

Mackenzie L. Zippay, Ph.D.
Environment and Sustainability Post-Doctoral Fellow
University of South Carolina
803-777-6832

EDUCATION

- (Aug) 2011 – present Post-Doctoral Fellow, University of South Carolina, Environment and Sustainability Program (Supervisor: Brian Helmuth, Ph.D.)
- 2009 – 2011 (Aug) Post-Doctoral Scholar, Oceans and Human Health, Medical University of South Carolina and NOAA (Supervisor: Fran VanDolah, Ph.D.)
- 2004 – 2009 Ph.D., Dept. Ecology, Evolution and Marine Biology, University of California, Santa Barbara (Supervisor: Gretchen Hofmann, Ph.D.)
- 2002 Bachelors of Science in Biology, Arizona State University (*cum laude*)

PROFESSIONAL EXPERIENCE

- 2009 Teaching Assistant, Marine Molecular Techniques, Northeastern Univ., Three Seas Program, Catalina Island
- 2008 Sea Grant Trainee, UCSB
- 2007 Teaching Assistant, EEMB 112L, Invertebrate Zoology Lab, UCSB
- 2006 - 2008 Teaching Assistant, Marine Molecular Techniques, Northeastern Univ., Three Seas Program, Catalina Island
- 2006 Teaching Assistant, EEMB 134, Phycology Lab, UCSB
- 2005 Teaching Assistant, EEMB 3L, Introductory Biology Lab, UCSB
- 2005 Research Assistant, Polar Programs, NSF grant
- 2002 – 2004 Research Technician for Dr. Gretchen Hofmann, UCSB

AWARDS, HONORS & FELLOWSHIPS

- 2009 – 2011 Oceans and Human Health Post-doctoral Fellow, MUSC, Department of Marine Biomedicine and Environmental Sciences
- 2008 – 2009 Broida-Hirschfelder Graduate Fellowship, UCSB
- 2007 – 2008 Coastal Environmental Quality Initiative Fellowship, UC Marine Council
- 2006 Alan Kohn Fellowship, Friday Harbor Labs, Univ. of Washington
- 2006 Fee Fellowship, UC Santa Barbara
- 2004 Block Grant, UC Santa Barbara
- 2001 – 2002 Beckman Scholar Fellowship, Arizona State University,
- 2001 NSF Research Experience for Undergraduates Fellowship
- 2001 Morris K. Udall Scholarship, Arizona State University Nominee
- 1998 – 1999 Arizona State University Freshman Achievement Scholar

GRANTS & AWARDS IN SUPPORT OF RESEARCH

- 2009 – 2012 Oceans and Human Health, Medical University of South Carolina
- 2008 – 2009 Nancy Brown, Environmental Graduate Dissertation Award
- 2005 - 2006 Mildred E. Mathias, UC Natural Reserve System, UCSB
- 2005 Science and Engineering, UCSB
- 2004 – 2005 Mildred E. Mathias, UC Natural Reserve System, UCSB
- 2001 – 2002 Beckman Scholar Fellowship, Arizona State University
- 2000 – 2002 Biology Research Experience for Undergraduates Fellowship, Arizona State University

PUBLICATIONS

Peer Reviewed Journals

- Zippay, M.L.**, Rein K.S., Wang Z., Seaborn G., and Van Dolah F.M. (2011) What do we currently know about dinoflagellate polyketide synthases? Insights from *Karenia brevis* (Wilson) (*in prep for Protist*).
- Zippay, M.L.** and Hofmann, G.E. (2010) Effect of pH on gene expression and thermal tolerance of early life history stages of red abalone (*Haliotis rufescens*). *J. Shellfish Research* 29: 429-439.
- Zippay, M.L.** and Hofmann, G.E. (2010) Physiological tolerances across latitudes: Thermal sensitivity on larval marine snails (*Nucella* spp.). *Marine Biology* 157(4):707-714.
- O'Donnell, M.J., Todgham, A.E., Sewell, M.A., Hammond, L.M., Ruggiero, K., Fangue, N.A., **Zippay, M.L.** and Hofmann, G.E. (2010) Ocean acidification alters skeletogenesis and gene expression in larval sea urchins. *Marine Ecology Progress Series* 398:157-171.
- Alberto F., Whitmer A., Coelho N., **Zippay M.**, Varela-Alvarez, Raimondi P.T., Reed D.C & Serrão E.A. (2009) Microsatellite markers for the giant kelp *Macrocystis pyrifera*. *Conservation Genetics* 10:1915-1917.
- Zippay, M.L.**, Place, S.P., and Hofmann, G.E. (2004) The molecular chaperone Hsc70 from a eurythermal marine goby exhibits temperature sensitivity during luciferase refolding assays. *Journal of Comparative Biochemistry and Physiology, Part A* 138: 1-7.
- Place, S.P., **Zippay, M.L.**, and Hofmann, G.E. (2004) Constitutive roles for inducible genes: evidence for the alteration in expression of the inducible *hsp70* gene in Antarctic notothenioid fishes. *American Journal of Physiology* 287: 429-436.
- Hofmann, G.E., Buckley, B.B., Place, S.P., and **Zippay, M.L.** (2002) Molecular chaperones in ectothermic marine animals: Biochemical function and gene expression. *Integrative and Comparative Biology* 42: 808-814.

Presentations at Science Meetings

- 2010** 14th International Conference on Harmful Algae, Crete, Greece. Polyketide synthase (PKS) in dinoflagellates: New Insights into Their Cellular Localization and Functionality.
- 2010** Society for Integrative and Comparative Biology, Seattle, WA. Studies of Ocean Acidification: The Physiological Response of Marine Larval Snails to Elevated CO₂.
- 2009** Oceans and Human Health Initiative Symposium/NOAA, Seattle, WA. Effects of Predicted Climate Change Scenarios on Growth and Toxicity of Florida Red Tides.
- 2008** Ocean acidification: Planning for Research and Monitoring, Friday Harbor WA. Examining the impacts of climate change on marine organisms: Effects of ocean acidification on larval marine snails.
- 2008** 8th Larval Biology Symposium, Lisboa, Portugal. Examining the impacts of climate change on marine organisms: Effects of ocean acidification on larval marine snails.
- 2007** Western Society of Naturalists, Ventura, CA. Examining the impacts of climate change on marine organisms: Effects of ocean acidification on larval marine snails.
- 2006** Ecology, Evolution and Marine Biology Symposium, UCSB, A latitudinal comparison of thermal tolerance and gene expression patterns in *Nucella* larvae.
- 2006** Mildred E. Mathias Symposium, Bodega Marine Labs, CA. A latitudinal comparison of thermal tolerance and gene expression patterns in *Nucella* larvae.
- 2004** Western Society of Naturalists, Sonoma Valley, CA. Patterns of *HSP70* mRNA expression and DNA binding activity of heat shock factor 1 in the intertidal mussel *Mytilus californianus* during tidal cycles.
- 2004** Society for Integrative and Comparative Biology, New Orleans, LA. DNA binding activity of the transcription factor, heat-shock factor 1, in the intertidal mussel *Mytilus californianus* during ecologically relevant fluctuations in body temperature.
- 2002** Beckman Scholars Symposium, University of California, Irvine. The effects of temperature variation on the function of Hsc70 in the eurythermal marine goby, *Gillichthys mirabilis*.

- 2001** 8th Annual Undergraduate Research Poster Symposium, Arizona State University
Geographical distribution of Genetic Variability in *Postelsia palmaeformis*.
- 2001** Western Society of Naturalists, Ventura, CA. The effects of temperature variation on the function of Hsc70 in the eurythermal marine goby, *Gillichthys mirabilis*.

RESEARCH EXPERIENCE

2011- present	USC	Using a mechanistic approach to understand the role of a changing oceanographic climate on the distribution of an ecologically dominant intertidal mussel, <i>Mytilus californianus</i> .
2009-2011	MUSC	Determine growth and toxicity responses of <i>Karenia brevis</i> to predicted increases in temperature and atmospheric CO ₂ . Examine changes in chloroplast physiology and polyketide synthase (PKS) expression concurrent with these responses to better elucidate the regulation of toxin biosynthesis in <i>K. brevis</i> (see Zippay et al. 2011, in prep). Develop a gene knock-down method for confirming involvement of identified PKSs in brevetoxin biosynthesis.
2004-2009	UCSB	Dissertation projects: Determining the calcification response to elevated carbon dioxide in marine larval snails, <i>Nucella</i> and <i>Haliotis</i> . Using quantitative PCR and physical measurements can provide a template for understanding how “shell forming” organisms might be affected in the near future (see Zippay and Hofmann 2010). A latitudinal comparison of thermal tolerance and gene expression patterns in <i>Nucella</i> larvae. Using early life history stages of larvae to understand how climate change affects species distributions (see Zippay and Hofmann 2010).
2007-2008	UCSB	Research assistant: Identifying the developmental challenges associated with growing up in a high CO ₂ world. I helped culture larval sea urchins, and assisted in designing and executing the experiment (see O’Donnell et al. 2010).
2005-2006	UCSB	Lead research assistant: Understanding protein homeostasis in Antarctic fishes thru autoradiography gels and hepatocyte isolations.
2002-2004	UCSB	Research technician: Examined HSF 1 binding activity in the intertidal mussel, <i>Mytilus californianus</i> using electromobility shift assays and northern blots to understand temperature effects on intertidal mussel.
2001–2003	UCSB	Research assistant: Comparative study of the heat shock response of Antarctic and New Zealand fishes at McMurdo Station, Antarctica and Portobello Marine Lab, University of Otago, New Zealand (see Place, Zippay and Hofmann 2004).
2001–2002	ASU	(undergraduate thesis) Examined the ecological physiology of <i>Gillichthys mirabilis</i> by measuring the refolding activity of the molecular chaperone Hsc70 across different ecological temperatures experienced by the Mexican goby (see Zippay et al. 2004).

2000–2001 ASU Undergraduate assistant: Studied the population structure of the brown alga, *Postelsia palmaeformis*, by developing microsatellite primers and running polyacrylamide gel electrophoresis (PAGE) with ³²P.

Research Skills: DNA, RNA and protein extractions; polymerase chain reaction (PCR); quantitative PCR; autoradiography; DNA cloning; cDNA library construction; microarray analysis; primer design; DNA/RNA and protein quantification with a spectrophotometer; northern, western and dot-blotting; biochemical protection and refolding assays of molecular chaperones; co-immunoprecipitation; fatty acid synthase assays; thin-layer chromatography; electro-mobility shift assay; collecting and identifying marine fishes and invertebrates.

INVITED LECTURES/SEMINARS

- 2010 *An Introduction to Oceans and Human Health: Climate Change*. Summer Undergraduate Research in association with the Marine Biomedicine and Environmental Science Center (MBES) at the Medical University of South Carolina (MUSC).
- 2010 *Climate Change and Ocean Acidification*. Graduate Course in Coastal Oceanography at Savannah State University.
- 2009 *Larval Biology in a Changing World: Effects of Global Climate Change on Marine Snails*. Hollings Marine Laboratory in association with MBES at MUSC.
- 2008 *Examining the impacts of climate change on marine organisms: Effects of ocean acidification on larval marine snails*. Dept. of Biology, University of South Carolina, Columbia, SC.

FIELD & SPECIALTY COURSES

- 2010 Teaching Techniques (CGS 725), Medical University of South Carolina
- 2008 Scientific Writing (EEMB 511), University of California, Santa Barbara
- 2005 Comparative Invertebrate Embryology (Bio 536), University of Washington, Friday Harbor Laboratories
- 2004 Teaching Techniques (EEMB 502), University of California, Santa Barbara
- 2002 Marine Invertebrate Zoology (Zool 432), University of Washington, Friday Harbor Laboratories
- 2001 Professional Values in Science (HPS 410), Arizona State University

PROFESSIONAL ACTIVITIES & SERVICE

- 2010 Mentor, Undergraduate (Aurora Baker), OHH Summer Undergraduate Research Program, MUSC
- 2010 Mentor, Graduate Student (Laura Pezolesi, Italian exchange student), MUSC
- 2007 Mentor, Undergraduate (John Feusier), UCSB
- 2007 Co-coordinator, Graduate Student Symposium, UCSB
- 2006 Mentor, Undergraduate (Sammy Davis), UCSB
- 2005 Mentor, Santa Barbara High school student (Veronica Pessino), UCSB
- 2004 Mentor, CAMP undergraduate (LaTisha Hammond), UCSB
- 2003 Docent, Marine Science Institute New Student Orientation, UCSB

ACADEMIC OUTREACH

- 2010-2011 **Oceans and Human Health Summer Undergraduate Research Program (NOAA OHH & MUSC's MBES):** Co-organizer and co-instructor for a 10 week research program, specifically for students from Minority Serving Institutions and HBCUs (Historically Black Colleges and Universities) across the US, to come to Charleston, SC to improve their understanding of the molecular processes regulating coastal and ocean environments to enhance benefits to human health and reduce public health risks through independent research.
- 2009 **American Museum of Natural History:** Interviewed for Scientific Bulletin: Acid Oceans <http://www.amnhblogs.org/content/science-bulletins-acid-oceans>

- 2009 **Teen Ocean Science Conference** in Dana Point: Co-teaching activities climate change for young ladies interested in the sciences.
- 2008 **Teen Ocean Science Conference** in Dana Point: Co-teaching activities in climate change for young ladies interested in the sciences.
- 2007 Mentor for **Los Angeles Conservation Corps** (LACC) Clean and Green program for underrepresented middle and high school students from the Los Angeles area.
- 2006-2007 **Santa Cruz Island Environmental Study Course**: Students from San Roque High School students are involved in hands-on learning about the island's ecosystem and biodiversity.
- 2006-2007 Activity assistant for **Tech Trek Science Camp**: Girls run by the American Association of University Women (AAUW). This involved co-teaching a marine conservation workshop to 4 separate groups of 7th grade girls.
- 2004-2006 **ScienceLine**, On-line science Q&A with middle-age students, UCSB
- 2003 Oceans to Classroom **Floating Lab**/Touch Tank tours, Docent, UCSB

PROFESSIONAL CONTRIBUTIONS

- 2010-present Reviewer for Zoo Biology Journal
- 2010-present Reviewer for Chemosphere Journal
- 2011-present Reviewer for Marine Ecology Progressive Series

PROFESSIONAL MEMBERSHIPS

- 2010-present International Society for the Study of Harmful Algae (ISSHA)
- 2004-present Sigma Xi
- 2004-present Graduate Women in Science (GWIS)
- 2004-2009 Women in Science and Engineering, UCSB
- 2003-present Society for Integrative Comparative Biology
- 2001-present Western Society of Naturalists