

# Kristen E. Whalen

## Curriculum Vitae

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Research Associate  
Woods Hole Oceanographic Institution  
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### Professional Preparation

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| ▪ Sempra Postdoctoral Fellow<br>Scripps Institution of Oceanography  | Cell/Dev. Biology  | Post doc., 2010 - 12 |
| ▪ NSF International Postdoctoral Fellow<br>University of California, Santa Barbara<br>University of New South Wales, Sydney, Australia | Ecological Genomics  | Post doc., 2008 - 10 |
| ▪ Massachusetts Institute of Technology/<br>Woods Hole Oceanographic Institution   | Bio. Oceanography  | Ph.D., 2008          |
| ▪ University of North Carolina at Wilmington   | Marine Biology<br><i>Honors in Biology</i><br><i>Summa cum laude</i><br><i>GPA 4.0</i> | B.S., 2001           |
- Honors Thesis entitled: *Antifouling Activity of Caribbean Sponge Extracts*

### Appointments

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- Woods Hole Oceanographic Institution, Biology, Guest Investigator, 2012 -present
- Scripps Institution of Oceanography-Sempra Postdoctoral Fellow, 2010 - 2012
- National Science Foundation International Postdoctoral Fellow, UNSW and UCSB, 2008-2010
- Guest Investigator, Woods Hole Oceanographic Institution, 2008 - 2010
- Postdoctoral Investigator, WHOI, June – Aug. 2008
- Graduate Research Assistant, MIT/WHOI, 2006-2008
- National Science Foundation Graduate Research Fellow, 2003-2006
- Research Assistant, Georgia Institute of Technology, Supervisor: Dr. Julia Kubanek, 2002
- Summer Student Fellow, Woods Hole Oceanographic Institution, Supervisor: Dr. Mark Hahn, 2001

### Fellowships

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2010-12	Scripps Institution of Oceanography - Sempra Postdoctoral Fellowship
2008-10	National Science Foundation – International Postdoctoral Research Fellowship
2003-06	National Science Foundation - Graduate Research Fellowship

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## Grants in Support of Research

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2013	Co-Investigator, R21 submitted to the National Institute of Allergy and Infectious Diseases at NIH (Pending)
2012	Co-Pi; WHOI Ignition Grant – “Ecological leads: Mining microbes for novel therapeutics to combat multidrug resistance in bacteria.” Co-PI with Tracy Mincer, WHOI; \$50,000
2008	National Science Foundation – International Postdoctoral Research Fellowship (NSF0754319) entitled “Profiling Marine Herbivore Gene Expression in Response to Algal Chemical Defenses”; \$181,660.00
2006	Lead PI.-Ocean Life Institute (WHOI) -Tropical Research Initiative Award, Grant entitled “Biochemical Ecology on Coral Reefs” (2006 – 2008); \$74,923.00
2005	Lead PI.-Ocean Ventures Fund, Grant entitled “Characterization of Detoxification Enzymes in the Marine Gastropod ( <i>Cyphoma gibbosum</i> ) in Response to a Gorgonian Diet (2005 – 2007); \$14,960.00
2004	Conchologists of America, Student award, Grant entitled “Detoxification and Transport of Dietary Metabolites in Marine Molluscs”; \$1,476.04
2004	SEASPACE Student Scholarship; \$2,000.00
2003	Lead PI.- Perry Institute of Marine Science/Caribbean Marine Research Center, National Undersea Research Center, Grant entitled “Physiological fate of dietary allelochemicals in generalist and specialist marine molluscs”; \$7,520.00

## Awards

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2012	ABC2012 Young Investigator Award, 4 <sup>th</sup> FEBS Special Meeting – ATP-Binding Cassette Proteins, Innsbruck, Austria
2011	Best Poster Award, Developmental Biology of Sea Urchin Meeting XX, Woods Hole, MA
2001	UNC-Wilmington Undergraduate Student Research & Travel Award
2001	Biology Achievement Award, UNCW
2001, 2000	Charles and Kay Bolles Marine Biology Scholarship, UNCW
2000	DeLoach Scholarship – Excellence in Organic Chemistry, UNCW
2001 - 1998	Chancellor’s Achievement Award of Excellence, UNCW
2001 - 1999	Glaxo-Wellcome ‘Women in Science’ Scholarship
1999	Outstanding General Chemistry Student Award, UNCW

## Publications in Peer Reviewed Journals

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- 2012 - **Whalen, K.E.**, Reitzel, A. and Hamdoun, A., Actin polymerization controls the activation of multidrug efflux at fertilization by translocation and fine-scale positioning of ABCB1a on microvilli. *Molecular Biology of the Cell* 22(18):3663-3672.
- Selected for consideration for MBoC Paper of the Year.
  - Awarded the journal cover for MBoC

- 2010 - **Whalen, K.E.**, Starczak, V.R., Nelson, D.R., Goldstone, J.V. and Hahn, M.E., Gorgonian host-inducible cytochrome P450s from the predatory gastropod *Cyphoma gibbosum*: evolution and function. *BMC Ecology* 10: 24 (doi:10.1186/1472-6785-10-24)
- 2010 - **Whalen, K.E.**, Sotka, E.E., Goldstone, J.V. and Hahn, M.E., The role of multixenobiotic transporters in molluscan predators as counter-defense mechanisms against dietary chemical stress. *Comparative Biochemistry and Physiology, Part C* 152(3): 288-300.
- 2010 - **Whalen, K.E.**, Lane, A.L, Kubanek, J. and Hahn, M.E., Biochemical warfare on the reef: the role of glutathione transferases in consumer tolerance of dietary prostaglandins. *PLoS One* 5(1): e8537.
- 2009 - Sotka, E.E.\*, Forbey, J., Horn, M., Poore, A.G.B., Raubenheimer, D., and **Whalen, K.E.\***, The emerging role of pharmacology in aquatic plant-herbivore interactions. *Integrative and Comparative Biology* 49: 291-313. \*denotes shared lead authorship
- 2008 - **Whalen, K.E.**, Morin, D., Lin, C.Y., Tjeerdema, R., Goldstone, J.V., Hahn, M.E., Proteomic characterization and cDNA cloning of glutathione S-transferases from the generalist marine gastropod, *Cyphoma gibbosum*. *Archives of Biochemistry and Biophysics* 478: 7-17.
- 2004 - **Whalen, K.E.**, Carvan, M.J., Hestermann, E.V., Jensen, B.A., Hahn, M.E., Structure-activity relationships for polychlorinated biphenyl binding to the aryl hydrocarbon receptor in a Dolphin kidney cell line. *Marine Environmental Research*. 58:131-141. (Abstract)
- 2003 - Hahn, M.E., Jensen, B.A., Kim, E-Y., Karchner, S.I., Franks, D.G., Lapsertis, J.M., **Whalen, K.E.**, Carvan, M.J., Molecular and cellular approaches to understanding the sensitivity of marine mammals to persistent organic pollutants. *Organohalogen Compounds*. 62:253-256.
- 2001 - Kubanek, J., **Whalen, K.E.**, Engel, S., Kelly, S., Henkel, T.P., Fenical, W., and Pawlik, J.R., Multiple defensive roles for triterpene glycosides from two Caribbean sponges. *Oecologia*. 131:125-136.

## Book Chapters

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- 2008 - Sotka, E.E. and **Whalen, K.E.**, Herbivore offense in the sea: the detoxification and transport of secondary metabolites, *Algal Chemical Ecology*, Amsler, C.D. Editor, Springer, New York, pp. 203-221

## Invited Manuscripts

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- 2009 - Sotka, E.E.\*, Forbey, J., Horn, M., Poore, A.G.B., Raubenheimer, D., and **Whalen, K.E.\***, The emerging role of pharmacology in aquatic plant-herbivore interactions. *Integrative and Comparative Biology* 49: 291-313. \*denotes shared lead authorship

## Feature Articles

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- 2008 - **Whalen, K.E.**, *Biochemical Warfare on the Reef*. *Oceanus Magazine*, Woods Hole Oceanographic Institution Vol 47, pp. 13-15.

## Teaching & Outreach

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- Graduate Teaching Assistant, Massachusetts Institute of Technology/Woods Hole Oceanographic Institution, Graduate course in Biological Oceanography, Spring 2006
- Course Instructor at High Tech Middle School, Chula Vista, CA for an afterschool program for 7-8<sup>th</sup> grade girls in Science Immersion Program (Spring 2012).
- Guest Lecturer, Chemical Ecology, San Diego State University, Course Biol 596, Lecture entitled – PharmEcology: a physiological understanding of consumer-prey interactions (Fall 2010)
- Instructor for the BE WiSE Education Program in Oncofertility, which engages young women in science, technology, engineering and math (STEM) learning experiences in collaboration with UC San Diego Health Sciences (Summer 2010)
- Guest Lecturer, Endangered Waters – Human Interaction with Ocean Ecosystems, Tufts University Experimental College, Medford, MA. Lecture – Emerging threats to coral reefs: are we already at the ‘tipping point’ (Fall 2007)
- Guest Lecturer, Biological Oceanography (Graduate Level), WHOI/MIT Course 7.47, Lecture entitled – Introduction to Coral Reefs: Biology, Ecology & Global Threats (Feb - June 2006)
- Ocean Sciences Enrichment Teacher (K-5), Mullen Hall Elementary, Falmouth, MA; participant in a educational outreach program funded by NSF in collaboration with the Centers of Ocean Sciences Education Excellence (COSEE) program of New England; developed lesson plans to promote ocean science literacy in the classroom (Feb – June 2006)
- Falmouth High School Science Fair Judge, Falmouth, MA (2006) and Lawrence Middle School Science Mentor, Falmouth, MA (2005)
- Volunteer for the Marine Mammal Standing Network, Wilmington, NC (1998-2001)
- Mentoring of the following junior researchers:
  - Supervisor of Julia Roche, High school intern, High Tech High – Chula Vista, CA (Summer 2011). Presented summer research project at Scripps to Senior White House Officials in Washington, D.C.
  - Supervisor of Amber Merril, recent UCSD graduate (Summer 2011).
  - Supervisor of Annalisa Carson, recent Wheaton College graduate (Summer 2011).
  - Supervisor of Kazuya Koda, Undergraduate Researcher, University of California, San Diego, contributed data to MBoC paper (2010-2011).
  - Co-Supervisor of Sarah Graham, Honors Student, School of Biological, Earth and Environmental Sciences, UNSW, (2008-10). Thesis title: *Chemical defenses and metals: effects on feeding preferences of a common marine consumer*. Currently a Ph.D. student at UNSW.

## Presentations

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2012 - Oral presentation at the Developmental Biology of Sea Urchin XXI Meeting, Woods Hole, MA, October 24-27, 2012. Entitled: “Activation of multidrug efflux transport by microvillar tip localization.”

Invited speaker, Webinar hosted by the journal *Cellular Signaling* on Sept. 20, 2012. Entitled: “Exploring cellular processes with super-resolution microscopy”.

Invited speaker, Presentation at the 4th Federation of European Biochemical Society on ATP-Binding Cassette (ABC) Proteins: From Multidrug Resistance to Genetic Diseases, Innsbruck, Austria, March 3-9,

2012. Entitled: "Actin-dependent translocation of ABCB1a during early embryogenesis revealed by 3D-structured illumination microscopy."
- 2011 - Invited Speaker, Biology Department, San Diego State University, San Diego, CA, Sept. 26, 2011. Entitled: "Investigating chemical defense mechanisms in marine invertebrates: Merging genomics and cell biology"
- Oral presentation at Pollution Response in Marine Organisms Meeting, Long Beach, CA, May 15-18, 2011. Entitled: "Cellular defense mechanisms: merging genomics and cell biology."
- Invited Speaker, Director's Circle Gala, Scripps Institution of Oceanography, La Jolla, CA; May 12, 2011. Entitled: "Survival at Sea: Imaging embryo cellular defenses."
- Poster presentation at the Developmental Biology of Sea Urchin XX Meeting, Woods Hole, MA, April 27-May 1, 2011. Entitled: "Just a few microns can make all the difference: implications of membrane reorganization on multidrug efflux activity at fertilization."
- Invited Speaker, Scripps Institution of Oceanography 2011 Science Showcase, January 20, 2011. Entitled: "The Art of Chemical Conversation in the Sea."
- 2010 - Invited Speaker, Marine Biology Research Division, Scripps Institution of Oceanography/UC-San Diego, April 26, 2010. Entitled: "Ecological genomics of consumer-prey interactions: from genes to communities."
- Invited Speaker, Environmental, Earth and Ocean Sciences, University of Massachusetts-Boston, April 6<sup>th</sup>, 2010. Entitled: "Ecological genomics of consumer-prey interactions: from genes to communities."
- Invited Speaker; Interdepartmental Graduate Program in Marine Science, UC-Santa Barbara, Winter Colloquium, February 16, 2010. Entitled: "Consumer offense: biochemical strategies for coping in a chemical defended world."
- 2009 - Poster presentation at the Gordon Research Conference: Evolutionary and Ecological Functional Genomics, July 12-17, 2009, Tilton, NH. Entitled: "A transcriptomic fingerprint of life in the sea: understanding allelochemical tolerance in the sea urchin."
- Invited Speaker; Society of Integrative and Comparative Biology (SICB) 2009 Meeting, January 3-7, 2009, Boston, MA. Entitled: "Transcriptome profiling in the sea urchin: understanding allelochemical modes of action and marine herbivore cellular defenses."
- 2007 - Poster presentation at 24<sup>th</sup> Annual Meeting of the New England Membrane Enzyme Group, October 14-16, 2007, Woods Hole, MA. Entitled: "Effects of gorgonian secondary metabolites on marine consumer detoxification enzymes."
- Oral presentation at the 36<sup>th</sup> Annual Benthic Ecology Meeting, March 21-25, 2007; Atlanta, GA. *Session Chair: Consumer-Prey Interactions*. Entitled: "A proteomic and molecular approach to chemical ecology: Identifying detoxification enzymes possibly involved in allelochemical resistance."
- 2006 - Oral presentation at the Woods Hole Oceanographic Institution, October 26, 2006, Woods Hole, MA. Entitled: "When corals leave a bad taste in your mouth: Understanding molluscan detoxification of gorgonian chemical defenses".
- 2005 - Poster presentation at 22<sup>nd</sup> Annual Meeting of the New England Membrane Enzyme Group, November 7-8, 2005, Sturbridge, MA. Entitled: "Detoxification enzymes and transporters in marine molluscs: An evolutionary answer to gorgonian chemical defenses?"
- Poster presentation at 34<sup>th</sup> Annual Benthic Ecology Meeting, April 6-10, 2005; Williamsburg, VA. Entitled: "Detoxification enzymes and transporters in marine molluscs: An evolutionary answer to gorgonian chemical defenses?"

- 2003 - Poster presentation at the Pollution Response in Marine Organisms Meeting, May, 2003; Tampa, Florida. Entitled: "Structure-activity relationships for polychlorinated biphenyl binding to the aryl hydrocarbon receptor in a dolphin kidney cell line."
- 2002 - Oral presentation at the 31<sup>st</sup> Annual Benthic Ecology Meeting, March 21- 24, 2002; Orlando, Florida. Entitled: "Localization of ecologically active secondary metabolites in two Caribbean sponges."
- 2001- Oral presentation of summer research project at Woods Hole Oceanographic Institution, Summer 2001, Entitled: "Are bottlenose dolphins (*Tursiops truncatus*) susceptible to polychlorinated biphenyls". Summer Student Fellowship, Woods Hole Oceanographic Institution
- Poster presentation at the 18<sup>th</sup> International Society of Chemical Ecology Meeting, July 7-12, 2001; North Lake Tahoe, CA. Entitled: "More bang for your buck: Multiple defenses roles of triterpene glycosides in marine sponges."
- 2000 - Oral presentation at the 29<sup>th</sup> Annual Benthic Ecology Meeting/ Marine Chemical Ecology Symposium, March 9-12, 2000; University of North Carolina at Wilmington. Entitled: "Antifouling activity of Caribbean sponge extracts."

## Contributed presentations

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- 2012 - Hamdoun, A., Campanale, J., and **Whalen, K.** Membrane dynamics and the control of multidrug efflux transport activity in sea urchin development. American Society of Cell Biology.
- 2011 - Hamdoun, A., Campanale, J., Gokirmak, T., Shipp, L., **Whalen, K.** Ontogenetic switches in activity and location of multidrug efflux transporters during embryonic development. American Association for Cancer Research, San Francisco, CA.
- 2002 – Kubanek, J., **Whalen, K.**, Pawlik, J.R., Fenical, W., Naar, J., Weidner, A., Bourdelais, A.J., Baden, D.G., Steidinger, K., Felwelling, L. Multiple functions and ecological consequences of chemical signals in the sea. Gordon Research Conference on Marine Natural Products, Ventura, CA.

## Scientific Cruises & Field Work

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- 2008-2009 Principle investigator, collection of invertebrates and macroalgae from Sydney Harbor and surrounding waters, Sydney Institute of Marine Science, Australia
- 2006, 2004 Principle investigator studying natural product detoxification in coral reef invertebrates, Perry Institute for Marine Science, Lee Stocking Island, Bahamas
- 2005 SUNY-Buffalo/U of Miami cruise; Research Scientist aboard the R/V Walton Smith, Bahamas, investigating coral recruitment on Grand Bahama Bank, H. Lasker (lead PI.-SUNY Buffalo)
- 2004 Research Assistant under the direction of A. Tarrant (lead PI-WHOI), studying endocrine disruption in scleractinian corals, Perry Institute for Marine Science, Lee Stocking Island, Bahamas
- 2004 WHOI Research Scientist studying nudibranch and coral abundance at the Liquid Jungle Lab located on the island of Canales de Tierra, Veraguas province of Panama
- 2001, 2000 National Science Foundation – Chemical Ecology Cruise; Research Scientist and Dive Team Member aboard the R/V Seaward Johnson investigating chemical defense in coral reef invertebrates, Bahamas, J. Pawilk (lead PI.-UNCW)

- 1999-2001      Research Dive Team member, investigating sponge health and ecology in Key Largo, FL in conjunction with the National Undersea Research Center and Center for Marine Science, UNCW, J.Pawlik (lead PI.-UNCW)
- 2001-2003      Cape Cod Stranding Network Volunteer under the direction of M. Moore (WHOI); assisted in marine mammal necropsies
- 1999-2001      UNCW Stranding Team Member Volunteer under the direction of A. Pabst (UNCW); assisted in marine mammal necropsies

## **Professional Activities, Service & Certifications**

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- Reviewer for the following peer reviewed journals and funding agencies:
  - NSF/Integrative Organismal Systems, California Sea Grant, CalFed-Delta Science Program,
  - PLoS One, Aquatic Toxicology, Comparative Biochemistry and Physiology, Ecotoxicology, Developmental and Comparative Immunology, Molecular Ecology, Journal of Shellfish Research, Open Marine Biology Journal.
- Member of the Scientific diving team at the University of New South Wales, Sydney, Australia (2008-2010)
- American Academy of Underwater Sciences (AAUS) Diving Control Board Member for Woods Hole Oceanographic Institution (2004 – 2008)
- Science Judge, National Ocean Sciences Bowl, MIT, (January 2007)
- SCUBA certifications: PADI Open water certification; NAUI Nitrox and Dry Suit certification; AAUS scientific diving certification (1999 – present) Over 400 research dives logged.
- Advanced First Aid, CPR, and DAN oxygen administration certified
- Professional memberships: AAAS, American Chemical Society; Society for Integrative and Comparative Biology