

# Brent L. Lockwood

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## EDUCATION

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- 2011 Ph.D., Biological Sciences, Stanford University  
2002 B.S., Ecology, Behavior, and Evolution, University of California, San Diego  
2002 B.A., Archaeological Anthropology, University of California, San Diego

## PROFESSIONAL EXPERIENCE

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- 2020 - now Associate Professor, Department of Biology, University of Vermont  
2014 - 2020 Assistant Professor, Department of Biology, University of Vermont  
2011 - 2014 National Institutes of Health Postdoctoral Fellow, Indiana University  
2003 - 2005 Research Technician, Dept. Biopharm. Sci., UC San Francisco

## GRANTS & FELLOWSHIPS

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- 2018 - 2023 National Science Foundation, CAREER: "Genomic, transcriptomic, and developmental drivers of thermal adaptation among natural populations of *Drosophila*," **B.L. Lockwood** (PI), \$1,054,119  
2018 - 2022 National Science Foundation, RII Track-2 FEC: "From Genome to Phenome in a Stressful World: Epigenetic regulatory mechanisms mediating thermal plasticity in *Drosophila*," S.H. Cahan (PI), S. Fietze (Co-PI), N. Teets (Co-PI), H. Axen (Co-PI), J. Waters (Co-PI), **B.L. Lockwood** (Co-I), \$4,771,722  
2017 - 2021 National Science Foundation, RII Track-2 FEC: "Using biophysical protein models to map genetic variation to phenotypes," F.M. Ytreberg (PI), C. Miller (Co-PI), D.M. Weinreich (Co-PI), **B.L. Lockwood** (Co-PI), \$6,000,000  
2011 - 2014 National Institutes of Health, NRSA Postdoctoral Fellowship, \$143,670  
2006 - 2009 National Science Foundation, Graduate Research Fellowship, \$121,500

## PUBLICATIONS

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### **Journal Articles:**

Mikucki EE, **Lockwood BL**. Local thermal environment and warming influence supercooling and drive widespread shifts in the metabolome of diapausing *Pieris rapae* butterflies. *Journal of Experimental Biology*. In Press.

Lecheta MC, Awde DN, O'Leary T, Unfried LN, Jacobs NA, Whitlock MH, McCabe E, Powers B, Bora K, Waters JS, Axen HJ, Fietze S, **Lockwood BL**, Teets NM, Helms Cahan S. 2020. Integrating GWAS and transcriptomics to identify the molecular underpinnings of thermal stress responses in *Drosophila melanogaster*. *Frontiers in Genetics* 11, 658.

Gupta T, Howe SE, Zorman ML, **Lockwood BL**. 2019. Aggression and discrimination among closely versus distantly related species of *Drosophila*. *Royal Society Open Science* 6, 190069.

Carra S, Alberti S, Benesch JLP, Boelens W, Buchner J, Carver JA, Cecconi C, Ecroyd H, Gusev N, Hightower LE, Klevit RE, Lee HO, Liberek K, **Lockwood B**, Poletti A, Timmerman V, Toth ME, Vierling E, Wu T, Tanguay RM. 2019. Small heat shock proteins: multifaceted proteins with important implications for life. *Cell Stress and Chaperones* 24(2), 295-308.

**Lockwood BL**, Gupta T., Scavotto R. 2018. Disparate patterns of thermal adaptation between life stages in temperate vs. tropical *Drosophila melanogaster*. *Journal of Evolutionary Biology* 31, 323-331.

**Lockwood BL**, Julick CR, Montooth KL. 2017. Maternal loading of a small heat shock protein increases embryo thermal tolerance in *Drosophila melanogaster*. *Journal of Experimental Biology* 220, 4492-4501.

German DP, Foti DM, Heras J, Amerkhanian H, and **Lockwood BL**. 2016. Elevated gene copy number does not always explain elevated amylase activities in fishes. *Physiological and Biochemical Zoology* 89, 277-293.

**Lockwood BL**, Connor KM, and Gracey AY. 2015. The environmentally tuned transcriptomes of *Mytilus* mussels. *Journal of Experimental Biology* 218, 1822-1833.

**Lockwood BL** and Somero GN. 2012. Functional determinants of temperature adaptation in enzymes of cold- vs. warm-adapted mussels (genus *Mytilus*). *Molecular Biology and Evolution* 29, 3061-3070.

**Lockwood BL** and Somero GN. 2011. Invasive and native blue mussels (genus *Mytilus*) on the California coast: the role of physiology in a biological invasion. *Journal of Experimental Marine Biology and Ecology* 400, 167-174.

**Lockwood BL** and Somero GN. 2011. Transcriptomic responses to salinity stress in invasive and native blue mussels (genus: *Mytilus*). *Molecular Ecology* 20, 517-529.

**Lockwood BL**, Sanders JG, and Somero GN. 2010. Transcriptomic responses to acute heat stress in invasive and native blue mussels (genus: *Mytilus*): molecular correlates of invasive success. *Journal of Experimental Biology* 213, 3548-3558.

Denny MW, **Lockwood BL**, and Somero GN. 2009. Can the giant snake predict palaeoclimate? *Nature* 460, E3-E4.

Peng J, Wagle M, Mueller T, Mathur P, **Lockwood BL**, Bretaud S, and Guo S. 2009. Ethanol-modulated camouflage response screen in zebrafish uncovers a novel role for cAMP and extracellular signal-regulated kinase signaling in behavioral sensitivity to ethanol. *Journal of Neuroscience* 29, 8408-8418.

Bretaud S, Li Q, **Lockwood BL**, Lau B, Lin E, and Guo S. 2007. A choice behavior for morphine reveals experience-dependent drug preference and underlying neural substrates in developing larval zebrafish. *Neuroscience* 146, 1109-1116.

**Lockwood B**, Bjerke S, Kobayashi K, and Guo S. 2004. Acute effects of alcohol on larval zebrafish: a genetic system for large-scale screening. *Pharmacology, Biochemistry and Behavior* 77, 647-654.

### **Books:**

Somero GN, **Lockwood BL**, and Tomanek L. 2017. *Biochemical Adaptation: Response to Environmental Challenges from Life's Origins to the Anthropocene*. Sinauer Associates, Inc. Sunderland, MA.

## **TEACHING**

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### **Professor:**

2019 - now BIOL 256, Physiology of Global Change, U Vermont  
2017 - now BIOL 295, Field Marine Biology, Hurricane Island, Maine, U Vermont  
2015 - now BIOL 255, Comparative Physiology, U Vermont  
2015 - 2017 BIOL 225, Physiological Ecology, U Vermont  
2017 BIOL 371B, Molecular Adaptation, U Vermont  
2016 BIOL 371A, Sensory Systems and Hormones, Co-Instructor with Dr. Rona Delay, U Vermont

2015 BIOL 296B, Investigations in Physiological Ecology, U Vermont

**Guest Lecturer:**

- 2011 Mussels and microarrays: environmental physiology of invasive vs. native mussels (genus *Mytilus*) on the California coast  
Course: Environmental Biomechanics, Physiology, and Genomics of Marine Species, Professors: Dr. Stephen R. Palumbi, Dr. Mark W. Denny, and Dr. George N. Somero, Stanford University
- 2010 Transcriptomic approaches to the study of ecological physiology  
Course: Ecological and Evolutionary Physiology, Professor: Dr. George N. Somero, Stanford University
- 2007 Introduction to intertidal ecology and experimental design  
Course: Marine Ecology, Professor: Dr. Fiorenza Micheli, Stanford University

**Teaching Assistant:**

- 2009 Course: Plant Biology, Evolutionary Biology, and Ecology, Professors: Dr. Mark W. Denny, Dr. Stephen R. Palumbi, and Dr. James Watanabe, Stanford University
- 2007 Course: Problems in Ecological and Evolutionary Physiology, Professor: Dr. George N. Somero, Stanford University
- 2007 Course: Marine Ecology, Professor: Dr. Fiorenza Micheli, Stanford University
- 2006 Course: Plant Biology, Evolutionary Biology, and Ecology, Professors: Dr. Mary Beth Mudgett, Dr. Dmitri A. Petrov, and Dr. Deborah Gordon, Stanford University

**MENTORSHIP**

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**As a Professor:**

- 2021 Isha Chauhan, Undergraduate summer research
- 2021 Lauren Clark, Undergraduate summer research
- 2019 - now Thomas O'Leary, PhD student
- 2019 - now Kylie Finnegan, Masters student
- 2019 - now Sumaetee Tangwancharoen, Postdoctoral associate
- 2019 - 2021 Neel Patel, Undergraduate honors thesis
- 2019 - 2021 Shervin Razavi, Undergraduate honors thesis
- 2019 - 2020 Gretchen Thompson, Undergraduate honors thesis
- 2018 - 2019 Ana Manuelian, Undergraduate honors thesis
- 2018 - 2019 Ona Ambrozaite, Undergraduate research
- 2018 - 2019 Caity DeCara, Undergraduate independent research
- 2017 - 2018 Jordyn Chace, Undergraduate honors thesis
- 2017 - 2018 Lily Keats, Undergraduate research
- 2017 - 2018 Grace Seta, Undergraduate research
- 2016 - 2017 Marlo Zorman, Undergraduate research
- 2016 - 2018 Tarun Gupta, Postdoctoral associate
- 2016 - 2016 Sandra Walser, Undergraduate research
- 2015 - now Emily Mikucki, PhD student (defended 2020) and Postdoc associate
- 2015 - 2016 Rosemary Scavotto, Research technician
- 2015 - 2017 Sarah Howe, Undergraduate research and post-grad technician
- 2014 - 2016 Marissa Ng, Undergraduate honors thesis
- 2014 - 2016 Gurkiranjit Rattu, Undergraduate honors thesis

**As a Postdoc:**

- 2013 Michael Bruner, High school student independent project, Indiana University
- 2012 Nathan Byrd, Undergraduate independent project, Indiana University

**As a Graduate Student:**

- 2009 Lauren Linsmayer, Undergraduate honors thesis, Stanford University

- 2008 Rachel Friedman, Undergraduate independent project, Stanford University  
 2007 Laura McDonald, Undergraduate independent project, Stanford University  
 2007 Andrew Wicklund, Undergraduate independent project, Stanford University

**Thesis Committees:**

- 2021 Jessica Wright, Undergraduate honors thesis, Dept. of Biology, U Vermont  
 2021 Andrew Stoloff, Undergraduate honors thesis, Dept. of Biology, U Vermont  
 2021 Anneke LaPosta, Undergraduate honors thesis, Dept. of Biology, U Vermont  
 2020 - now Csenge Petak, Dissertation, Dept. of Biology, U Vermont  
 2020 - now Benjamin Camber, Dissertation, Dept. of Biology, U Vermont  
 2020 - now Helaina Stergas, Dissertation, Dept. of Biology, U Vermont  
 2020 Jhanavi Kapadia, Undergraduate honors thesis, Dept. of Biology, U Vermont  
 2020 Chelsea Darwin, Undergraduate honors thesis, Dept. of Biology, U Vermont  
 2019 - now Erika Bueno, Dissertation, Dept. of Plant and Soil Sciences, U Vermont  
 2018 - 2020 Emily Shore, Masters, Dept. of Biology, U Vermont  
 2016 - 2018 Brendan Chandler, Masters, Dept. of Biology, U Vermont  
 2018 Julia Cline, Undergraduate honors thesis, Dept. of Biology, U Vermont  
 2016 - 2017 Amanda Rasming-Lund, Undergraduate honors thesis, Rubenstein, U Vermont  
 2016 - 2020 April Garrett, Dissertation, Dept. of Biology, U Vermont  
 2016 - 2019 Ashley Waldron, Dissertation, Dept. of Biology, U Vermont  
 2016 Elizabeth White, Undergraduate honors thesis, Dept. Biology, U Vermont  
 2014 - now Trevor Gearhart, Dissertation, Dept. of Biology, U Vermont  
 2014 - now Emily Price, Dissertation, Dept. of Biology, U Vermont  
 2014 - now Ravi Nagori, Masters, Dept. of Biology, U Vermont  
 2014 - 2018 Chase Stratton, Dissertation, Dept. of Plant and Soil Sciences, U Vermont  
 2014 - 2017 Andrew Nguyen, Dissertation, Dept. of Biology, U Vermont

**HONORS & AWARDS**

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- 2021 University of Vermont, College of Arts and Sciences Grant for Anti-racist Curricular Development, \$1,000  
 2010 Jane Miller Scholars Award, \$1000  
 2010 Best Poster, Runner-up, American Physiological Society Intersociety Meeting  
 2009 Friends of Hopkins Scholar Award, \$1000  
 2008 Dr. Earl H. and Ethel M. Myers Oceanographic and Marine Biology Trust, \$2000  
 2006 Stanford University Excellence in Teaching Award  
 1997 - 2001 National Alliance for Scholastic Achievement Award, \$15,000

**UNIVERSITY & PROFESSIONAL SERVICE**

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- 2021 Organizer of faculty workshop on Anti-racism featuring Dr. Brandon Ogbunu of Yale Univ., U Vermont  
 2020 Department of Biology Chair Five-year Review Committee, U Vermont  
 2018 - now Academic Affairs Committee Chair, Department of Biology, U Vermont  
 2018 - 2019 Department of Chemistry Chair Five-year Review Committee, U Vermont  
 2018 - 2019 College of Arts and Sciences Honors Committee, University of Vermont  
 2015 - 2018 Academic Affairs Committee member, Department of Biology, U Vermont  
 2014 - now Member of the Graduate College, U Vermont  
 2007 - 2008 Elected officer, Hopkins Marine Station Graduate Student Organization. Stanford University.  
 2000 Co-organizer for the 20th International Conference on Science and Social Responsibility. Student Pugwash USA. San Diego, CA.

**Society Memberships:**

Society for Integrative and Comparative Biology, Genetics Society of America, Society for the Study of Evolution, European Society for Evolutionary Biology

**Peer Reviewer:**

*Proceedings of the National Academy of Sciences USA, PLoS Biology, Ecology, Proceedings of the Royal Society B - Biology, Ecology, Evolution, Global Change Biology, Molecular Biology and Evolution, Evolutionary Applications, Molecular Ecology, Journal of Experimental Biology, Genome Biology and Evolution, PLoS One, Marine Biology, Comparative Physiology and Biochemistry, Cells Stress and Chaperones, International Journal of Molecular Sciences, Biological Invasions, Behavioural Brain Research*

**SEMINARS & PRESENTATIONS**

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**Invited:**

- 2019 **Lockwood BL.** “Genetic and physiological mechanisms of response to environmental change.” Departmental Seminar, Department of Biology, Western University of Ontario.
- 2019 **Lockwood BL.** “Integrating genetics and physiology to gain insights into species responses to environmental change.” Marvin Seminar, Department of Plant Biology, University of Vermont.
- 2018 **Lockwood BL.** “Integrating genetics and physiology to gain insights into species responses to environmental change.” Departmental seminar, Biology Department, Boston College.
- 2018 **Lockwood BL.** “Integrating genetics and physiology to gain insights into species responses to environmental change.” Departmental seminar, School of Marine Sciences, University of Maine.
- 2018 **Lockwood BL.** “Small heat shock proteins in ectotherms: response to environmental challenges across generations and through evolutionary time.” Cell Stress Society International Workshop on Small Heat Shock Proteins, Quebec City, Canada.
- 2014 **Lockwood BL.** “Unity in diversity: What can we learn from transcriptomics studies in *Mytilus* mussels?” Symposium on Biochemical Adaptation, Hopkins Marine Station, Stanford University.
- 2014 **Lockwood BL.** “Mechanisms of temperature adaptation in the sea and on land.” Departmental seminar, Dept. of Biology, University of Vermont.
- 2013 **Lockwood BL.** “Mechanisms of temperature adaptation in the sea and on land.” Departmental seminar, Dept. of Biology, Sewanee, The University of the South.
- 2013 **Lockwood BL.** “Mechanisms of temperature adaptation in the sea and on land.” Departmental seminar, Dept. of Biology, Sonoma State University.
- 2010 **Lockwood BL.** “Molecular physiological determinants of biogeography in invasive vs. native mussel species.” Dept. of Systems Biology, Harvard Medical School.

**Contributed:**

- 2020 Awde DN, Lecheta MC, Unfried LN, Jacobs NA, Powers B, Bora K, Waters JS, Axen HJ, Fietze SE, **Lockwood BL**, Helms Cahan S, Teets NM. “Genetic mechanisms of basal thermal tolerance in *Drosophila melanogaster*,” Society for Integrative and Comparative Biology Annual Meeting, Austin, TX.
- 2020 Helms Cahan S, Fietze SE, Gerrard DL, Bora K, Kaplan I, Perez M, **Lockwood BL**, Teets NM, Waters JK, Axen HJ. “Developmental temperature alters brain gene expression in adult *Drosophila melanogaster*,” Society for Integrative and Comparative Biology Annual Meeting, Austin, TX.
- 2020 Mikucki EE, Buchanan J, Julick CR, Montooth KL, and **Lockwood BL.** “The effects of winter warming stress on metabolic activity in diapausing *Pieris rapae* butterflies,” Society for Integrative and Comparative Biology Annual Meeting, Austin, TX.

- 2019 Mickucki EE and **Lockwood BL**. "Winter warming threatens cold tolerance and survival in diapausing *Pieris rapae* butterflies," Society for Integrative and Comparative Biology Annual Meeting, Tampa, FL.
- 2018 Gupta T, Howe SE, Zorman ML, **Lockwood BL**. "Aggression among *Drosophila* species is driven by reproductive competition." Annual *Drosophila* Research Conference, Genetics Society of America.
- 2018 **Lockwood BL**, Gupta T, and Scavotto R. "Disparate patterns of thermal adaptation between life stages in temperate vs. tropical *Drosophila melanogaster*." Society for Integrative and Comparative Biology Annual Meeting.
- 2017 **Lockwood BL** and Gupta T. "Molecular targets of thermal stress during early development in *Drosophila melanogaster*." Society for Integrative and Comparative Biology Annual Meeting.
- 2016 **Lockwood BL** and Scavotto R. "Natural variation in embryonic thermal tolerance among populations of *Drosophila melanogaster* along a thermal gradient." Society for Integrative and Comparative Biology Annual Meeting.
- 2014 **Lockwood BL** and Montooth KL. "Heat stress disrupts key events in early embryonic development." Annual *Drosophila* Research Conference, Genetics Society of America.
- 2014 **Lockwood BL** and Montooth KL. "The consequences of thermal stress on early embryonic development: from cells to the whole-organism." Society for Integrative and Comparative Biology Annual Meeting.
- 2013 **Lockwood BL** and Montooth KL. "The effects of thermal stress on embryonic development: from cellular defects to whole-organism survival." Annual *Drosophila* Research Conference, Genetics Society of America.
- 2013 **Lockwood BL** and Montooth KL. "Coping with stress: the cellular maintenance of embryonic development." Society for Integrative and Comparative Biology Annual Meeting.
- 2011 **Lockwood BL** and Somero GN. "Temperature adaptation of orthologous enzymes correlates with biogeographic distributions of invasive vs. native marine mussels (genus *Mytilus*) on the California coast." Evolution Annual Meeting.
- 2010 **Lockwood BL** and Somero GN. "Effects of acute temperature and salinity stresses on the transcriptomes of invasive and native mussel species (genus *Mytilus*)." American Physiological Society Intersociety Meeting: Global Change and Global Science Comparative Physiology in a Changing World. Best Poster Runner-up
- 2010 **Lockwood BL**, Sanders JG, and Somero GN. "Transcriptomic responses to heat-stress reveal the molecular basis for the success of invasive mussels." Society for Integrative and Comparative Biology Annual Meeting.
- 2009 **Lockwood BL** and Somero GN. "Differences in transcriptomic responses to heat-stress in native and invasive blue mussels (genus: *Mytilus*): molecular correlates of invasive success." Western Society of Naturalists Annual Meeting.
- 2007 **Lockwood BL** and Somero GN. "Enzyme activities of the blue mussels, *Mytilus trossulus* and *M. galloprovincialis*, indicate differential temperature adaptation." Partnership for Interdisciplinary Studies of Coastal Oceans Scientific Symposium.
- 2007 **Lockwood BL** and Somero GN. "Enzyme activities of the blue mussels, *Mytilus trossulus* and *M. galloprovincialis*, indicate differential temperature adaptation." Western Society of Naturalists Annual Meeting.
- 2007 **Lockwood BL** and Somero GN. "PAML identifies amino acid sites that are critical for temperature adaptation in orthologous enzymes." Society for Molecular Biology and Evolution Annual Meeting.
- 2006 **Lockwood BL** and Somero GN. "Temperature adaptation in cytosolic malate dehydrogenase (cMDH) in blue mussels." Western Society of Naturalists Annual Meeting.

- 2003 **Lockwood B**, Bjerke S, Kobayashi K, and Guo S. "Acute effects of alcohol on larval zebrafish: a genetic system for large-scale screening." West-Coast Regional Zebrafish Conference.
- 2002 **Lockwood BL**. "Sex-ratio evolution in a population of dark-eyed juncos (*Junco hyemalis thurberi*) at UC San Diego." Undergraduate Research Symposium, University of California, San Diego.