmental change: a direct comparison of the alkalinity anomaly and buoyant weight techniques. *Coral Reefs* 36: 13-25.
- Borell, E.M., **Pettay, D.T.**, Steinke, M., Warner, M., Fine, M. (2016) Symbiosis-specific changes in dimethylsulphoniopropionate concentrations in *Stylophora pistillata* along a depth gradient. *Coral Reefs* 35: 1383-1392.
- Cai, W., Ma, Y., Hopkinson, B.M., Grottoli, A.G., Warner, M.E., Ding, Q., Hu, X., Yuan, X., Schoepf, V., Xu, H., Han, C., Melman, T.F., Hoadley, K.D., **Pettay, D.T.**, Matsui, Y., Baumann, J.H., Levas, S., Ying, Y., Wang, Y. (2016) Microelectrode characterization of coral daytime interior pH and carbonate chemistry. *Nature Communications* 7: 11144.
- * Hoadley, K.D., **Pettay, D.T.**, Dodge, D., Warner, M.E. (2016) Contrasting physiological plasticity in response to environmental stress within different cnidarians and their respective symbionts *Coral Reefs* 35: 529-542.
- Hoadley, K.D., **Pettay, D.T.**, Grottoli, A.G., Cai, W.J., Melman, T.F., Schoepf, V., Hu, X., Li, Q., Xu, H., Wang, Y., Matsui, Y., Baumann, J.H., Warner, M.E. (2016) Physiological response to elevated temperature and pCO₂ varies across four Pacific coral species: Understanding the unique host+symbiont response. *Scientific Reports* 5: 18371.
- **Pettay, D.T.**, Smith, R.T., Wham, D.C., Iglesias-Prieto, R., LaJeunesse, T.C. (2015) Microbial invasion of the Caribbean by an Indo-Pacific “zooxanthella”. *Proceedings of the National Academy of Sciences* 112: 7513-7518.
- * Hoadley, K.D., Rollison, D., **Pettay, D.T.**, Warner, M.E. (2015) Differential carbon utilization and asexual reproduction under elevated pCO₂ conditions in the model anemone, *Exaiptasia pallida*, hosting different symbionts. *Limnology and Oceanography* 60: 2108-2120.

- Suggett D.J., Goyen S., Evenhuis C., Szabó M., **Pettay D.T.**, Warner M.E., Ralph P.J. (2015) Functional diversity of photobiological traits within the genus *Symbiodinium* appears to be governed by the interaction of cell size with cladal designation. *The New Phytologist* 208: 370-381.
- Levas, S., Grottoli, A.G., Warner, M.E., Cai, W-J, Bauer, J., Schoepf, V., Baumann, J.H., Matsui, Y., Gearing, C., Melman, T.F., Hoadley, K.D., **Pettay, D.T.**, Hu, X., Li, Q., Xu, H., Wang, Y. (2015) Organic carbon fluxes mediated by corals at elevated $p\text{CO}_2$ and temperature. *Marine Ecology Progress Series* 519: 153-164.
- Leal, M.C., Hoadley, K., **Pettay, D.T.**, Calado, R., Warner, M.E. (2015) Symbiont type influences trophic plasticity in a model cnidarian-algal symbiosis. *Journal of Experimental Biology* 218: 858-863.
- † LaJeunesse, T.C., Wham, D.C., **Pettay, D.T.**, Parkinson, J.E., Keshavmurthy S., Chen, C.A. (2014) Ecologically differentiated - stress tolerant - endosymbionts in the dinoflagellate genus *Symbiodinium* (Dinophyceae), clade D, are different species. *Phycologia* 53: 305-319.
- Rodríguez-Troncoso, A.P., Carpizo-Ituarte, E., **Pettay, D.T.**, Warner, M.E., Cupul-Magaña, A.L. (2014) The affects of an abnormal decrease in temperature on the Eastern Pacific reef-building coral *Pocillopora verrucosa*. *Marine Biology* 161: 131-139.
- **Pettay, D.T.**, LaJeunesse, T.C. (2013) Long-range dispersal and high-latitude environments influence the population structure of a “stress-tolerant” endosymbiont harbored by *Pocillopora* in the Eastern Pacific. *PLoS ONE* 8: e79208.
- Thorhill, D.J., Yu, X., **Pettay, D.T.**, Zhong, M., Santos, S. (2013) Population genetic data of a model symbiotic cnidarian system reveal remarkable symbiotic specificity and vectored introductions across ocean basins. *Molecular Ecology* 22: 4499-4515. *Feature Article*
- Schoepf, V., Grottoli, A.G., Warner, M.E., Cai, W-J, Melman, T.F., Hoadley, K.D., **Pettay, D.T.**, Hu, X., Li, Q., Xu, H., Wang, Y., Matsui, Y., Baumann, J.H. (2013) Coral energy reserves and calcification in a high- CO_2 world at two temperatures. *PLoS ONE* 8: e75049.
- McGinley, M.P., Aschaffenburg, M.D., **Pettay, D.T.**, Smith, R.T., LaJeunesse, T.C., Warner, M.E. (2012) Transcriptional response of two core photosystem genes in *Symbiodinium* spp. exposed to thermal stress. *PLoS ONE* 7: e50439.
- McGinley, M.P., Aschaffenburg, M.D., **Pettay, D.T.**, Smith, R.T., LaJeunesse, T.C., Warner, M.E. (2012) *Symbiodinium* spp. in colonies of eastern Pacific *Pocillopora* spp. are highly stable despite the prevalence of low-abundance background populations. *Marine Ecology Progress Series* 462: 1-7. *Feature Article*
- Suggett, D.J., Hall-Spencer, J.M., Rodolfo-Metalpa, R., Boatman, T.G., Payton, R., **Pettay, D.T.**, Johnson, V.R., Warner, M.E., Lawson, T. (2012) Sea anemones may thrive in a high CO_2 world. *Global Change Biology* 18: 3015-3025.
- **Pettay, D.T.**, Wham, D.C., Pinzon, J.H., LaJeunesse, T.C. (2011) Genotypic diversity and spatial-temporal distribution of *Symbiodinium* clones in an abundant reef coral. *Molecular Ecology* 20: 5197-5212.
- Wham, D.C., **Pettay, D.T.**, LaJeunesse, T.C. (2011) Microsatellite loci for the host-generalist “zooxanthella” *Symbiodinium trenchi* and other Clade D *Symbiodinium*. *Conservation Genetics Resources* 3: 541-544.
- Finney, J.C., **Pettay, D.T.**, Sampayo, E.M., Warner, M.E., Oxenford, H.A., LaJeunesse, T.C. (2010) The relative significance of host-habitat, depth and geography on the ecology, endemism and speciation of coral endosymbionts in the genus *Symbiodinium*. *Microbial Ecology* 60: 250-263.
- LaJeunesse, T.C., Walther, M., Pinzon, J., **Pettay, D.T.**, McGinley, M., Aschaffenburg, M., Medina-Rosas, P., Cupul-Magana, A.L., Perez, A.L., Reyes-Bonilla, H., Warner, M. (2010) Host-symbiont recombination versus natural selection in the response of coral-dinoflagellate symbioses to environmental disturbance. *Proceedings of the Royal Society B* 277: 2925-2934.
- LaJeunesse, T., **Pettay, T.**, Sampayo, E. Phongsuwan, N., Brown, B., Obura, D., Hoegh-Guldberg, O., Fitt, W. (2010) Long-standing environmental conditions influence community diversity and dominance among ancient lineages of symbiotic dinoflagellates associated with coral reef cnidarians. *Journal of Biogeography* 37: 785-800.

- **Pettay, D.T.**, LaJeunesse, T.C. (2009) Microsatellite loci for assessing the diversity, dispersal and clonality of coral symbionts in the ‘stress-tolerant’ clade D *Symbiodinium*. *Molecular Ecology Resources* 9: 1022-1025.
- **Pettay, D.T.**, LaJeunesse, T.C. (2007) Microsatellites from clade B *Symbiodinium* spp. specialized for Caribbean corals in the genus *Madracis*. *Molecular Ecology Notes* 7: 1271-1274.

* Publications including mentored undergraduate coauthors

† Tye Christensen Prize - International Phycological Society best paper of the year

PAPERS IN PREPARATION

- * Shi, Y., Hamman, C., Coyne, K., **Pettay, D.T.** (in prep for *Journal of Phycology*) Investigating the diversity of *Heterosigma akashimo* using multigene phylogenetics.
- **Pettay, D.T.**, Hoadley, K.D., Grottoli, A.G., Warner, M.E. (in prep for *Limnology and Oceanography*) The photophysiological response of different *Symbiodinium* species to elevated pCO_2 and temperature.

REVIEWER

- Journals: African Journal of Marine Sciences, Global Change Biology, Journal of Phycology, Limnology and Oceanography, Marine Ecology Progress Series, Molecular Ecology, Proceedings of the National Academy of Sciences, Symbiosis
- Grants: NSF – Biological Oceanography (2012, 2014, 2015 & 2017)

MENTORED STUDENTS

Amanda Williams (M.S., University of Delaware)	2018 to Present
Emily Deardorff (B.S., Western Washington University, REU)	Summer 2019
Aidan Durkan (B.S., Delaware Technical College, REU)	Summer 2019
Joshua Simpson (B.S., Delaware Technical College, REU)	Summer 2018
Yuechen Shi (M.S., University of Delaware)	2016 - 2018
Chris Grasso (B.S. & M.S., University of Delaware)	2013 - 2018
Carolyn Hamman (B.S., University of Miami, REU)	Summer 2017
Mikaela Kropp (B.S., Charleton College, REU)	Summer 2017
Kenny Hoadley (Ph.D., University of Delaware)	2011 - 2016
Dani Dodge (B.S., University of Delaware)	Summer/Fall 2014
Julia Hagemeyer (B.S. & M.S., University of Delaware)	2013 - 2015
Eslam Osman (Ph.D., University of Essex)	2013 - 2015
Jonathan Dinman (B.S., University of Delaware)	Summer 2012
Dana Rollison (B.S., University of Delaware)	Summer 2012
Matt Aschaffenburg (Ph.D., University of Delaware)	2011 - 2012
Mike McGinley (Ph.D., University of Delaware)	2011 - 2012
Tim O'Donnell (B.S., Pennsylvania State University)	2009 - 2011
João Monteiro (Ph.D., University of the Azores)	2008 - 2010
Leonard Chauka (Ph.D., University of Dar es Salaam)	2008 - 2010
Josh Bates (B.S., Florida International University)	2006 - 2007

SYMPOSIA, PRESENTATIONS AND WORKSHOPS

- Invited Speaker: **Tye Pettay**; “Improving resolution and accessibility of real-time water quality data using low-cost, high-frequency sensors maintained by citizen scientists”, Center for the Inland Bays – Science & Technical Advisory Committee, Lewes, DE (2019).
- Invited Speaker & Panelist: **Tye Pettay**; "Working to address water quality issues in Delaware estuaries", DE Sea Grant Site Review, University of Delaware, Lewes, DE (2019).
- Invited Speaker: **Tye Pettay**; “Symbionts, Protons and HABs, Oh My!”, College of Earth, Ocean, and Environment, University of Delaware, Lewes, DE (2019).

- Invited Lecturer: **Tye Pettay**; “Ecology and Evolution of Coral-Algal Symbioses: The Symbiont’s Perspective”, Biological Oceanography, University of Delaware, Lewes, DE (2018).
- Invited Speaker: **Tye Pettay**; “Eutrophication Dependent Coastal Acidification in the Tidally Coupled Murderkill Estuary and Delaware Bay”, Mid-Atlantic Sea Grant Coastal Acidification Training, University of Delaware, Lewes, DE (2018).
- Invited Speaker: **Tye Pettay**; “Harmful Algal Diversity and Monitoring”, Citizen Monitoring Program, University of Delaware, Lewes, DE (2018).
- Invited Lecturer: **Tye Pettay**; “Coral Bleaching: Cellular Mechanisms and Differential Bleaching”, Physiology of Marine Organisms, University of Delaware, Lewes, DE (2018).
- Invited Speaker: **Tye Pettay**; “Ecology and Evolution of Coral-Algal Symbioses: The Symbiont’s Perspective”, Department of Natural Sciences, University of South Carolina at Beaufort, Bluffton, SC (2018).
- *Presentation: Carolyn Hamman, Yeuchen Shi, Kathryn Coyne, **Tye Pettay**; “Salinity driven changes in the diversity of *Heterosigma akashiwo*”, Ocean Sciences Meeting, Portland, OR (2018).
- *Poster: Yuechen Shi, Carolyn Hamman, **D. Tye Pettay**, Kathryn Coyne; “Diversity within the Harmful Algal Species, *Heterosigma akashiwo*, Phylogeny, Growth Rate and Morphology”, 9th U.S. Symposium on Harmful Algae, Baltimore, MD (2017).
- Invited Lecturer: **Tye Pettay**; “Coral-Algal Symbioses: The Symbiont’s Role in Adaptation”, Biological Oceanography, University of Delaware, Lewes, DE (2017).
- Invited Speaker: **Tye Pettay** and Kathy Coyne; “The Good, the Bad, and the HABs”, Ocean Currents Lecture Series, University of Delaware, Lewes, DE (2017).
- Invited Lecturer: **Tye Pettay**; “Coral Bleaching: Cellular Mechanisms and Differential Bleaching”, Physiology of Marine Organisms, University of Delaware, Lewes, DE (2017).
- *Invited Speaker: Yuechen Shi, Kathy Coyne and **Tye Pettay**; “Diversity within the harmful algal species, *Heterosigma akashiwo*”, Citizen Monitoring Program, University of Delaware, Lewes, DE (2016).
- Presentation: **Tye Pettay**; “Physiological Diversity between Closely Related *Symbiodinium* spp.”, Symbiofest Northeast, Lewes, DE (2013).
- Invited Speaker: **Tye Pettay**; “From Clade to Clone: The Genetic and Physiological Diversity of Symbiotic Algae in Reef-building Coral”, Department of Marine Sciences, University of North Carolina, Chapel Hill, NC (2013).
- Invited Speaker: **Tye Pettay**; “From Clade to Clone: The Genetic and Physiological Diversity of Algal Symbionts in the Genus *Symbiodinium*”, College of Earth, Ocean, and Environment, University of Delaware, Lewes, DE (2013).
- Presentation: **Tye Pettay**, Drew Wham, Todd LaJeunesse; “Was *Symbiodinium* Clade D Introduced to the Caribbean?”, 12th International Coral Reef Symposium, Cairns, Australia (2012).
- Presentation: **Tye Pettay**, Todd C. LaJeunesse; “Long Distance Dispersal and Strong Population Differentiation Characterize *Symbiodinium D1* from *Pocillopora* in the Eastern Pacific”, 39th Benthic Ecology Meeting, Wilmington, NC (2010).
- Invited Speaker: **Tye Pettay**; “*Symbiodinium* spp. Populations: Development and Application of Microsatellite Markers”, Responses of Coral Holobionts under the Impact of Climate Change, Taipei, Taiwan (2009).
- Co-taught Workshop: Todd LaJeunesse and **Tye Pettay**; “Species Identification of Symbiotic Algae”, Taipei, Taiwan (2009).
- Presentation: **Tye Pettay**, Todd LaJeunesse, Dustin Kemp; “Stability of Clonal Lineages over Space and Time”, 11th International Coral Reef Symposium, Ft. Lauderdale, FL (2008).
- Presentation: **Tye Pettay**; “*Symbiodinium* Microsatellites”, Symbiofest Symposium, Athens, GA (2007).

- Presentation: **Tye Pettay**; “Effects of Irgarol 1051 on Various Cultures of *Symbiodinium* spp. (Zooxanthellae)”, Society of Environmental Toxicology and Chemistry North America 26th Annual Meeting, Baltimore, MD (2005).
- Poster: **Tye Pettay**; “Effects of Irgarol 1051 on Various Cultures of *Symbiodinium* spp. (Zooxanthellae)”, Coral Reef Ecotoxicology and Health Workshop, Hamilton, Bermuda (2003).
- Presentation: **Tye Pettay**; “The Effects of Triazine Pesticides on the Coral/Algal Symbiosis of *Porites porites*”, Grice Marine Laboratory Student Colloquium, College of Charleston, Charleston, SC (2003).

*Speaker was a mentored undergraduate or graduate student

MEDIA & OUTREACH

- Support Sea Grant with Delaware Senator Tom Carper (04/13/17).
 - News Journal (04/14/17) – “Trump budget puts science under attack”
 - Cape Gazette (04/30/17) – “Sea Grant scientists brace for budget cuts”
- Nautilus (10/01/15) – “When evolution is infectious.”
- Media release for Pettay *et al.* 2015.
 - UDaily (06/01/15) – “UD researcher reports evidence that microbial algae found in Greater Caribbean originated from Indo-Pacific Ocean.”
 - National Geographic (06/02/15) – “The microbe that invaded Caribbean coral reefs.”
 - NPR/WDDE (06/07/15) – “Research shows invasive algae species poses possible threat to Caribbean coral reefs.”