

LARS TOMANEK

CURRICULUM VITAE

Biological Sciences Department
California Polytechnic State University
San Luis Obispo, CA 93407-0401

APPOINTMENTS

Associate Professor: California Polytechnic State University, San Luis Obispo, 2011-Present

Assistant Professor: California Polytechnic State University, San Luis Obispo, 2005 – 2011

PROFESSIONAL EXPERIENCE

Postdoctoral Researcher: Proteomics (Dr. Dietmar Kültz), University of California, Davis, 2003 – 2005

Postdoctoral Researcher: Biochemical adaptation (Dr. George Somero), Hopkins Marine Station, Stanford University, 1999 –2003

EDUCATION

Ph.D.: Oregon State University, Corvallis, Zoology, 1999 (Dr. George Somero)

MS, BS: University of Konstanz, Germany, Biology, 1995 (Dr. Meinhard Simon)

REFEERED PUBLICATIONS

- Diehl, J., Johnson, S. E., Xia, K., West, A. and **Tomanek, L. (in review)**: The distribution of 4-nonylphenol in marine organisms of North American Pacific Coast estuaries. *Chemosphere*.
- Fields, P. A., Zuzow, M. J. and **Tomanek, L. (in press)**: Comparative proteomics of blue mussel congeners (genus *Mytilus*) to temperature acclimation. *Journal of Experimental Biology*.
- Serafini, L., Hann, J. B., Kültz, D., and **Tomanek, L. (2011)**: The proteomic response of sea squirts (genus *Ciona*) to acute heat stress: a global perspective on the thermal stability of proteins. *Comparative Biochemistry and Physiology, Part D* 6, 322-334.
- **Tomanek, L.**, Zuzow, M. J., Ivanina, A. V., Beniash, E., and I. M. Sokolova (2011): Proteomic responses to elevated P_{CO2} level in eastern oysters, *Crassostrea virginica*: evidence for oxidative stress. *Journal of Experimental Biology* 214, 1836-1844.
- **Tomanek, L. (2011)**: Environmental proteomics: changes in the proteome of marine organisms in response to environmental stress, pollutants, infection, symbiosis and development. *Annual Review of Marine Sciences* 3, 373-399. CITATIONS: 3
- Campanale, J. J., **Tomanek, L.**, and N. Adams (2010): Exposure to ultraviolet radiation causes proteomic changes in embryos of the purple sea urchin, *Strongylocentrotus purpuratus*. *Journal of Experimental Marine Biology and Ecology* 397, 106-120. CITATIONS: 1
- Robinson, G. E., Banks, J. A., Padilla, D. K. et al., **Lars Tomanek (2010)**: Empowering 21st Century Biology. *BioScience* 60, 923-930. CITATIONS: 1
- **Tomanek, L.**, and M. Zuzow (2010): The proteomic response of the two mussel congeners *Mytilus galloprovincialis* and *M. trossulus* to acute heat stress: Implications for thermal limits and energetic costs of thermal stress. *Journal of Experimental Biology* 213, 3559-3574. CITATIONS: 6
- Mykles, D. L., Ghalambor, C. K., Stillman, J. H., and **Tomanek, L. (2010)**: Grand challenges in comparative physiology: Integration across disciplines and across levels of biological organization. *Integrative and Comparative Biology* 50, 6-16. CITATIONS: 0

- **Tomanek, L. (2010):** Review: Variation in the heat shock response and its implication for predicting the effect of global climate change on species' biogeographic distribution ranges and metabolic costs. *Journal of Experimental Biology* 213, 971-979. CITATIONS: **5**
- **Tomanek, L. (2008):** The importance of physiological limits in determining biogeographical range shifts due to global warming: the heat shock response. *Physiological and Biochemical Zoology*, 81, 709-717. CITATIONS: **24**
- Connolly, J. A., Oliver, M. J., Beaulieu, J. M., Knight, C. A., **Tomanek, L.**, and Moline, M. A. (2007). Correlated evolution of genome size and cell volume in diatoms (Bacillariophyceae). *Journal of Phycology* 4, 124-131. CITATIONS: **6**
- Harley, C. D. G., Hughes, A. R., Hultgren, K., Miner, B. G., Sorte, C. J. B., Thornber, C. S., Rodrigues, L. F., **Tomanek, L.**, and Williams, S. (2006). The impacts of climate change in coastal marine systems. *Ecology Letters* 9, 228-241. CITATIONS: **259**
- **Tomanek, L. (2005):** Two-dimensional gel analysis of the heat-shock response in marine snails (genus *Tegula*): interspecific variation in protein expression and acclimation ability. *Journal of Experimental Biology* 208, 3133 - 3143. CITATIONS: **23**
- **Tomanek, L.**, and E. Sanford (2003). Heat-shock protein 70 (Hsp70) as a biochemical stress indicator: an experimental field test in two congeneric intertidal gastropods (genus *Tegula*). *Biological Bulletin* 205, 276 - 284. CITATIONS: **41**
- **Tomanek, L.**, and Helmuth, B. (2002). Physiological ecology of rocky intertidal organisms: a synergy of concepts. *Integrative and Comparative Biology* 42, 771-775. CITATIONS: **4**
- **Tomanek, L. (2002).** The heat-shock response: its variation, regulation and ecological importance in intertidal gastropods (genus *Tegula*). *Integrative and Comparative Biology* 42, 797-807. CITATIONS: **6**
- **Tomanek, L.**, and Somero, G. N. (2002). Interspecific and acclimation-induced variation in levels of heat-shock protein 70 (hsp70) and 90 (hsp90) and heat-shock transcription factor-1 (HSF-1) in congeneric marine snails (genus *Tegula*): implications for regulation of *hsp* gene expression. *Journal of Experimental Biology* 205, 677-685. CITATIONS: **62**
- **Tomanek, L.**, and Somero, G. N. (2000). Time course and magnitude of synthesis of heat-shock proteins in congeneric marine snails (genus *Tegula*) from different tidal heights. *Physiological and Biochemical Zoology* 73, 249 – 256. CITATIONS: **61**
- **Tomanek, L.**, and Somero, G. N. (1999). Evolutionary and acclimation-induced variation in the heat-shock responses of congeneric marine snail species (genus *Tegula*) from different thermal habitats: implications for limits of thermotolerance and biogeography. *Journal of Experimental Biology* 202, 2925 - 2936. CITATIONS: **151**

POPULAR CONTRIBUTIONS TO PROFESSIONAL JOURNALS

Five contributions (since 2004) to the “Outside” section of the *Journal of Experimental Biology*.

PRESENTATIONS (INVITED LECTURES, 2005-PRESENT)

- **Franklin and Marshall College, Lancaster (2011):** Environmental stress proteomics in *Mytilus*.
- **University of California, Bodega Marine Laboratory (2011):** See above
- **Leibniz-Institute for Marine Science, Kiel (2011):** The biological effects of climate change – a mechanistic (proteomics) approach
- **Pollution Responses in Marine Organisms (PRIMO), Long Beach (2011):** See above
- **University of California, Davis (2011):** See above
- **University of Washington, Seattle (2010):** See above
- **Southern California Coastal Water Research Project (Costa Mesa, CA, 2010):** Proteomics as a tool to assess the biological effects of environmental stress and pollution.
- **Symposium on *Genomics and Proteomics Approaches to Understanding Environmental Stress* (American Physiological Society, Denver, 2010):** The role of oxidative stress in setting thermal tolerance limits: a proteomics approach.
- **Symposium on *Effects of Endocrine Disrupting Compounds in Estuaries* (Society for Environmental Toxicology and Chemistry, Berkeley, CA, 2010):** The ubiquitous distribution of nonylphenol in marine organisms in West Coast estuaries.
- **Symposium on *Biological Consequences of Global Change* (Experimental Biology, San Diego, 2010):** The costs of getting too hot: proteins that take the heat from global warming.
- **Symposium on *Emerging Contaminants in California's Coastal and Estuarine Ecosystems* (American Chemical Society, San Francisco, March 2010):** Ubiquitous distribution of alkylphenols: The next emerging wave of endocrine disruptors along coastal waters.
- **University of California, Santa Barbara (2010):** The ecological importance of the cellular stress response – a proteomics approach.
- **San Francisco State University, San Francisco (2009):** The proteomic response of marine emerging model organisms to thermal and oxidative stress.
- **Colorado State University, Fort Collins (2009):** Applying proteomics to study the response to environmental stress in emerging model organisms.
- **State of the San Francisco Estuary, Oakland (2009):** The ubiquitous distribution of alkylphenols: The next emerging wave of endocrine disruptors along coastal waters.
- **Session Opening Lecture at the Meeting of the European Society for Comparative Physiology and Biochemistry, Austria (2009):** The proteomic response of marine model and non-model organisms to thermal and oxidative stress.
- **Symposium on *Survival in a Changing World* by the Company of Biologists, Kyoto, Japan (2009):** Variation in the cellular stress response and its implications for the effect of global climate change.
- **Annual meeting of the Society for Experimental Biology, Symposium, Marseille, France (2008):** The proteome response to salinity and temperature stress in blue mussel (genus *Mytilus*) congeners.
- **California State University, Long Beach (2007):** Ecoproteomics: new approaches to tracking environmental change.
- **Stanford University (2007):** Proteomics: investigating the dynamics of the molecular phenotype.
- **Alfred-Wegener Institute for Polar Research, Bremerhaven, Germany (2007):** Environmental proteomics: investigating the dynamics of the molecular phenotype.
- **University of California, Davis (2005):** Stress proteins: evolutionary variation and ecological importance.
- **Harvey Mudd College (2005):** The stress response: its evolutionary variation and ecological importance.
- **California Polytechnic State University, San Luis Obispo (2005):** see above.

TEACHING EXPERIENCE

Courses taught as an Assistant Professor (faculty also teach the laboratory sections of their courses):

- *Introduction to Organismal Form and Function* (freshman-level, 2 labs per week, 6 sections), 2006-2010.
- *Principles of Physiology* (junior-level, 2 labs per week, 2 sections), 2006-2011.
- *Animal Physiology: Adaptations to the Environment* (graduate level, 1 lab per week), 2007-2009.
- Graduate seminar on “*Philosophy of Biology: Darwin’s Dangerous Idea*”, 2006-2007, 2010.
- Graduate seminar on “*Evolutionary Genomics and Proteomics*”, 2008.
- Graduate seminar on “*Environmental OMICS*”, 2012.

Lecturer:

- Applied biology for designers and artists, California College of the Arts, San Francisco, 2004/05

Graduate Student Advising:

- Research of **four Masters-level graduate** students has resulted in **11 abstracts** to professional meetings over the last few years, **two publications** and **six publications in preparation**. Students trained in proteomics got jobs in mass spectrometry facilities (Lab Manager at John Hopkins University; UC San Francisco) or as senior research associates in biotechnology companies (Gilead, BioRad). I co-advised and trained four additional MS-level graduate students involved in collaborations with our laboratory.

Undergraduate Student Advising:

- Research of **24 undergraduate students** in my laboratory has resulted in **18 abstracts** to professional conferences over the last six years. Mentoring undergraduates has been a major focus of my research program at Cal Poly. Most undergraduates learn the entire proteomic workflow, including mass spectrometry and bioinformatic analysis of the data. This is a unique teaching opportunity for undergraduates in the USA.

GRANTS (ONLY FUNDED ONES, SINCE 2005: TOTAL \$1,505,088; \$948,032 FROM NSF)

Details available upon request

SERVICE

REVIEWER (SELECTION)

Journals

American Journal of Physiology	Journal of Comparative Biology
American Naturalist	Journal of Experimental Marine Biology and Ecology
Animal Genetics	Journal of Proteome Research
Aquatic Toxicology	Journal of Thermal Biology
Biological Journal of the Linnean Society	Marine Biology
Biological Bulletin	Marine Ecology Progress Series
Comparative Physiology and Biochemistry	Oecologia
Ecology Letters	Pesticide Biochemistry and Physiology
Ecosystems	Physiological and Biochemical Zoology
Functional Ecology	PLoS One
Functional Genomics and Proteomics	Proc. of the National Academy of Sciences USA
Global Change Biology	Proteomics
Journal of Experimental Biology	Proteome Science

Granting agencies

National Science Foundation (**25 grants**)
National Sea Grant Program (one grant)
California State University Program for Education and Research in Biotechnology (CSUPERB)

Textbooks

Berg, Tymoczko and Stryer: Biochemistry (6th edition)
Hill, Wyse and Anderson: Animal Physiology (2009; 2nd edition)

SYMPOSIA ORGANIZED

- **Physiological ecology of rocky intertidal organisms: from molecules to ecosystems**, 2002 Annual Meeting of the Society for Integrative and Comparative Biology, Anaheim, California, 2002 (with Dr. Brian Helmuth); supported by NSF grant 0131317.
- **Temperature-dependent biogeography of aquatic ectotherms: from genes to the effects of climate change**, 2004 Annual Meeting of the German Zoological Society, Rostock (with Dr. Hans-Otto Pörtner).
- **Cross-tolerance towards environmental stress: molecular mechanisms and ecological case studies**, 2008 Annual Meeting of the Society for Experimental Biology, Marseille, France (with Dr. Hans-Otto Pörtner).
- **Comparative proteomics of environmental and pollution stress**, 2012 Annual Meeting of the Society for Integrative and Comparative Biology, Charleston, South Carolina.

COLLABORATIONS (PAST AND PRESENT, SINCE 2005)

- Dr. George Somero, Hopkins Marine Station, Stanford University (Collaborative NSF research grant 2007-2010).
- Dr. Jonathon Stillman, San Francisco State University, COAST grant (2009), NSF (2010-2013).
- Dr. Peter Fields, Franklin and Marshall College, Lancaster, PA (sabbatical stay in our laboratory January to May 2008; see **Fields et al., in press**).
- Dr. Alexa Tullis, University of Puget Sound, Tacoma, WA (sabbatical stay in our laboratory, September 2009 – April 2010).
- Dr. Anne Todgham, San Francisco State Univ. (limpet proteomics, 2010-ongoing)
- Dr. Bengt Allen, San Francisco State Univ. (limpet proteomics, 2010-ongoing)
- Dr. Donald Mykles, Colorado State University, Fort Collins, NSF collaborative grant proposals.
- Dr. Inna Sokolova, University of North Carolina at Charlotte (ocean acidification experiment, see **Tomanek et al. 2011**).
- Dr. Nikki Adams, Cal Poly (effect of UV-radiation on sea urchin embryos, see **Campanale et al. 2010**).
- Dr. Ken Hillers, Cal Poly (*C. elegans* proteomics, 2005-ongoing).
- Rafael Jimenez-Flores, Cal Poly (mass spectrometry of milk proteins, ongoing).
- Dr. Dan Peterson, Cal Poly (bovine mammary gland proteomics, 2008-ongoing)
- Dr. Pat Fidopiastis, Cal Poly (*Vibrio* proteomics, 2010-ongoing)
- Dr. Dean Wendt, Cal Poly (barnacle cement proteomics, 2008-ongoing)

COLLABORATIONS WITH INDUSTRY AND NON-PROFIT ORGANIZATIONS

- **Biomimicry Guild**: A product development project for a Fortune500 company with the goal to mimic nature's design solutions, 2004.
- **BioRad**: Collaboration with a biotechnology company, a leader in electrophoresis and proteomics, 2005-2009.

SERVICE ON THE LEVEL OF THE DEPARTMENT AND THE LOCAL ACADEMIC COMMUNITY (SELECTION)

- Organization of the Department Seminar Series (2005-2011)
- Faculty Hiring Committee (2006-07, 2007-08, 2011-2012)
- Member of Personal Committee (since 2011)
- Member of the Graduate Curriculum Committee (2005-2011)
- Member of the Marine Steering Committee (2005-present)
- Member of the Science Advisory Board of the Morro Bay SLOSEA (San Luis Obispo Science and Ecosystem Alliance) project (2005-2011)

AWARDS AND HONORS

- Scholander Award Finalist (American Physiological Society, 2002)
- Dr. Earl H. Myers and Ethel M. Myers Grant for Oceanographic and Marine Biology, 1997
- Scholar of the Studienstiftung des deutschen Volkes – German Academic National Foundation (given to the top 0.3% of the students in Germany), 1989-1994.