Brent L. Lockwood

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EDUCATION

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

2025 - now Chair of the Department of Biology, University of Vermont
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

2023 - 2027 Australian Research Council, Discovery Project Grants, "Some like it hot: invasive species, hybridisation, and a warming world," C. Riginos (CI), C. Sherman (CI), N. Bierne (CI), R. Ellis (CI), **B.L. Lockwood** (CI), $593,157 AUD
2018 - 2025 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. Frietze (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

Lockwood Lab trainees are underlined.

Journal Articles:

Mikucki EE, Julick C, Buchanan JL, Montooth KL, **Lockwood BL**. 2025. Thermal effects on metabolic rate in diapausing *Pieris rapae* butterflies. *Current Research in Insect Science*. 7, 100111.

Mikucki EE, O'Leary TS, **Lockwood BL**. 2024. Heat tolerance, oxidative stress response tuning, and robust gene activation in early-stage *Drosophila melanogaster* embryos. *Proceedings of the Royal Society B.* 291, 20240973.

Mikucki EE, **Lockwood BL**. 2021. Local thermal environment and warming influence supercooling and drive widespread shifts in the metabolome of diapausing *Pieris rapae* butterflies. *Journal of Experimental Biology* 224(22), jeb243118.

Lecheta MC, Awde DN, O'Leary T, Unfried LN, Jacobs NA, Whitlock MH, Mccabe E, Powers B, Bora K, Waters JS, Axen HJ, Frietze 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

Professor:

2025 - now	CAS 1720, Extraterrestrial Life, 3-credit interdisciplinary undergraduate course between faculty in Biology, Geosciences, English, and Philosophy
2019 - now	BIOL 4410, Physiology of Global Change, 4-credit CURE
2015 - now	BIOL 4405, Comparative Physiology, 4-credit undergraduate capstone
2021 - 2024	BIOL 1075, First-year Zoology Seminar, 1-credit undergraduate seminar
2015 - 2017	BIOL 225, Physiological Ecology, 3-credit undergraduate course
2017	BIOL 371B, Molecular Adaptation, 2-credit graduate seminar
2017	BIOL 295, Field Marine Biology, Hurricane Island, Maine, 4-credit undergraduate field research course
2016	BIOL 371A, Sensory Systems and Hormones, Co-Instructor with Dr. Rona Delay, 2-credit graduate seminar
2015	BIOL 296B, Investigations in Physiological Ecology, 1-credit undergraduate seminar

Guest Lecturer:

2019 - 2020	BIOL 199, Introduction to Marine Science, U Vermont

MENTORSHIP

Postdocs:

2020 - 2022	Emily Mikucki - Ecological genomics of fruit fly embryogenesis - now Faculty at U Vermont
2019 - 2021	Sumaetee Tangwancharoen - Evolutionary genomics of fruit fly heat tolerance - now Faculty at Chulalongkorn University, Thailand
2016 - 2018	Tarun Gupta - Evolution of fruit fly aggression behavior, developmental physiology of heat stress - now a Senior Data Scientist at Bank of Montreal, Canada

Graduate Students:

2023 - now	Gwen Ellis, Dissertation, Ecological genetics of amphibian disease
2023 - now	Emily Dombrowski, Dissertation, Ecological genomics and physiology of Australian marine mussels
2019 - now	Thomas O'Leary, Dissertation, Ecological genomics and developmental physiology of fruit flies
2019 - 2024	Kylie Finnegan, Masters, Ecological genomics of fruit fly embryogenesis
2015 - 2020	Emily Mikucki, Dissertation, Ecological physiology and genomics of insects

Undergraduate Honors College Theses and Independent Research:

2024 - now	Olin King, Honors thesis, Genomics of heat tolerance
2023 - now	Eliza Bufferd, Honors thesis, Genomics of heat tolerance

2022 - 2023 Toni Nakatsugawa, Independent project, Trans-generational plasticity of heat tolerance
2021 Isha Chauhan, NSF summer intern, Adaptation of fruit fly heat tolerance
2021 Lauren Clark, NSF summer intern, Adaptation of fruit fly heat tolerance
2019 - 2021 Neel Patel, Honors thesis, Thermal plasticity of mitochondrial membranes
2019 - 2021 Shervin Razavi, Honors thesis, Computational analysis of enzyme structures
2019 - 2020 Gretchen Thompson, Honors thesis, Temperature adaptation of enzyme biochemistry
2018 - 2019 Ana Manuelian, Honors thesis,
2018 - 2019 Caity DeCara, Independent project, Fruit fly cold tolerance
2017 - 2018 Jordyn Chace, Honors thesis, Environmental physiology of corals
2016 - 2017 Marlo Zorman, Independent project, Evolution of fruit fly aggression behavior
2015 - 2017 Sarah Howe, Independent project and post-grad technician, Fruit fly embryonic heat tolerance
2014 - 2016 Marissa Ng, Honors thesis, Thermal plasticity of aquatic mussels
2014 - 2016 Gurkiranjit Rattu, Honors thesis, Role of endoplasmic reticulum stress in asthma
2012 Nathan Byrd, Independent project, Indiana University
2009 Lauren Linsmayer, Honors thesis, Stanford University
2008 Rachel Friedman, Independent project, Stanford University
2007 Laura McDonald, Independent project, Stanford University
2007 Andrew Wicklund, Independent project, Stanford University

Undergraduate Research Assistants:

2022 - 2023 Aly Rodger, Research volunteer
2018 - 2019 Ona Ambrozaite, Research volunteer
2017 - 2018 Lily Keats, Research volunteer
2017 - 2018 Grace Seta, Research volunteer
2016 - 2016 Sandra Walser, Research volunteer

High School Student:

2013 Michael Bruner, Independent project, Indiana University

Graduate Student Committees:

2022 - now Andrew McCracken, Dissertation, Dept. of Biology, U Vermont
2022 - now Daniel Munteanu, Dissertation, Dept. of Biology, U Vermont
2022 - now Blair Christensen, Dissertation, Dept. of Plant and Soil Sciences, U Vermont
2022 Lauren Ashlock, Dissertation, Dept. of Biology, U Vermont
2021 - now George Ni, Dissertation, Dept. of Biology, U Vermont
2020 - now Alison Hall, Dissertation, 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 - 2023 Helaina Stergas, Dissertation, Dept. of Biology, U Vermont
2019 - 2023 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
2016 - 2020 April Garrett, Dissertation, Dept. of Biology, U Vermont
2016 - 2019 Ashley Waldron, Dissertation, Dept. of Biology, U Vermont
2014 - 2020 Trevor Gearhart, Dissertation, Dept. of Biology, U Vermont
2014 - 2022 Emily Price, Dissertation, Dept. of Biology, U Vermont
2014 - 2022 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

Undergraduate Student Committees:

2024 Aly Rodger, Honors thesis, Dept. of Biology, U Vermont
2023 Olivia Budington, Honors thesis, Dept. of Molecular Physiology and Biophysics, U Vermont
2023 Eamonn Heney, Honors thesis, Dept. of Biomedical and Health Sciences, U Vermont
2023 Marlana Winschel, Honors thesis, Dept. of Surgery, U Vermont
2021 Jessica Wright, Honors thesis, Dept. of Biology, U Vermont
2021 Andrew Stoloff, Honors thesis, Dept. of Biology, U Vermont
2021 Anneke LaPosta, Honors thesis, Dept. of Biology, U Vermont
2020 Jhanavi Kapadia, Honors thesis, Dept. of Biology, U Vermont
2020 Chelsea Darwin, Honors thesis, Dept. of Biology, U Vermont
2018 Julia Cline, Honors thesis, Dept. of Biology, U Vermont
2016 - 2017 Amanda Rasming-Lund, Honors thesis, Rubenstein, U Vermont
2016 Elizabeth White, Honors thesis, Dept. Biology, U Vermont

HONORS & AWARDS

2021 University of Vermont, College of Arts and Sciences Grant for Inclusive Excellence 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

2025 - now Chair of the Department of Biology, U Vermont
2022 - now Member of the Faculty Senate
2014 - now Member of the Graduate College, U Vermont
2025 - 2025 Member of the College of Arts and Sciences Faculty Standards Committee
2024 - 2025 Chair of Faculty Affairs Committee, Department of Biology, U Vermont
2023 Chair of Dept. of Biology faculty search committee
2022 College of Arts and Sciences Diversity Equity and Inclusion Strategic Planning Committee
2022 - 2024 Academic Affairs Committee Co-Chair, Department of Biology, U Vermont
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 - 2021 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
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, Society of Experimental 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

Invited:

2024 **Lockwood BL**. "Adaptive developmental physiology: How embryos survive in a variable environment." Departmental Seminar, Department of Biology, Pomona College, California.

2024 **Lockwood BL**. "Developmental physiological insights into how embryos survive in a variable environment." Departmental Seminar, Marine Ecology Group, GEOMAR Helmholtz Centre for Ocean Research, Kiel, Germany.

2023 **Lockwood BL**, T O'Leary, E Mikucki, S Tangwancharoen, S Helms Cahan, and S Frietze. "Single-nuclei multiome ATAC and RNA sequencing reveals the molecular basis of thermal acclimation in *Drosophila melanogaster* embryos." Symposium on Epigenetics, Entomological Society of America, National Harbor, Maryland.

2022 **Lockwood BL**. "Genetic and physiological mechanisms of response to environmental change." Departmental Seminar, School of Biological Sciences, University of Queensland, Australia.

2019 **Lockwood BL**. "Genetic and physiological mechanisms of response to environmental change." Departmental Seminar, Department of Biology, Western University of Ontario, Canada.

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:

2024 **Lockwood BL**, T O'Leary, E Mikucki, S Tangwancharoen, S Helms Cahan, and S Frietze. “Single-nuclei multiome ATAC and RNA sequencing reveals the molecular basis of thermal acclimation in *Drosophila melanogaster* embryos.” Society for Experimental Biology Annual Meeting, Prague, Czech Republic.

2024 Finnegan K, **Lockwood BL**. “Gene regulatory targets of selection for enhanced heat tolerance in *Drosophila melanogaster* embryos,” Allied Genetics Conference, Genetics Society of America, National Harbor, MD.

2022 Tangwancharoen S, **Lockwood BL**. “The quantitative genetic basis of tolerance to environmental change during early embryogenesis in *Drosophila melanogaster,*” Population, Evolutionary, and Quantitative Genetics Conference, Genetics Society of America, Pacific Grove, CA.

2020 Awde DN, Lecheta MC, Unfried LN, Jacobs NA, Powers B, Bora K, Waters JS, Axen HJ, Frietze 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, Frietze 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 acitivity 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, Philadelphia, PA.

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, San Diego, CA.

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, Washington, D.C.

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.