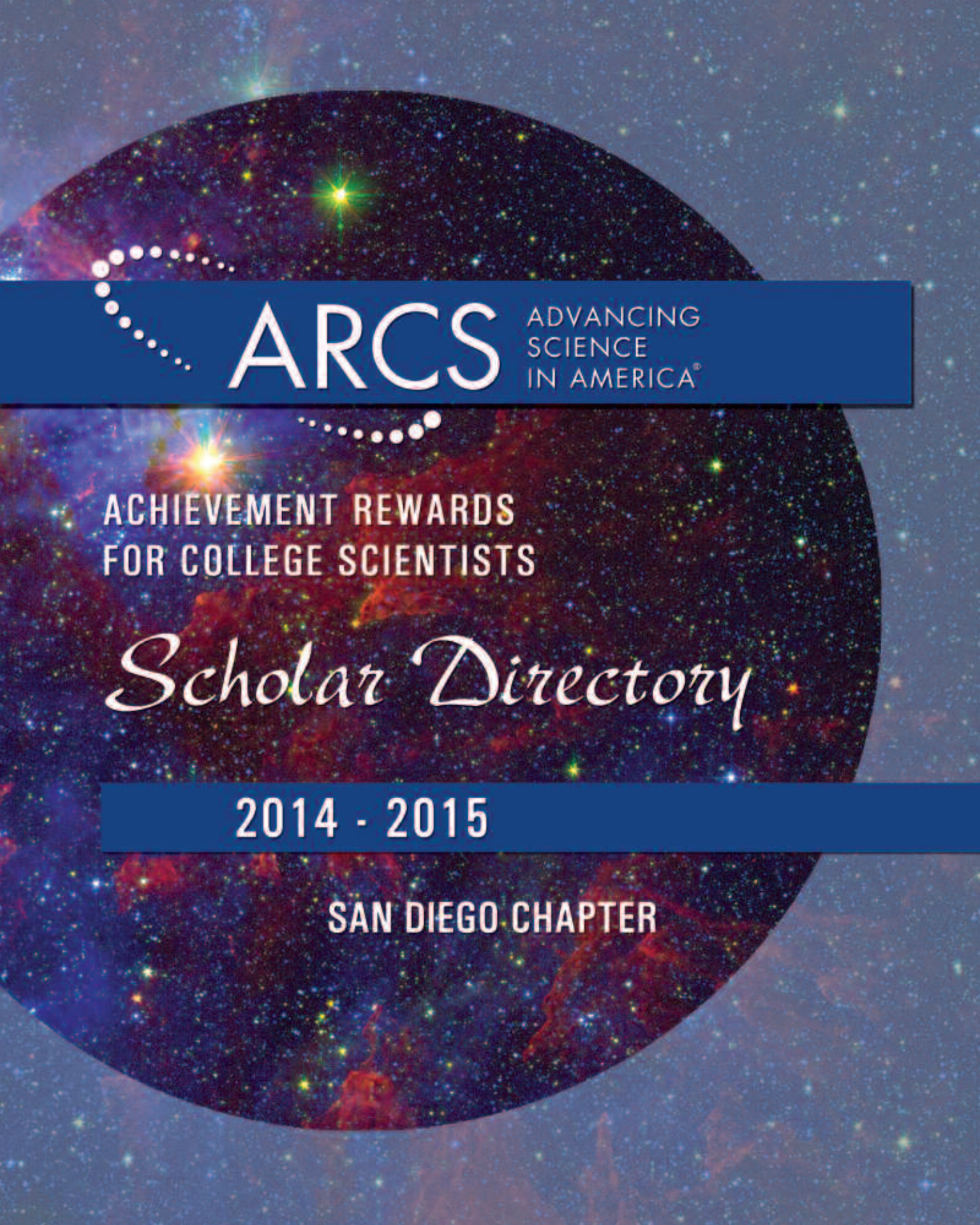

ARCS
ADVANCING SCIENCE IN AMERICA®
ACHIEVEMENT REWARDS FOR COLLEGE SCIENTISTS
Scholar Directory
2014 - 2015
SAN DIEGO CHAPTER

Words from University Presidents

"We're extremely grateful to the ARCS Foundation for their partnership and support of our students. Working together, we can help develop the scientists and engineers who will lead our country's future scientific and economic development."

Elliot Hirshman, President
San Diego State University

SAN DIEGO STATE UNIVERSITY

"The ARCS Foundation's longstanding support of The Scripps Research Institute has helped strengthen the quality of our biomedical research education by enabling us to attract the best students from around the world. With your support, we can better prepare these remarkable young men and women for careers as scientists, doctors, and teachers. TSRI is proud of our partnership with the ARCS Foundation, and we thank you for your continued support of education throughout San Diego."

Dr. James Paulson
Acting President and CEO of
The Scripps Research Institute

THE SCRIPPS RESEARCH INSTITUTE

"At UC San Diego, we appreciate the generous support of ARCS Foundation, which provides Scholar awards for our graduate and doctoral students conducting research in the sciences, engineering and medical fields. Together, we are educating our future leaders so they can go on to greatly impact our community, nation and world through their discoveries and innovations."

Pradeep K. Khosla, Chancellor
University of California, San Diego

UC San Diego

"The University of San Diego is proud to partner with ARCS in providing outstanding science, engineering and healthcare education for talented students who will contribute mightily to their chosen professions and to the community. We are very grateful for ARCS' continued confidence and support."

Mary E. Lyons, President
University of San Diego

University of San Diego

ARCS® Foundation, Inc.

Achievement Rewards for College Scientists

About Us

ARCS Foundation is a non-profit organization started and run entirely by women who see a national problem and are taking the initiative to try to solve it. The organization's aim is to address this country's most critical competitiveness issue: the serious shortage of American scientists and engineers. We address this issue by providing financial awards and encouragement to men and women working to complete their degrees in science, engineering, and medical research.

Since its founding in 1958 ARCS Foundation has grown to 16 chapters nationally and invested more than $87 million[1] in the innovation potential of nearly 9,000 of the most outstanding American graduate and undergraduate Scholars in science, engineering and medical research at 54 of the country's top research universities. The San Diego chapter alone has contributed nearly $8 million in support of Scholars at our recipient institutions.

We are very proud of what ARCS Foundation has accomplished. We know that we have a mission that is important to our country's economic recovery, our global technological leadership, and ultimately the well-being and quality of life for all people.

About Our Scholars

ARCS Scholars represent an elite group of students, selected by their faculty not only for their recognized achievements, but also for their exceptional promise to contribute substantially to their fields. These Scholars represent America's future; as such, it is imperative that we provide financial support and encouragement to help them stay the course and complete their studies in a timely manner. To that end, the San Diego Chapter of ARCS Foundation can boast of a 98% completion rate, compared with the national completion rate for graduate students in the sciences and engineering of 60%. Funds invested in our Scholars pay dividends for generations to come.

[1] As of 2012-2013 Fiscal Year

Award Criteria

In addition to their proven accomplishments and exceptional promise as judged by their faculty, ARCS Scholars must be U.S. citizens, maintain a grade point average of 3.5, and be enrolled full-time in an approved program in science, engineering or medical research. Scholars are selected without regard to race, religion, or gender.

During 2014-2015 ARCS is pleased to support 56 Scholars for a total of $400,000.

ARCS® Scholars 2014-2015

San Diego State University

NAME	DEGREE	AREA OF CONCENTRATION	SPECIALIZATION
Vincent Berardi	Ph.D.	Computational Science	Computational Human Behavior
Marcel Hetu	Ph.D.	Analytical Chemistry	Cancer, Alzheimer's Disease
Vicki Hurless	Ph.D.	Cell & Molecular Biology	Gene Regulatory Networks
Manna Iwabuchi	Ph.D.	Analytical Chemistry	Parkinson's Disease, Disease Detection
Brandon Kim	Ph.D.	Cell & Molecular Biology	Bacterial Infections, Meningitis
Gene Ko	Ph.D.	Computational Science	Cheminformatics, Drug Discovery
Sarah McCullough-Hennessy	Ph.D.	Ecology	Invasion of Native Plant Communities
Tim Montgomery	Ph.D.	Organic Chemistry	Green Organic Chemistry Synthesis
Katy Patras	Ph.D.	Cell & Molecular Biology	Post Pathogen Interactions, Immunology
Pearl Quijada	Ph.D.	Cell & Molecular Biology	Stem Cells, Heart Disease
Steven Quistad	Ph.D.	Cell & Molecular Biology	Immunology
Stephen Rice	Ph.D.	Evolutionary Biology	Population Trends and Extinction Risks
Julia Rossi	Ph.D.	Computational Science	Atomic Many-body Physics

The Scripps Research Institute

Jessica Bruhn-Johannsen	Ph.D.	Structural Biology	Henipavirus, Innate Immune Response
George Campbell	Ph.D.	Biological Sciences	Neurodegenerative Brain Disease
Sarah LeBoeuf	Ph.D.	Biological Sciences	Cancer Biology
Nicki Schirle	Ph.D.	Biology	RNA Interference, Gene Splicing
Joshua Silverman	Ph.D.	Biophysics	Cell Growth
John Tat	Ph.D.	Cell & Molecular Biology	Cell Cycle Regulation, Cancer Therapeutics

University of San Diego

Dinnah Didulo	Ph.D.	Nursing Science	Diabetes
Monique Lineback	Ph.D.	Nursing Science	Health Promotion
Gabriella Malagon-Maldonado	Ph.D.	Nursing Science	Diabetes
Fritzi McDonald	Ph.D.	Nursing Science	Informatics, Patient Outcomes
Kathleen McGuire	B.S./B.A.	Engineering	Electrical Engineering
Tawni Paradise	B.S./B.A.	Engineering	Industrial & Systems Engineering

NAME	DEGREE	AREA OF CONCENTRATION	SPECIALIZATION
Karmel Allison	Ph.D.	Bioinformatics & Systems Biology	Regulation of Immune Systems
Laura Andersen	Ph.D.	Materials Science & Engineering	Bulk Metallic Glasses
Corina Antal	Ph.D.	Biomedical Sciences	Cancer Biology
Joseph Campanale	Ph.D.	Marine Biology	Embryonic Defense Mechanisms
Monica Chu	Ph.D.	Biological Sciences	Behavioral Learning Activity
Chris DeBoever	Ph.D.	Bioinformatics & Systems Biology	Genetics and Genomics
Edward Dechaumphai	Ph.D.	Mechanical Engineering	Thermal Engineering/Design
Matthew Del Bel	Ph.D.	Chemistry & Biochemistry	Natural Product Synthesis
Maggie Johnson	Ph.D.	Marine Biology	Coral Reef Ecology, Phycology
Trevor Joyce	Ph.D.	Biological Oceanography	Commercial Harvesting Impacts
Guipeun Kang	Ph.D.	Physical Chemistry	Protein Interactions for Drug Development
Joe Kaus	Ph.D.	Chemistry	Computer Aided Drug Design
Aditya Kumar	Ph.D.	Bioengineering	Stem Cells and Heart Disease
Sarah Leinwand	Ph.D.	Neuroscience	Sensory Circuits and Behavior
Jason Leonard	Ph.D.	Physics	Manipulation of Light Particles
Eric Lindsey	Ph.D.	Geophysics	Ocean Patterns of Ground Movement
Frederick Matsuda	Ph.D.	Physics	Science of Early Universe
Emily Nardoni	Ph.D.	Physics	High Energy Theory
Morgan Nunn Martinez	Ph.D.	Chemistry	Water, Solar System
Edward O'Brien	Ph.D.	Bioinformatics & Systems Biology	Microbial Evolution and Engineering
Matthew Ondeck	Ph.D.	Materials Science & Engineering	Cell Substrate Stiffness
Andrew Peters	Ph.D.	Neuroscience	Systems Neuroscience
Dustin Richmond	Ph.D.	Computer Engineering	Hardware Systems
Suchol Savagatrup	Ph.D.	Chemical Engineering	Conjugated Polymer Mechanics
Lauren Shipp	Ph.D.	Marine Biology	Embryonic Development, Toxicology
Michael Tait	Ph.D.	Mathematics	Graph Theory and Extremal Combinatorics
Cali Turner Tomaszewicz	Ph.D.	Marine Ecology	Endangered Species, Ecology, Conservation
Stephanie Weng	Ph.D.	Biomedical Sciences	Cancer Biology
Matthew Wingert	Ph.D.	Mechanical Engineering	Nanomaterials, Energy Transport
Christine Wittich	Ph.D.	Structural Engineering	Earthquake Engineering
David Zimmermann	Ph.D.	Mathematics	Functional Analysis

KARMEL ALLISON

University of California, San Diego
Jacobs School of Engineering

Degrees:

B.A. in Linguistics, University of California, Berkeley

Scholar Sponsors:

The Beyster Family Foundation Fund IV

About the Scholar:

Karmel studies the genomic regulation of T cells in the immune system. Though her background is in software engineering and computer science, Karmel developed a love for immunology as she tried to better understand her own disease, type 1 diabetes. As both a scientist and a patient, she is driven to expand our understanding of and ability to treat autoimmune diseases like type 1 diabetes. Thus, her research involves the generation and analysis of high-throughput sequencing data of cell types relevant to the development of autoimmune disease. With the insight that this genome-wide data gives, Karmel hopes to help establish new therapies that will aid in the treatment of immune pathologies. When not in the lab, Karmel enjoys hanging out in the sunshine with her husband and her copy of the *New Yorker.*

Benefits to Society:

Type 1 diabetes is an autoimmune disease that requires constant management and can have devastating long-term complications affecting millions of people. With her research, Karmel hopes to contribute to the prevention and cure of type 1 diabetes for all the children and adults who are affected. Her current work is therefore focused on deep analyses of the mechanisms that can lead to autoimmunity, and on using this information to identify potential ways to target pathogenic cells. By improving our understanding of what is going wrong in cells of the immune system at the genomic level, this research has the potential to advance our ability to treat autoimmune diseases like type 1 diabetes.

Awards and Honors:

NIH Ruth Kirschstein National Research Service Award (F31), 2014 – 2018

NSF Graduate Research Fellowship Program Honorable Mention, 2012 and 2013

NIDDK Keystone Symposia Scholarship, 2013

University of Eastern Finland International Doctorate Visitor Grant, 2012

UC Berkeley Regents' and Chancellor's Scholar, 2003 - 2006

Publications and Posters:

Allison, K.A.; Kaikkonen, M.U.; Gaasterland, T.; Glass, C.K. Vespucci: a system for building annotated databases of nascent transcripts. Manuscript submitted.

Heinz, S.; Romanoski, C. E.; Benner, C.; Allison, K. A.; Kaikkonen, M.U.; Orozco, L. D.; Glass, C. K. Natural genetic variation perturbs collaborative transcription factor binding required for enhancer selection and function. Manuscript submitted.

Kaikkonen, M. U.; Spann, N.; Heinz, S.; Romanoski, C. E.; Allison, K. A.; Prinja, R. K.; Tough, D. F.; Benner, C.; Glass, C. K. Remodeling of the Enhancer Landscape during Macrophage Activation Is Coupled to Enhancer Transcription. Molecular Cell 2013, 51 (3), 1-16.

Allison, K. A.; Kaikkonen, M. U.; Glass, C. K. Genome-Wide Sequencing of Nascent Transcripts in NOD Mouse Macrophages Reveals New Mechanisms of Innate Immune Dysregulation in Type 1 Diabetes. Keystone Symposium on the Immunopathology of Type 1 Diabetes, Whistler, BC; April 2013.

LAURA ANDERSEN

University of California, San Diego
Jacobs School of Engineering

Degrees:

M.S. in Materials Science & Engineering, University of California, San Diego

B.S. in Materials Science & Engineering, University of Washington, Seattle

Scholar Sponsors:

The Donald C. and Elizabeth M. Dickinson Foundation

About the Scholar:

Laura is studying the fracture and wear properties of bulk metallic glasses. Bulk metallic glasses are a special class of metallic materials created by rapid solidification, which causes them to form glass-like structures. This unique atomic structure leads to ideal mechanical properties for excellent wear resistance. However, in order to exploit these materials, we need to better understand their fracture mechanics. Laura hopes to define critical relationships between the atomic structure, processing conditions and fracture properties of these ambiguous materials. Laura enjoys biking, baking and brewing beer.

Benefits to Society:

Improving the plasticity of bulk metallic glasses is currently one of the hottest topics in the field of materials science because of the great scientific and technological importance of these materials. This work has had some success; however, it has not been followed up by widespread technological use. Laura intends to design a bulk metallic glass by maximizing its inherent properties such as hardness and wear-resistance, while retaining a minimum plasticity and toughness. Potential applications for such wear-resistant materials range from gearbox materials to biomedical implants. This project will not only enable the commercialization of bulk metallic glasses, but will also provide insight as to how the structure and processing translate to the fracture toughness and wear properties.

Awards and Honors:

Teaching Assistant Appreciation Award, UCSD Office for Students with Disabilities

Abe Hurlich Scholarship, ASM San Diego Chapter

CAL-RA and Materials Science Fellowships, UCSD Jacobs School of Engineering

RISE-Pro Scholarship, German Academic Exchange Service

The Boeing Company Academic Grant

Publications and Posters:

Kolodziejska, J.; Roberts, S.N.; Andersen, L.M.; Hofmann, D.C. Exceptional wear resistance of Cu-based metallic glass. (In preparation).

Andersen, L.M.; Kolodziejska, J.; Hofmann, D.C.; Vecchio, K.S. Investigating the fracture mechanics of wear-resistant bulk metallic glasses. Jacobs School 33rd Annual Research Expo, La Jolla, CA; April 17, 2014.

Andersen, L.M.; Hofmann, D.C.; Vecchio, K.S. Fracture and wear behavior of amorphous metals for use as gearbox materials. Jacobs School 32nd Annual Research Expo, La Jolla, CA; April 18, 2013.

CORINA ANTAL

University of California, San Diego
Biomedical Sciences Program

Degrees:

B.S. in Marine and Atmospheric Sciences, University of Miami

Scholar Sponsors:

Farrell Family Foundation

About the Scholar:

Corina's research focuses on an enzyme, protein kinase C, that plays a role in a number of cellular functions, among which are cancer-relevant activities such as cell survival, growth, and migration. She is investigating how mutations identified within this enzyme in diverse human cancers contribute to the disease. Understanding how these mutations affect protein kinase C signaling is critical because it allows us to determine whether therapeutic strategies should target ways to activate of inactivate this enzyme in the treatment of cancer. Corina's hobbies include triathlons, hiking, and scuba diving.

Benefits to Society:

Cancer affects millions of people worldwide. Treatment of cancer requires a complete understanding of signaling pathways and how these pathways are misregulated by mutations in our genomes. Corina's work focuses on elucidating how mutations within protein kinase C, a key component in signaling networks, contribute to cancer. Her work is of significant impact because it would dictate whether therapeutic strategies should be aimed at inactivating or activating this enzyme in different human cancers.

Awards and Honors:

NSF Graduate Research Fellowship

Biochemical Society Travel Award and Best Poster Award

Pharmacology Department Retreat Best Poster Award

ASPET Graduate Student Travel Award

ASBMB Graduate Student Travel Award

Publications and Posters:

Antal, C.E., Hudson, A.M., Kang, E., Zanca, C., Wirth, C., Stephenson, N.L., Trotter, E.W., Gallegos, L.L., Miller, C.J., Furnari, F.B., Hunter, T., Brognard, J., and Newton, A.C., Cancer-associated Protein Kinase C Mutations Reveal Kinase's Role as Tumor Suppressor. Cell 2015, In Press

Antal, C. E.; Violin, J. D.; Kunkel, M. T.; Skovso, S.; Newton, A. C., Intramolecular conformational changes optimize protein kinase C signaling. Chemistry & biology 2014, 21

Antal, C. E.; Newton, A. C., Tuning the signalling output of protein kinase C. Biochemical Society transactions 2014, 42 (6), 1477-83

Antal, C. E.; Newton, A. C., Spatiotemporal dynamics of phosphorylation in lipid second messenger signaling. Molecular & cellular proteomics : MCP 2013, 12 (12), 3498-508

VINCENT BERARDI

San Diego State University/Claremont Graduate University

Degrees:

M.S. in Applied Mathematics, San Diego State University

B.S. in Mathematics, Saint Peters Univ.

Scholar Sponsors:

Reuben H. Fleet Foundation Fund/ARCS Foundation

About the Scholar:

The goal of Vincent's research is to harness the power of mobile technology to improve the way health-promoting interventions are performed. Specifically, his research attempts to reduce secondhand smoke concentrations in households by placing monitors in the home that measure the concentration of indoor air particle concentrations. Vincent is attempting to identify patterns in the data that will allow for more effective behavioral interventions aimed at reducing indoor particle concentrations. Patterns in the data regarding the sequence of different classifications of events are identified and compared to air diaries kept by household participants. The result is that the air particle data time-series is converted to a behavioral time-series, on which behavioral theory can be applied. When not working, Vincent enjoys travelling, running, and playing the harmonica.

Benefits to Society:

The benefits of reducing secondhand smoke, particularly among children (who live in every household within our study) are well known and incredibly important. In addition, the constant, real-time interaction our participants have with the monitors is expected to be much more effective than the intermittent interaction in a typical health intervention (e.g., meeting with a smoking cessation counselor). My project focuses on increasing the specificity with which behaviors are identified. Doing so allows well-known principles of behavior (e.g., reinforcement) to be employed with significantly more rigor with the intended effect of enhancing public health interventions.

Awards and Honors:

Internal Advisory Committee Stipend (SDSU/UCSD San Diego Cancer Center Comprehensive Partnership, 2013-2014)

ESET Award for Achievement (SDSU CSRC ACCESS For Industry, 2014)

Academic Excellence in Mathematics, Graduate Student (San Diego State University, 2013)

Kruze Award for Excellence in Mathematics, (Saint Peters College, May 2003)

Publications and Posters:

Berardi, V.; Lydon, J.; Kevrekidis, P. G.; Daraio, C.; Carretero-González , R. Directed Ratchet Transport in Granular Crystals. Physical Review E. 2013, 88(5).

Bellettiere, J.; Hughes, S. C.; Liles, S.; Boman-Davis, M.; Klepeis, N. E.; Blumberg, E.; Mills, J.; Berardi, V.; Obayashi, S.; Allen, T. T.; Hovell, M. F. Developing and Selecting Auditory Warnings for a Real-Time Behavioral Intervention. American Journal of Public Health Research. 2014, 2(6), 232-238.

Berardi, V.; Carretero-González; Hovell, M. F.; Palacios, R. A New Model for Behavioral Interventions. Presented at Society for Chaos Theory in Psychology and Life Sciences, 23rd Annual Conference, Portland, Oregon, July 26, 2013.

JESSICA BRUHN-JOHANNSEN

The Scripps Research Institute
Kellogg School of Science and Technology

Degrees:

B.A. in Biochemistry, Biophysics and Molecular Biology, Whitman College

Scholar Sponsors:

Roche/ARCS Foundation Scholar Award

About the Scholar:

Jessica's research focuses on the molecular and structural properties governing viral life cycles. She initially studied the RNA replication machinery from Nipah virus; solving a high-resolution crystal structure of one of these proteins. Nipah virus causes encephalitis in Southeast Asia with up to 90% fatality, and this work has contributed to the understanding necessary for the rational drug design. Her current research is focused on Ebola virus, which has infected over 20,000 people in the current West African outbreak. She is trying to better understand how the viral matrix protein forms new virions, controls replication and suppresses the immune system. Jessica enjoys surfing, rock climbing and rafting.

Benefits to Society:

There are no approved therapeutics or vaccines available to treat and protect people from infection with Nipah and Ebola viruses. Both of these viruses cause high mortality rates in humans (70-90%) and affect some of the poorest communities across the globe. This work provides a better understanding of how these viruses infect humans and how we can design better drugs to combat them in infected individuals.

Awards and Honors:

Roche Scholar

NIH training grant T32

Delia and Donald Baxter Fellowship

Dean's Fellowship

Publications and Posters:

Jessica F. Bruhn*, Matthew Clifton*, Terry Webb, Ruth Baydo, Kateri Atkins, Amy Raymond, Don Lorimer, Thomas Edwards, Peter Myler, Erica Ollmann Saphire. Crystal structure of the Sudan ebolavirus VP40 dimer. Journal of Infectious Diseases. Under review.

Jessica F. Bruhn, Katherine Barnett, Jaclyn Bibby, Jens Thomas, Ronan Keegan, Daniel Rigden, Zachary Bornholdt, Erica Ollmann Saphire. Crystal structure of the Nipah virus phosphoprotein tetramerization domain. J. Virology 2014.

Bruno Correia, Yih-En Andrew Ban, Margaret Holmes, Hengyu Xu, Katharine, Ellingson, Zane Kraft, Chris Carrico, Erica Boni, D. Noah Sather, Camille Zenobia, Katherine Burke, Tyler Bradley-Hewitt, Jessica F. Bruhn-Johannsen, Oleksandr, Kalyuzhniy, David Baker, Roland Strong, Leonidas Stamatatos, and William Schief. "Computational Design of Epitope-Scaffolds Allows Induction of Antibodies Specific for a Poorly Immunogenic HIV Vaccine Epitope." Structure 2010.

Bruno Correia, Yih-En Andrew Ban, Della Friend, Katharine Ellingson, Hengyu Xu, Erica Boni, Tyler Bradley-Hewitt, Jessica F. Bruhn-Johannsen, Leonidas Stamatatos, Roland Strong and William Schief. "Computational Protein Design Using Flexible Backbone Remodeling and Resurfacing: Case Studies in Structure-Based Antigen Design." J. Mol. Biol. 2010.

JOSEPH CAMPANALE

University of California, San Diego
Scripps Institution of Oceanography

Degrees:

M.S. in Biological Sciences, California Polytechnic State University, San Luis Obispo

B.S. in Biological Sciences, B.S. in Microbiology, California Polytechnic State University, San Luis Obispo

Scholar Sponsors:

Timken-Sturgis Foundation

About the Scholar:

The focus of Joseph's research is to investigate embryo-environment interactions. Whether protected in a womb or floating in the ocean, embryos develop in a chemically complex environment and have potent defenses that protect them from toxic chemicals. Anthropogenic compounds present new challenges for these defenses, particularly during specific windows of vulnerability during development. Joseph uses embryos of the purple sea urchin to understand how chemical defenses are regulated in embryos with the goal of identifying which embryonic cells and stages are the most sensitive to chemical stress. When not working in the lab, Joseph enjoys gardening and knitting.

Benefits to Society:

Embryos have few mechanisms to protect themselves from environmental stress. Even human embryos are not without exposure to their mother's blood, which can contain circulating toxic pharmaceuticals and toxicants. Understanding how robust the process of embryogenesis is to chemical stress will contribute to a growing body of work aimed at better predicting how environmental change, especially the release of man-made pollutants, will affect embryos and will lead to more informed predictions of human health risks associated with teratogens.

Awards and Honors:

Environmental Protection Agency Science to Achieve Results (STAR) Graduate Fellowship

National Institutes of Health Training Fellowship in Marine Biotechnology and Biomedicine

Young Investigator of the Year (2012), FEBS International meeting for ABC-transporters

Milne Family Scholarship, Marine Biological Laboratories Embryology Course

Graduate Student of the Year (2009) in Biological Sciences, Cal Poly San Luis Obispo

Publications and Posters:

Campanale, J. P.; Gokirmak, T.; Espinoza, J. A.; Oulhen, N.; Wessel, G. M.; Hamdoun, A. Migration of sea urchin primordial germ cells. Dev. Dyn. 2014, 243, 917-927.

Campanale, J. P.; Hamdoun A. Programed reduction of ABC transporter activity in sea urchin germline progenitors. Development 2012, 139, 783-792.

Gokirmak, T.; Campanale, J.P.; Shipp, L.E.; Moy, G.W.; Tao, H.; Hamdoun, A. Localization and substrate selectivity of sea urchin multidrug (MDR) efflux transporters. J. Biol. Chem. 2012, 287, 43876-43883.

Campanale, J.P.; Tomanek, L.; Adams, N.L. Exposure to ultraviolet radiation causes proteomic changes in the embryos of the purple sea urchin, Strongylocentrotus purpuratus. J. Exp. Mar. Biol. Ecol. 2011, 397, 106-120.

GEORGE CAMPBELL

The Scripps Research Institute
The Scripps Research Institute Graduate Program

Degrees:
B.S. in Biology, B.S. in Chemistry, University of Tennessee at Chattanooga

Scholar Sponsors:

Hervey Family Non-Endowment Fund

About the Scholar:

George uses microscopy to study the movement of motor proteins that convert chemical energy inside the cell to mechanical energy in order to transport key molecules inside each cell. These motor proteins are essential to the process of axonal transport in neurons, which enables highly elongated neurons to distribute key molecules anywhere from the cell body toward the synapses that allow neurons to communicate. His primary career objective is to develop expert knowledge in microscopy methods and apply them to answer key questions in biology. Outside the lab, George enjoys Frisbee, hiking, and board games.

Benefits to Society:

Further understanding of transport mechanisms in neurons may provide new knowledge with relevance to several neurodegenerative diseases. The most common neuro-degenerative disease, Alzheimer's disease, afflicts millions in the U.S. alone, and this number is expected to grow rapidly in the coming years. This rapid growth in Alzheimer's patients means that neurodegeneration research, such as understanding the role of axonal transport in neurodegenerative disease, is a priority for public health, which could provide the foundation for novel treatments for currently incurable diseases.

Awards and Honors:

NIH Clinical and Translational Science Award Traineeship

Student Poster Award, Annual Meeting of the Association of Southeastern Biologists

Outstanding Research Award

S.G.A. Outstanding Senior in B.S. Biology: Molecular

Murray Raney Chemistry Scholarship

Publications and Posters:

Neumann, S., Campbell, G. E., Szpankowski, L., Goldstein, L. S. B., Encalada, S. E. Characterizing the Composition of Molecular Motors on Moving Axonal Cargo Using "Cargo Mapping" Analysis. J. Vis. Exp. 2014, 92, e52029.

Campbell, G.E.; Encalada, S.E. Coordination of Molecular Motors in Axonal Transport; Graduate Student Retreat, The Scripps Research Institute, Lake Arrowhead, CA.; October 2014.

Campbell, G.E., Searching for Genetic Control: A Closer Look at Methylation Patterns and Microsatellites in Colon Cancer. Departmental Honors Thesis. The University of Tennessee at Chattanooga, Chattanooga, TN, 2011.

Campbell, G.E.; Kovach, M.J. Searching for Genetic Control: A Closer Look at Methylation Patterns and Microsatellites in Colon Cancer, 72nd Annual Meeting of the Association of Southeastern Biologists, Huntsville, AL; April 2011.

MONICA CHU

University of California, San Diego
Division of Biological Sciences

Degrees:
B.S. in Biology, Massachusetts Institute of Technology

Scholar Sponsors:

ARCS Foundation Endowment Fund

About the Scholar:

Monica's research aims to understand how the activity of neurons in the brain changes with experience. She is using a cutting-edge technique called in vivo two-photon calcium imaging to record the activity of neuronal populations in the mouse olfactory bulb, which is the first relay station of olfactory information in the brain. This technique enables her to follow the activity of hundreds of neurons over months in awake behaving animals, and allows her to better understand how odor information in the brain is shaped by things like behavioral state or learning. Outside of the lab, Monica enjoys swimming and crafting.

Benefits to Society:

Olfaction plays an important role in the behaviors of many mammals. In humans, the sense of olfaction is closely linked to memory and emotion. In mice and other rodents, identifying palatable foods or detecting the scent of predators is crucial for survival. These olfactory behaviors rely on experiences that are acquired during the lifetime of an animal. How the brain encodes such sensory information and generates appropriate behavioral responses is a fundamental question in the field of neuroscience. However, our understanding of these processes is still in its infancy. By studying how experience, such as the learning of an odor guided task, alters the way odor information is initially encoded, Monica's research may provide insight into more fundamental principles that underlie how sensory information and experience are integrated in flexible circuits in the brain. Identifying these general mechanisms behind neural plasticity is one step closer to understanding the neural substrates involved in encoding information and generating behaviors.

Awards and Honors:

NIH Cellular and Molecular Genetics Training Grant Recipient

Publications and Posters:

Kato, H.K.*; Chu, M.W.*; Isaacson, J.S.; Komiyama, T. Dynamic sensory representations in the olfactory bulb: modulation by wakefulness and experience. Neuron 2012, 76(5):962-75.

Kay, J.N.; Chu, M.W.; Sanes, JR. MEGF10 and MEGF11 mediate homotypic interactions required for mosaic spacing of retinal neurons. Nature 2012, 483(7390):465-9.

Kay, J.N.; Voinescu, P.E.; Chu, M.W.; Sanes, J.R. Neurod6 expression defines new retinal amacrine cell subtypes and regulates their fate. Nat Neurosci 2011, 14(8):965-72

CHRISTOPHER DEBOEVER

University of California, San Diego
Bioinformatics and Systems Biology

Degrees:

B.S. in Mathematical Biology, Harvey Mudd College

Scholar Sponsors:

The Heller Foundation of San Diego

About the Scholar:

Chris uses genomics to study human disease with a focus on cancer development and progression. He has studied the role of mutations in the splicing factor SF3B1 in chronic lymphocytic leukemia (CLL) and investigated how the genomic landscape of CLL changes as the disease progresses. He is also using genomic data from a large cohort of induced pluripotent stem cells and differentiated cardiomyocytes to study the role of genetics in human cardiac phenotypes and disease. When not on his computer, Chris enjoys camping, sports, and playing guitar.

Benefits to Society:

The sequencing revolution in biology has provided us with a well-documented flood of genomics data. Processing, interpreting, and utilizing these data presents unique challenges but also offers the ability to study biology at an unprecedented level of breadth and depth. Chris's work is aimed at utilizing genomics data to learn about human biology and disease and translate this knowledge to the clinic to both improve diagnosis and treatment and lower healthcare costs. His work builds toward a future where genomic analysis is a cornerstone of medical care.

Awards and Honors:

Best Poster, UCSD Bioinformatics and System Biology Research Expo, 2014

Best Talk, UCSD Bioinformatics and System Biology Research Expo, 2013

Best Poster, UCSD Genetics Training Program Annual Retreat, 2013

Publications and Posters:

DeBoever C; Ghia EM; Shepard PJ; Rassenti L; Jepsen K; Jamieson CHM; Carson D; Kipps TJ; Frazer KA. Pan-cancer analysis shows SF3B1 mutations cause widespread cryptic 3' splice site selection downstream of the branch point. PLoS Computational Biology. 2015. in press.

Cheng CP; DeBoever C; Frazer KA; Liu YC; Tseng VS. MiningABs: mining associated biomarkers across multi-connected gene expression datasets. BMC Bioinformatics. 2014, 15:173. Doi:10.1186/1471-2105-15-173

DeBoever C; Reid EG; Smith EN; Wang X; Dumaop W; Harismendy O; Carson D; Richman D; Masliah E; Frazer KA. Whole transcriptome sequencing enables discovery and analysis of viruses in archived primary central nervous system lymphomas. PLOS One. 2013; 8(9): e73956. Doi: 10.1371/journal.pone.0073956

EDWARD DECHAUMPHAI

University of California, San Diego
Jacobs School of Engineering

Degrees:

B.S. in Mechanical Engineering, University of Maryland at College Park

Scholar Sponsors:

Wally Schirra Memorial Fund

About the Scholar:

Edward is interested in incorporating traditional mechanical engineering with emerging fields in nanotechnology, and biomedical science. He is involved in two research projects: i) to understand heat transport phenomenon at a nanoscale level and ii) to develop a state-of-art microchip heat sensor (known as calorimeter) to probe physical states of a single cell. He had developed a chip-based calorimeter with the highest heat flow resolution to date. His goal is to advance various types of sensors and transfer lab-based prototypes into possible future consumer-driven personalized medical devices. Outside the lab, Edward enjoys playing soccer and badminton.

Benefits to Society:

Heat and temperature play a very important role in our daily lives. For instance, as electronic devices get smaller, overheating becomes an inevitable problem. Therefore, having a clearer understanding in micro/nano-scale thermal transport is crucial in developing future electronics. Furthermore, sensing heat and temperature of biological samples can provide progress to biomedical sciences. The microchip calorimeter developed can be exploited to accelerate drug discovery process, provide faster bacteria detection, and used as a tool to understand basic biology.

Awards and Honors:

CalIT2 fellowship
California Research Assistantship Fellowship
The SUEZ Energy Generation NA Scholarship
H. Russell Knust Memorial Scholarship
A. James Clark School of Engineering Scholarship

Publications and Posters:

Dechaumphai, E.; Chen, R. Sub-picowatt resolution calorimetry with niobium nitride thin-film thermometer. Review of Scientific Instruments 2014, 85, 094903.

Dechaumphai, E.; Lu, D.; Kan, J. J.; Moon, J.; Fullerton, E. E.; Liu, Z.; Chen, R. Ultralow thermal conductivity of multilayers with highly dissimilar Debye temperatures. Nano Letters 2014, 14 (5), 2448-2455.

Dechaumphai, E.; Barton, J. L.; Tesmer, J. R.; Moon, J.; Wang, Y. Q.; Tynan, G. R.; Doerner, R. P.; Chen, R. Near-surface thermal characterization of plasma facing components using the 3-omega method. J. Nucl. Mater. 2014, 455, 56-60.

Dechaumphai, E.; Chen, R. Thermal transport in phononic crystals: the role of zone folding effect. J. Appl. Phys. 2012, 111, 073508.

MATT DEL BEL

University of California, San Diego
Department of Chemistry and Biochemistry

Degrees:

B.S. Biochemistry, University of California, San Diego

Scholar Sponsors:

ARCS Foundation Endowment Fund

About the Scholar:

Matt studies the synthesis of chemically complex secondary metabolites known as natural products. Unlike primary metabolites, secondary metabolites are not necessary for the survival of an organism. Although not essential, secondary metabolites provide organisms with an evolutionary advantage and are often used as "chemical warfare" agents against other harmful organisms. However, many of these natural products are often produced in very small quantities and are not abundant enough for use by humans without an alternative way to isolate them. The goal of his project is to provide a short and robust synthesis of a potent anti-cancer natural product.

He is working on a convergent, enantio-selective synthesis of natural product viridin, a potent PI3K inhibitor. The strategy involves breaking the molecule into roughly equal halves of complexity and joining them together using palladium cross couplings. After coupling, the remainder of the work is oxidation to the natural product. Upon completing the synthesis of the natural product itself he hopes to develop analogs that will be more selective PI3K inhibitors than viridin.

His hobbies are rocking climbing, cooking, and craft beer tasting.

Benefits to Society:

The natural products that we study in our lab have pharmacological or biological activity that can be of therapeutic benefit in treating diseases. It is estimated that nearly half of the drugs on the market are either natural products themselves or have been derived from natural products. The goal of our lab is to be able to make these molecules in a scalable fashion that will allow them to be studied for their applications as therapeutic agents. In addition to making the compounds in an efficient manner we hope to advance organic chemistry by developing new chemical transformations during the course of our synthesis.

Awards and Honors:

UC San Diego Graduate Assistance in Areas of National Need Fellowship

Publications and Posters:

Del Bel, M.; Rovira, A.; Guerrero, C.A. "Cyclopentannulation of Conjugated Enones Using a Vinyldiazomethane-Based Reagent." J. Am. Chem. Soc. 2011, 135, 12188 – 12191

Fujiwara, Y.; Domingo, V.; Seiple, I. B.; Gianatassio, R.; Del Bel, M.; Baran, P. S. "Practical C-H Functionalization of Quinones with Boronic Acids." J. Am. Chem. Soc. 2011, 133, 3292 – 3295.

DINNAH L. DIDULO

University of San Diego
Hahn School of Nursing and Health Science

Degrees:

M.S. in Nursing Education, University of California, San Francisco

B.S. in Nursing, San Diego State University

A.S. Degree in Nursing, Fresno City College

Scholar Sponsors:

Reuben H. Fleet Foundation Fund

About the Scholar:

Dinnah's research is focused on diabetes. While doing research at UCSF, Dinnah became interested in studying the relationship of acculturation of immigrants, specifically the Filipino population and why diabetes is prevalent in this population. Diabetes is a progressive and chronic disease that can affect anyone who may be at risk. Because of the body's inability to adequately process glucose in the body, different organs and body systems can be affected. Early identification of patients who have diabetes or at risk of developing diabetes is important in preventing the devastating and disabling effect of diabetes. The objective of her research is to identify barriers that prevent early identification of diabetes in the Filipino population. World Health Organization projects that diabetes will be the 7th leading cause of death in 2030. Her research will explore current protocols in identifying patients at risk for diabetes, identify cultural barriers that affect treatment and compliance, and propose solutions that are culturally relevant and significant in managing Filipino patients with diabetes.

Benefits to Society:

Despite current protocols in identifying patients at risk for diabetes, a gap exists in early diagnoses of diabetes in Filipinos. Understanding the relevance of applying culturally specific protocols in diagnosing patients with early diabetes can help prevent the disabling effect of diabetes and the risk of cardiovascular disease.

Awards and Honors:

Nurse Educator of the Year 2007, Philippine Nurses Association of San Diego

Sigma Theta Tau, Alpha Eta Chapter: UCSF

Sigma Theta Tau, Zeta Mu: USD

Dean's List, Fresno City College

Whittier Institute of Diabetes, Scholarship recipient; Diabetes Educator

MARCEL HETU

San Diego State University
College of Sciences

Degrees:

M.S. in Chemistry, San Diego State University
B.S. in Chemistry, San Diego State University

Scholar Sponsors:

ARCS Foundation/Dottie Georgens

About the Scholar:

Marcel is using lasers to detect proteins associated with neurodegenerative and autoimmune diseases. The high selectivity and sensitivity of the lasers make it possible to identify biomarkers in the early stages of disease. The procedure uses extremely small sample sizes, such as a single cell, and utilizes a multi-photon non-linear laser wave mixing technique. He has studied biomarkers associated with cancer, HIV and Alzheimer's disease. Marcel has also used lasers to detect explosives. This technology has the potential to save lives by reporting the presence of explosives from long distances. Marcel has varied interests, among them hiking the trails throughout San Diego County.

Benefits to Society:

This work could make significant contributions to society. Current diagnostic measurements for disease require multiple vials of blood to be collected and often involve costly and time-consuming work-up for more advanced measurements such as viral loads. This technique requires only a single-cell to make measurements of the cell's protein content. The sensitivity of the technique allows for the development of early detection diagnostic methods to be developed. High sensitivity, selectivity, and small sample size requirements make this technique ground breaking for the way diseases could be discovered and treated.

Awards and Honors:

Cotton Metzger Scholarship, 2014

Susan and Steven Weber Endowed Scholarship, 2014

Harry E. Hamber Memorial Scholarship 2014

Publications and Posters:

Hetu, M., Iwabuchi, M., Maxwell, E., Wu, H., Ramos, S., Tong, W.G. Zepto-mole detection in microfluidics by novel nonlinear multi-photon laser wave-mixing spectroscopy for biomedical and environmental applications. Proc. SPIE, 2014, 9193, 7.

Gregerson, M., Hetu, M., Iwabuchi, M., Jimenez, J., Warren, A., Tong, W. G. Ultrasensitive standoff chemical sensing based on nonlinear multi-photon laser wave-mixing spectroscopy. Proc. SPIE, 2014, 8497, 31.

Hetu, M. H. Synthesis and Reactivity of New Transition Metal Complexes for Environmentally and Biologically Relevant Chemistry. M.S. Thesis, San Diego State University, San Diego, CA, 2009.

Liang, H., Zhang, Y., Hetu, M. Phosphate diester hydrolysis promoted by new Cu(II) alkoxide complexes. Inorganic Chemistry Communications, 2007, 10, 204-208.

VICKI HURLESS

San Diego State University
College of Sciences

Degrees:

B.S. in Biology, University of Washington

Scholar Sponsors:

Hervey Family Non-Endowment Fund

About the Scholar:

Vicki is researching the gene regulatory network (GRN) underlying the development of the peripheral nervous system (PNS) in the ascidian Ciona intestinalis. Ascidians are marine invertebrate chordates and excellent model organisms for studying developmental biology and GRNs. The PNS is comprised of ciliated sensory neurons but the GRN governing how these specialized cell types are produced is unknown. She aims to refine and expand the putative PNS GRN through RNA-sequencing to identify important gene targets of a PNS regulatory gene. Additionally, Vicki has been developing the molecular tool of RNA interference (RNAi) in C. intestinalis utilizing artificial microRNAs. She has been successful in silencing a gene that plays an important regulatory role in PNS development. Her work will not only benefit the ascidian community by establishing the efficient RNAi tool but will also offer a better understanding of the role regulatory genes play during PNS development which will provide insights into the PNS GRN in chordates.

Benefits to Society:

Vicki's work will help to elucidate the regulatory gene network responsible for producing ciliated sensory neurons in the PNS. Ciliated sensory neurons are found in the vertebrate inner ear and hearing loss is attributed to the limited regenerative capabilities of damaged ciliated hair cells. Therefore, it is important to understand how these ciliated cells are developed especially the transcription factors that play a regulatory role to specify these cells. Additionally, Vicki's work will also benefit the ascidian community by establishing the much-needed molecular tool of RNA interference in C. intestinalis further proving them as an ideal model for chordate development and genomics.

Awards and Honors:

November 2013 – Achievement in Outreach or Community Service Award, Association for Women in Science (AWIS), San Diego Chapter

Publications and Posters:

Viswanathan, S.R.; Powers, J.T.; Einhorn, W.; Hoshida, Y.; Ng, T.L.; Toffanin, S.; O'Sullivan, M.; Lu, J.; Phillips, L.A.; Lockhart, V.L.; Shah, S.P.; Tanwar, P.S.; Mermel, C.H.; Beroukhim, R.; Azam, M.; Teixeira, J.; Meyerson, M.; Hughes, T.P.; Llovet, J.M.; Radich, J.; Mullighan, C.G.; Golub, T.R.; Sorensen, P.H.; Daley, G.Q. Lin28 promotes transformation and is associated with advanced human malignancies. Nature Genetics 2009, 41(7), 843-848.

Roberts, B.; Davidson, B.; MacMaster, G.; Lockhart, V.; Ma, E.; Wallace, S.S.; Swalla, B.J. A complement response may activate metamorphosis in the ascidian Boltenia villosa. Development, Genes and Evolution 2007, 271(6), 449-458.

Lockhart, V.; Liu, L.; Jiang, S. Interactions between Secreted Protein, Acidic and Rich in Cysteine (SPARC), and Type I Collagen Identified by Surface Plasmon Resonance Biosensor. Journal of Undergraduate Research in Bioengineering 2004, 4(2), 69-74.

MANNA IWABUCHI

San Diego State University
College of Sciences

Degrees:

B.A. in Natural Science, International Christian University

Scholar Sponsors:

The French and Masserini Funds at Wells Fargo

About the Scholar:

Manna's project involves the study of alpha-synuclein, beta-amyloid 1-40 and 1-42, and key neurotransmitters, biomolecules related to Parkinson's and Alzheimer's disease. The proteins are biomarker candidates that can be used for early diagnosis. The plan is to develop ultra-sensitive laser-based detection methods for these important biomolecules. So far, these studies have demonstrated that alpha-synuclein and key neurotransmitters are detected by laser-based method with better chemical selectivity levels, enhanced detection sensitivity levels and higher spectral and spatial resolution levels compared to currently available methods. These new tools for early diagnostic technique could scientifically help Parkinson's patients over the world.

Benefits to Society:

Manna is very motivated to study and develop new ultrasensitive laser-based methods to detect Parkinson's disease at early stages even before symptoms appear. Since Manna's grandparents suffered from Parkinson's, she has first-hand knowledge of the challenges associated with the disease. Currently the disease has no cure and the mechanism of what causes it is unclear. Early diagnosis of the disease is key to understanding the disease. These new tools for early detection could significantly help Parkinson's patients all over the world.

Awards and Honors:

Inamori Fellowship

Harry E. Hamber Memorial Scholar

Wilma Tyler Trott Memorial Scholar

Publications and Posters:

Gregerson, M.; Hetu, M.; Iwabuchi, M.; Jimenez, J.; Warren, A.; Tong, W. G. In Ultrasensitive standoff chemical sensing based on nonlinear multi-photon laser wave-mixing spectroscopy, 2012; pp 84970S-84970S-7

Hetu, M.; Iwabuchi, M.; Maxwell, E.; Wu, H.; Ramos, S.; Tong, W. G. In Zepto-mole detection in microfluidics by novel nonlinear multi-photon laser wave-mixing spectroscopy for biomedical and environmental applications, 2014; pp 91930T-91930T-7

Iwabuchi, M.; Hetu, M.; Pradel, J.; Tong, W.G In Ultrasensitive detection of protein biomarkers by nonlinear absorption based degenerate four-wave mixing, 2015 (Submitted)

MAGGIE JOHNSON

University of California San Diego
Scripps Institution of Oceanography

Degrees:

M.S. in Biology, California State University, Northridge

Professional M.S. in Marine Biology, Northeastern University

B.A. in Biology, Colby College

Scholar Sponsors:

Carlos and Sharon Arbelaez

About the Scholar:

Maggie grew up on the coast of Maine, and discovered her passion for the marine sciences in college. Maggie is particularly excited about coral reef seaweeds, as they are incredibly important for reef development and energy production. She is continuing to explore how reef organisms are affected by global change, mainly ocean acidification. Her research takes her to some of the most beautiful reefs on the planet: Hawaii, Polynesia, and the uninhabited Line islands of the central Pacific. She hopes to provide information on reef seaweeds that are more or less vulnerable to the changing ocean climate and inform policy that can be used to best manage reefs of the near-future.

Benefits to Society:

The goal of Maggie's research is to quantify the impacts of ocean acidification on critical foundation species on coral reefs. The data will provide information on the extent that ocean acidification has positive, negative or no effect on a variety of coral reef seaweeds, and on how ocean acidification impacts growth rates, photosynthesis and organic and inorganic production by seaweeds. The potential benefits to society will be in how this information is relayed to the parties responsible for policy and management decisions on coral reefs. By identifying species or even genera that are threatened by ocean acidification, information can be provided to conservation managers that inform local management strategies: ultimately working towards healthy, surviving coral reefs. Healthy coral reefs mean more money, jobs and food for coastal nations that rely directly on coral reef resources.

Awards and Honors:

Edna Bailey Sussman Foundation Award

Scripps Institution of Oceanography, Graduate Student Excellence Award

International Women in Fishing Association Scholarship

Outstanding Graduate Research Award, California State University, Northridge Department of Biology

Sally Casanova California Pre-Doctoral Award, California State University, Northridge

Publications and Posters:

Johnson, M. D.; Price, N. N.; Smith, J. E. Contrasting effects of ocean acidification on tropical fleshy and calcareous algae. PeerJ. 2014, 2, e411, http://dx.doi.org/10.7717/peerj.411.

Johnson, M. D.; Moriarty, V. W.; Carpenter R. C. Acclimatization of the crustose coralline alga Porolithon onkodes to variable pCO2. PloS One. 2014, 9, e87678.

Williams, G. J.; Price, N. N.; Ushijima, B.; Aeby, G. S.; Callahan, S.; Davy, S. K.; Gove, J. M.; Johnson, M. D.; Knapp, I. S.; Shore-Maggio, A.; Smith, J. E.; Videau, P.; Work, T. M. Ocean warming and acidification have complex interactive effects on the dynamics of a marine fungal disease. Proc. R. Soc., B, 2014, 281, 20133069.

Johnson, M. D.; Carpenter, R. C. Ocean acidification and warming decrease calcification in the crustose coralline alga Hydrolithon onkodes and increase susceptibility to grazing. J. Exp. Mar. Biol. Ecol. 2012, 434, 94-101.

TREVOR WILLIAM JOYCE

University of California, San Diego
Scripps Institution of Oceanography

Degrees:

B.S. in Biology, University of Alaska Southeast

Scholar Sponsors:

Virginia Lynch Grady Endowment

About the Scholar:

Trevor is studying how seabirds forage in a close symbiotic relationship with tunas and dolphins in the tropical Eastern Pacific Ocean. In his dissertation research, he is using several unique datasets of seabird observations from research vessels in the region over the last thirty years to document changes in the abundance, composition, and size of seabird flocks in relation to the tuna harvest levels and climatic variability. Trevor enjoys commuting to work on fun mountain biking trails. When traveling he enjoys learning about the natural and cultural history of his surroundings, and ends up taking thousands of photographs. He particularly enjoys bird and plant identification.

Benefits to Society:

Because of typically remote breeding colony sites and offshore feeding habitats, the important role of seabirds as mid-level predators in marine ecosystems is often underappreciated. Some seabird species play an additional role in maintaining the health of native plant and insect communities on islands where they breed, by transporting nutrients from the ocean to breeding colonies. Besides the intrinsic value of conserving these important components of marine and terrestrial ecosystems, the conservation of these species also has value to recreational and artisanal fishermen who rely on tropical seabirds to indicate the locations of fish schools. Because of this role as aids in fishing and historically as a food resource, many tropical seabirds hold great cultural significance to Pacific Island peoples. Finally, as human impacts on populations of large predators of the world's oceans grow, these seabird datasets provide a unique fisheries-independent indicator of marine ecosystem health.

Awards and Honors:

National Science Foundation, Graduate Research Fellowship

Michael Mullin Fellowship

Pacific Seabird Group, Best Student Poster Award, 39th Pacific Seabird Group Annual Meeting

Research Corporation of the University of Hawaii, Outstanding Employee of the Year Award

National Science Foundation, Research Experience for Undergraduates

Publications and Posters:

Joyce, T.W.; Eifler, D.A.; Powell, R.D. Variable habitat use influences the mating system of a Lesser Antillean anole. Amphibia-Reptilia 2010, 31, 395-401.

Joyce T.W. Abundance estimates of the Hawaiian Petrel (Pterodroma sandwichensis) and Newell's Shearwater (Puffinus newelli) based on data collected at sea, 1998-2011. Technical Report to U.S. Fish and Wildlife Service, 2013.

Joyce, T.W.; Ballance L.T. Model-based abundance estimates of the Hawaiian Petrel (Pterodroma sandwichensis) and Newell's Shearwater (Puffinus newelli) based on data collected at sea, 1998-2011. Pacific Seabird Group Annual Meeting, Portland, OR, Feb. 20-24, 2013.

Joyce, T.W.; Holmes, N.D.; Ballance L.T. Breeding season marine distribution and spatial habitat use of the Newell's shearwater from Kauai, Hawaii. Poster Presentation. Pacific Seabird Group Annual Meeting, Turtle Bay, HI, Feb. 7-11, 2012.

GUIPEUN KANG

University of California, San Diego
Department of Chemistry and Biochemistry

Degrees:

M.S. in Chemistry, Sookmyung Women's University

B.S. in Chemistry, Sookmyung Women's University

Scholar Sponsors:

Reuben H. Fleet Foundation Fund

About the Scholar:

Guipeun's research focuses on the folding dynamics of membrane protein by utilizing several spectroscopic methods: Circular Dichroism (CD), Fluorescence, Förster resonance energy transfer (FRET), and ultra-violet resonance Raman (UVRR). Here, one of the outermembrane protein family, beta-barrel Outermembrane protein A (OmpA), is used to achieve fundamental information on the dynamics of membrane protein folding as a model membrane protein. Guipeun enjoys traveling, hiking, and walking along the San Diego beach.

Benefits to Society:

This work could provide important information for drug targetable membrane protein structure and interaction between membrane protein and lipids bilayer. Although membrane proteins make up roughly 40 % of the proteome and act as drug targets (e.g. ion pumps, channels, and ligand receptors) of roughly 45 % of all therapeutic drugs, membrane protein folding is still not well understood due to experimental difficulties. Eventually, her research goal is to contribute to the current knowledge gap on the folding mechanisms of membrane proteins and to the fundamental information on the protein-lipid interactions during folding as potential drug target.

Awards and Honors:

NIH Heme and Blood Protein Training Grant Fellowship (UCSD)

Sookmyung Women's University Fellowship

Poster Awards in the 101st National Meeting, The Korean Chemical Society

Poster Awards in the 6th KIAS Conference on Protein Structure and Function

Publications and Posters:

Kang, G.; López-Peña, I.; Bhakta, S.; Kim, J.E. Probing membrane protein structure and dynamics by fluorescence. Encylopedia of Analytical Chemistry, 2013, In press

Kang, G.; López-Peña, I.; Oklejas, V.; Gary, C.S.; Cao, W.; Kim, J.E. Förster resonance energy transfer as a probe of membrane protein folding. Biochem. Biophys. Acta 2012, 1818, 154-161.

Sanchez, K.M.; Kang, G.; Wu, B.; Kim, J.E. Tryptophan-Lipid Interactions in Membrane Protein Folding Probed by Ultraviolet Resonance Raman and Fluorescence Spectroscopy. Biophys. J. 2011, 100, 2121-2130.

Chong, S.H.; Lee, C.; Kang, G.; Park, M.; Ham, S. Structural and Thermodynamic Investigations on the Aggregation and Folding of Acylphosphatase by Molecular Dynamics Simulations and Solvation Free Energy Analysis. J. Am. Chem. Soc. 2012, 133, 7075-7083.

JOE KAUS

University of California, San Diego
Department of Chemistry and Biochemistry, Physical Sciences

Degrees:

M.S. in Chemistry, University of California, San Diego

B.S. in Chemistry, University of Pittsburgh

Scholar Sponsors:

ARCS Foundation, Susan Hoekenga & Edward Gergosian

About the Scholar:

Joe is developing methods that will improve predictions for computer-aided drug design. Using computers to predict which drug molecules will successfully bind to a target protein helps improve the chance of finding new drugs. His published work improves the design of the calculations used in computer-aided drug design to overcome limitations encountered when using these methods. He is currently investigating potential antibacterial drugs that will target drug resistant bacteria. Joe enjoys spending time outdoors and traveling.

Benefits to Society:

By improving the methodology used in drug discovery, the time and costs needed for the development of new drugs is reduced. This work helps researchers trying to develop new drugs by providing a more efficient means to guide the drug development process using computer simulations. Joe will apply this methodology to study potential antibacterial drugs. Development of a new antibacterial drug would have a large impact towards treating patients with antibiotic resistant strains of bacteria.

Awards and Honors:

NIH Molecular Biophysics Training Grant

Silverman Award

Richard F. Zarilla Award

Rita R. and David A. Rossi, Sr. Scholarship

Publications and Posters:

Kaus, J.W.; Pierce, L.T.; Walker, R.C.; McCammon, J.A. Improving the Efficiency of Free Energy Calculations in the Amber Molecular Dynamics Package. J. Chem. Theory Comput. 2013, 9 (9), 4131-4139

Kaus, J.W.; Arrar, M.; McCammon, J.A. Accelerated Adaptive Integration Method. J. Phys. Chem. B, 2014, 118 (19), 5109-5118

Kim, O.M.; Blachly, P.G.; Kaus, J.W.; McCammon, J.A. Protocols Utilizing Constant pH Molecular Dynamics to Compute pH-Dependent Binding Free Energies. J. Phys. Chem. B, 2014 (In Press)

Zwier, M.C.; Kaus, J.W.; Chong, L.T. Efficient Explicit-Solvent Molecular Dynamics Simulations of Molecular Association Kinetics: Methane/Methane, Na+/Cl-, Methane/Benzene, and K+/18-Crown-6 Ether. J. Chem. Theory Comput. 2011, 7 (4), 1189-1197

BRANDON KIM

San Diego State University
College of Sciences

Degrees:

B.S. in Cellular and Molecular Biology, San Diego State University

Scholar Sponsors:

Reuben H. Fleet Foundation Fund

About the Scholar:

Brandon is examining how bacterial pathogens can interact with, and cross the blood brain barrier to cause meningitis. During bacterial meningitis this barrier is disrupted, allowing bacteria and immune cells to enter the central nervous system. *Streptococcus agalactiae* (Group B Streptococcus, GBS) is a leading cause of neonatal meningitis. To cause this disease, bacteria such as GBS possess certain factors that allow them to interact with and penetrate the blood brain barrier. Brandon's focus specifically is to examine the mechanisms by which GBS is able to disrupt the blood brain barrier during infection to cause meningitis. Brandon enjoys sailing and playing lacrosse in his spare time.

Benefits to Society:

The blood brain barrier is a critical barrier that has implications with many diseases such as meningitis, stroke, and other neurological disorders. Furthermore, this barrier represents an impasse for many marketable drugs leaving many neurological disorders unable to be treated effectively. This research highlights a completely novel mechanism of blood brain barrier disruption during an infectious disease. Understanding how the blood brain barrier reacts to stressors and becomes disrupted has implications regarding stroke and meningitis, but also has potential to design drugs that have the ability to cross the blood brain barrier to treat other neurological disorders.

Awards and Honors:

American Heart Association Graduate Research Fellowship

Rees-Stealy / San Diego State Heart Institute Graduate Research Fellowship

Kyoto Foundation Inamori Fellowship

Shiley Life Sciences Award

BIO International Genetic Engineering News GEN TEN Award

Publications and Posters:

Kim, B.J.; Hancock, B.H.; Reyes, E.; van Sorge, N.M.; Lauth, X.; Hilton, B.; Stotland, A.; Banerjee, A.; Buchanan J.; Wolkowicz, R.; Doran, K.S. 2015 Bacterial induction of Snail1 contributes to blood-brain barrier disruption. (Under Revision at Journal of Clinical Investigation)

Kim, B.J.; Hancock, B.H.; Del Cid, N.; Bermudez, A.; Traver D.; Doran, K.S.; 2015 Streptococcus agalactiae infection in zebrafish larvae. (Under Revision at Microbial Pathogenesis)

Banerjee, A.; Kim, B.J.; Carmona, E.M.; Cutting, A.S.; Gurney, M.A.; Carlos, C.; Feuer, R.; Prasadarao, N.V.; Doran, K.S. 2011. Bacterial Pili exploit integrin machinery to promote immune activation and efficient blood-brain barrier penetration. Nat Commun 2:462.

Seo, H.S.; Mu, R.; Kim, B.J.; Doran, K.S.; Sullam, P.M. 2012. Binding of glycoprotein Srr1 of Streptococcus agalactiae to fibrinogen promotes attachment to brain endothelium and the development of meningitis. PLoS Pathog 8:e1002947.

GENE KO

San Diego State University
Computational Science Research Center

Degrees:

B.S. in Bioengineering: Biotechnology, University of California, San Diego

Scholar Sponsors:

Joyce Butler/ARCS Foundation

About the Scholar:

Gene is developing computational models using data mining methods to study the interactions between HIV integrase and its inhibitor drugs. These models are used to understand the chemical features conducive for the inhibition of HIV and are used in the drug discovery process by identifying potential novel drug candidates from large chemical databases, saving time, money, and effort. Gene enjoys playing basketball in his free time.

Benefits to Society:

HIV is a worldwide epidemic with an estimated 33 million people infected with the virus and approximately two million deaths yearly resulting from the AIDS disease. Drug resistances in HIV have posed challenges in the anti-HIV drug development process, thus there is a great need for the development of new anti-HIV inhibitors tolerable to these mutations. By using computational models as a predictive tool to identify potential novel drug candidates from large chemical databases of existing compounds, the costs associated with the in vivo experimentation phase can be reduced by synthesizing a small subset of chemical compounds in the chemical library identified by the models, resulting in an expedited drug discovery process.

Awards and Honors:

CINF-FIZ Scholarship for Scientific Excellence, American Chemical Society

Love of Learning Award, Phi Kappa Phi

Los Alamos Award for Outstanding Poster Presentation, SDSU Computational Science Research Center

Publications and Posters:

Garg, R.; Ko, G. M. HIV Integrase Inhibitors: Qualitative and Quantitative Structure-Activity Relationship Studies. In Cancer-Causing Viruses and Their Inhibitors; Gupta, S. P., Ed.; CRC Press: Boca Raton, FL, 2014; pp 345-406.

Ko, G. M.; Reddy, A. S.; Garg, R.; Kumar, S.; Hadaegh, A. R. Computational Modeling Methods for QSAR Studies on HIV-1 Integrase Inhibitors (2005-2010). Curr. Comput.-Aided. Drug Des. 2012, 50, pp 225-270.

Ko, G. M.; Reddy, A. S.; Kumar, S.; Garg, R.; Bailey, B. A.; Hadaegh, A. R. Differential Evolution-Binary Particle Swarm Optimization Algorithm for the Analysis of Aryl ,-Diketo Acids for HIV-1 Integrase Inhibition. In IEEE World Congress on Computational Intelligence, Brisbane, Australia, 2012; pp 1849 – 1855.

Ko, G. M.; Reddy, A. S.; Kumar, S.; Bailey, B. A.; Garg, R. Computational Analysis of HIV-1 Protease Protein Binding Pockets. J. Chem. Inf. Model. 2010, 50, pp 1759-1771.

ADITYA KUMAR

University of California, San Diego
Jacobs School of Engineering

Degrees:

B.S. in Bioengineering, Rice University

Scholar Sponsors:

Roche/ARCS Foundation Scholar Award

About the Scholar:

Aditya is working on the development of a novel "disease-in-a-dish" niche which mirrors the dynamic extracellular changes that occur during myocardial infarction (MI). This niche will be used to identify novel pathways that could result in potential therapeutic solutions for the treatment and prevention of MI. In addition, Aditya is culturing patient-specific induced pluripotent stem cell-derived cardiomyocytes on this niche to better assess potential genetic susceptibility towards MI. Outside of lab, Aditya enjoys exercising and playing basketball.

Benefits to Society:

Myocardial infarction represents the leading cause of death in the United States. Therapeutic treatments are limited due to the inability to replicate the environmental changes associated with MI progression, namely the dynamic increase in stiffness of the infarcted tissue compared to the surrounding healthy tissue. The development of this novel biological substrate, coupled with stem cell-derived cardiomyocytes, allows for better understanding of altered cellular behavior in response to MI progression in addition to providing a platform for drug testing.

Awards and Honors:

National Science Foundation Graduate Research Fellowship

Distinction in Research and Creative Works, Rice University

Publications and Posters:

Wiltz, D. W.; Han, R. I.; Wilson, R. L.; Kumar, A.; Morrisett, J. D.; Grande-Allen, K. J. Differential Aortic and Mitral Valve Interstitial Cell Mineralization and the Induction of Mineralization by Lysophosphatidylcholine In Vitro. Cardiovasc. Eng. Technol. 2014, 5(4), 371-383.

Kumar, A.; Wiltz, D. W.; Grande-Allen, K. J. Gentamicin Reduces Calcific Nodule Formation by Aortic Valve Interstitial Cells In Vitro. Cardiovasc. Eng. Technol. 2013, 4(1), 16-25.

Kumar, A.; Wiltz, D. W.; Grande-Allen, K. J. In Vitro Modeling of the Effect of Gentamicin on Aortic Valve Interstitial Cell Calcification. Tissue Engineering & Regenerative Medicine International Society Conference, Houston, TX. December 12, 2011

SARAH LEBOEUF

The Scripps Research Institute
Kellogg School of Science and Technology

Degrees:

B.S. in Biology, University of Texas at Austin

Scholar Sponsors:

Union Bank

About the Scholar:

Sarah's research focuses on understanding what changes in tumor metabolism to promote a malignant phenotype in breast cancer. Her goal is to understand how the class of NAD+ dependent protein deacetylases, called sirtuins, function as cellular sensors of metabolism, and how changes in their activity may promote breast cancer progression. She is also exploring ways to 'normalize' tumor metabolism as a possible therapeutic approach.

Benefits to Society:

Sarah is studying how changes to tumor cell metabolism contribute to breast cancer progression. During transformation, cells undergo several metabolic changes that may contribute to disease progression. Understanding changes that promote a malignant phenotype will give scientists and doctors a better understanding of breast cancer progression and metastasis. Sarah is studying specifically how a group of proteins called sirtuins, which modify the function and activity of a wide variety of other cellular proteins, regulate tumor metabolism.

Awards and Honors:

NIH Clinical and Translational Science Awards Traineeship

The Scripps Research Institute Dean's Fellow

Signature Science Excellence in Chemistry Research Award

Publications and Posters:

Santidrian, A.F., LeBoeuf, S.E., Wold, E.D., Ritland, M., Forsyth, J.S., Felding, B.H, Nicotinamide phosphoribosyltransferase can affect metastatic activity and cell adhesive functions by regulating integrins in breast cancer. DNA Repair. 23, 79-87.

Santidrian, A.F.; Yagi, A.M.; Ritland, M.; Seo, B.B.; LeBoeuf, S.E.; Yagi, T. Felding-Habermann, B.; Enhancement of the NAD+/NADH redox balance by mitochondrial complex 1 activity and NAD+ precursor treatment inhibit breast cancer progression and metastasis. J. Clin. Invest. 2013, 123, 1068-1081.

Chung, M.I.; Peyrot, S.M.; LeBoeuf, S.E.; Park, T.J.; Marcotte, E.M.; Wallingford, J.B. RFX2 is broadly required for ciliogenesis during vertebrate development. Developmental Biol. 2012, 1, 155-165.

Umail, A.P.; LeBoeuf, S.E.; Newberry, R.W.; Kim, S.; Tran, L.; Rome, W.A.; Tian, T.; Taing, D.; Hong, M.; Kwan, Heymann, H.; Anslyn, E.V. Discrimination of flavonoids and red wine varietals by arrays of differential peptidic sensors. Chemical Sci. 2010, 2, 439-445.

SARAH LEINWAND

University of California, San Diego
Neurosciences Graduate Program

Degrees:

B.A. in Biological Basis of Behavior, University of Pennsylvania

Scholar Sponsors:

ARCS Foundation

About the Scholar:

Sarah's research aims to increase our understanding of how the brain processes information about the environment to generate appropriate behaviors. Recently, Sarah has begun investigating how the aging process changes how sensory cues such as smells are processed. She is also passionate about science education, and has spent many hours designing hands-on, experiment-based lessons to teach students of all levels about the brain. When she is not in the lab or teaching, Sarah enjoying hiking, traveling and cooking.

Benefits to Society:

The senses of smell and taste are essential for finding good quality food and for avoiding toxins. Sarah's research contributes to our understanding of the enormous complexity of how the brain represents information about smell and taste and processes it to drive many different behaviors. In particular, her research revealed that the connections between the cells in the brain are flexible, and information can be routed through different networks of these cells depending on the sensory context. This suggests there is no single map of the brain; rather, there are many different maps that correspond to different paths through the brain that are active at different times.

Additionally, Sarah's work provides new insights into the aging process. In people and other animals, the sense of smell declines greatly with old age, this is called presbyosmia. Sarah's research suggests new mechanisms that may underlie these declines. This research and work by others shows that olfactory abilities may be predictive of health and longevity, which could have broad implications for society. Perhaps this work will be the basis for new treatments for age-associated loss of olfactory function.

Awards and Honors:

National Science Foundation Graduate Research Fellowship

Leon Thal Award for Excellence in Neurosciences Graduate Research (at UCSD)

Salk Society of Research Fellows and Fine Science Tools Travel Award 2014

Fine Science Tools Travel Award 2012

Timken Sturgis Foundation Award

Publications and Posters:

Leinwand S.G., Yang C.J., Chalasani S.H. Age-dependent decline of neurotransmission in distributed olfactory neural circuits. 2015. In preparation.

Leinwand S.G. and Chalasani S.H. From genes to circuits and behaviors: neuropeptides expand the coding potential of the nervous system. Worm 2014, 3.

Leinwand S.G. and Chalasani S.H. Neuropeptide signaling remodels chemosensory circuit composition in Caenorhabditis elegans. Nat Neurosci 2013, 16(10), 1461-7.

Leinwand S.G. and Chalasani S.H. Olfactory Networks: from sensation to perception. Curr Opin Genet Dev 2011, 21(6), 806-11.

JASON LEONARD

University of California, San Diego
Department of Physics, College of Sciences

Degrees:

M.S. in Physics, University of California, San Diego

B.S. in Physics, Harvey Mudd College

Scholar Sponsors:

Kenneth & Marjorie Blanchard

About the Scholar:

Jason is researching excitons, electrically controllable particles that are easily created by light and easily converted back into light. He has designed and studied various optical circuit components using these exotic particles. These devices include an optical transistor, diode and a primitive CCD, the same technology that digital cameras are based on. Excitonic devices potentially allow for easier and faster manipulation of light. This technology has the potential to improve the speed and further miniaturize telecommunication devices.

Benefits to Society:

The expected benefit to society is that these devices will make it easier to manipulate light, potentially improving optical communication devices. The development of optical circuit components that can be integrated into conventional electronic circuits will allow for lower chip to chip communication time in computers.

Awards and Honors:

Chateaubriand Fellowship

Publications and Posters:

High, A. A.; Hammack, A. T.; Leonard, J. R.; Yang, Sen; Butov, L. V.; Ostatnicky, T.; Vladimirova, M.; Kavokin, A. V.; Liew, T. C. H.; Campman, K. L.; Gossard, A. C. Spin currents in a coherent exciton gas. Physical Review Letters 2013, 110, 246403.

Leonard, J. R.; Remeika, M.; Chu, M. K.; Kuznetsova, Y. Y.; High, A. A.; Butov, L. V.; Wilkes, J.; Hanson, M.; Gossard, A. C. Transport of Indirect Excitons in a Potential Energy Gradient, Applied Physics Letters 2012, 100, 231106.

High, A. A.; Leonard, J. R.; Hammack, A. T.; Fogler, M. M.; Butov, L. V.; Kavokin, A. V.; Campman, K. L.; Gossard, A. C. Spontaneous Coherence in a Cold Exciton Gas. Nature 2012, 483, 584.

Winbow, A. G.; Leonard, J.R.; Remeika, M.; Kuznetsova, Y. Y.; High, A. A.; Hammack, A. T.; Butov, L. V.; Wilkes, J.; Guenther, A.; Ivanov, A. L.; Hanson, M.; Gossard, A. C. Electrostatic conveyer for excitons. Physical Review Letters 2011, 106, 196806.

ERIC LINDSEY

University of California, San Diego
Scripps Institution of Oceanography

Degrees:

M.S. in Physics, University of Oregon

B.A. in Physics, Reed College

Scholar Sponsors:

Ellen Browning Scripps Foundation

About the Scholar:

Eric is studying patterns in the slow, gradual motion of the ground that leads to major earthquakes in California and elsewhere. By precisely mapping the areas where the most stress is accumulating, we can better understand the processes responsible for these natural disasters, and also where they may occur next. These data will also lead to improved computer simulations of the earthquake process, which Eric is working to develop. In addition to research-related field work in the deserts of Southern California and northern Mexico, Eric enjoys playing soccer, backpacking, cycling, and running.

Benefits to Society:

Earthquakes are among the most devastating and destructive natural hazards, responsible for hundreds of thousands of deaths worldwide in the last decade alone. Yet despite decades of research, true earthquake prediction remains outside our grasp. New geodetic, seismic, and computer modeling techniques will lead to a better understanding of the processes responsible for these events. Even if we do not succeed in predicting a specific event, our improved understanding will lead to better maps of long-term hazard and allow for more effective preparation against the inevitable, here in California and worldwide. Additionally, a better understanding and appreciation for the Earth's natural history and the massive forces that shape it is a benefit to society, allowing us to place our lives and histories in a greater context.

Awards and Honors:

Shepard Foundation field research award

Scripps Institution of Oceanography Director's Fellowship

Phi Beta Kappa

Academic Excellence, Reed College

Publications and Posters:

Lindsey, E. O.; Fialko, Y.; Bock, Y.; Sandwell, D. T.; Bilham, R. Localized and distributed creep along the southern San Andreas Fault. J. Geophys. Res. 2014, 119, 7909-7922.

Lindsey, E. O.; Sahakian, V. J.; Fialko, Y.; Bock, Y.; Barbot, S.; Rockwell, T. K. Interseismic strain localization in the San Jacinto fault zone, Pure Appl. Geophys. 2013, 171, 2937-2954.

Lindsey, E. O.; Fialko, Y. Geodetic Slip Rates in the Southern San Andreas Fault System: Effects of Elastic Heterogeneity and Fault Geometry, J. Geophys. Res. 2013, 118, 689-697.

MONIQUE A. LINEBACK

University of San Diego
Hahn School of Nursing and Health Science

Degrees:

M.S.N. in Nursing, University of San Diego

A.D.N. in Nursing, Palomar College, San Marcos

B.A. in Critical Gender Studies University of California, San Diego

Scholar Sponsors:

The Beyster Family Foundation Fund IV

About the Scholar:

Monique's goal is to identify strategies that will promote health in vulnerable populations. Her experience with her own family has reinforced the importance of the role of mothers in promoting the health of their children through diet, exercise, other positive health practices and family support. However, many women are unaware of these health practices and lack access to information regarding health promotion strategies. Her research aim is to increase women's' awareness of the importance of positive health practices to improve health outcomes for themselves and their families.

Monique's experience as a nurse in the critical care unit has increased her awareness of the need for developing a healthy lifestyle and preventing chronic illness or mediating the negative effects of such illnesses when possible. However, many women face barriers to achieving a healthy lifestyle for themselves and their families. These can be socioeconomic factors, lack of education, environmental risk-factors, and/or lack of access to health care. She intends to focus on a specific population of women experiencing health disparities, identify barriers to achieving healthy outcomes and develop strategies that can improve the health of these women and their families.

Benefits to Society:

Women are the major health brokers of their families in terms of life-style, eating habits, stress reduction and other factors of daily living. However, many women continue to experience barriers to obtaining information regarding lifestyle changes that could improve health outcomes as well as limited access to health care. Although there is a significant body of research related to health promotion and behavior change, it frequently does not address the unique needs of women who may be disadvantaged by race, ethnicity, sociocultural factors, economic status or other factors that increase health disparities. If these barriers could be identified for a specific group of women, then more effective strategies for health promotion interventions could be developed and evaluated for effectiveness.

Awards and Honors:

Nurse Traineeship Award

Nurse Faculty Loan Forgiveness Program Award

GABRIELLA MALAGON-MALDONADO

University of San Diego
Hahn School of Nursing and Health Science

Degrees:

D.N.P., Western University of Health Sciences, Pomona

MSN, California State University, Fresno
BSN, California State University, Frenso

Scholar Sponsors:

The Beyster Family Foundation Fund IV

About the Scholar:

Gabriella's research focuses on identifying antepartum, intrapartum, and postpartum predictors of readiness for hospital discharge and post-discharge coping after birth. In this capacity, she works in collaboration with obstetrical providers to facilitate a safe transition to home after hospital discharge and improve the provision of services to mothers and families at risk for adverse health outcomes. Her work focuses on improving clinical practice by responding to adverse health outcomes for women and their families.

Benefits to Society:

Health care providers can utilize the results from this research to identify mothers at risk for discharge unreadiness in the antepartum, intrapartum, and postpartum periods to implement specific interventions for maternal support along the continuum of care. Assessment of maternal vulnerabilities paired with individualized patient care and education can then effectively be incorporated into daily practice along with clinical guidelines and policies with local providers, hospitals, insurers, patients/families, and social agencies to improve the overall health and wellness of childbearing women.

Awards and Honors:

University of San Diego Merit Scholar

University of San Diego, Hahn School of Nursing and Health Science Dean's Scholar Award

Sigma Theta Tau International Honor Society of Nursing Excellence in Nursing Award Recipient

Sharp HealthCare Center of Nursing Excellence Scholarship Recipient

Sade E. Smith Scholarship Recipient

Publications and Posters:

Malagon-Maldonado, G. Qualitative Research for Health design. Health Environments Research and Design Journal, 2014, 7, 134-148.

Malagon-Maldonado, G.; O'Brien, J. Professional Development Education-An Integral Component of Nurse Mentor Programs, National Nurse Mentoring Institute, Podium Presentation, Atlantic City, NJ Nov 6-7, 2014.

Malagon-Maldonado, G.; Burr, S.G. Implementation of a Nurse Residency Program in a Women and

Newborn's Specialty Hospital: A Magical Transformation. Association of Women's Health, Obstetric, and Neonatal Nurses 2014 Annual Convention, Podium Presentation, Orlando, FL, June 14-18, 2014.

Malagon-Maldonado, G. (2013). Using an Inquiry Based Approach to Understand Interprofessional

Collaboration. National Association of Clinical Nurse Specialist National Conference, Podium Presentation, San Antonio, TX, March 6-8, 2013.

Malagon-Maldonado, G. Reframing the Interprofessional Approach to Care for Long-Term Acute Care Patient: An Exploratory Study to Inform a New Model for Collaborative Practice. [Online] 2013, http://www.knowledge.scot.nhs.uk/practitioner-forums/resources-library/topics (accessed Dec 16, 2014).

FREDERICK MATSUDA

University of California, San Diego
Center for Astrophysics and Space Sciences

Degrees:

B.A. in Astrophysics, B.A. in Physics,
University of California, Berkeley

Scholar Sponsors:

ARCS Foundation/Karen & Bob Bowden

About the Scholar:

Frederick is researching the physics of the early universe through observing remnant light left over from the Big Bang. He is a member of the POLARBEAR experiment and has helped develop a radio telescope located in San Pedro de Atacama in Chile, which he is using to detect a polarized signal that can potentially be the strongest evidence or proof of a widely accepted and mainstream theory of the beginnings of our universe. He is a second generation Japanese American and has spent most of his life in the Bay Area. In his free time he enjoys going out with friends in the Japanese community. He also enjoys cooking and inviting friends over for dinner and visiting new places and restaurants in San Diego and Los Angeles. Recently he enjoys wine tasting in Temecula.

Benefits to Society:

This research will further the understanding of the physics of the origins of the universe. If primordial B-modes are detected, it will have a tremendous impact on the astrophysics and physics communities because it will be the strongest evidence to support the inflationary theory of the Big Bang model - currently the most widely accepted theory of the early universe. Currently there is large debate on the influence of cosmological dust that contaminates the B-mode signal which has created further interest in the field. Even if the B-modes are not detected, this fact will rule out many mainstream theories of the early universe. Studying cosmology allows us to understand how the current universe came to be. This research will influence many other physics fields because inflationary cosmology involves all fundamental physics such as general relativity, quantum mechanics, and statistical mechanics. Understanding the Big Bang allows us to further enhance and develop the theories of all fundamental physics, which in turn influences technological advancement as well.

Awards and Honors:

Inamori Fellowship
UCSD Graduate Research Fellowship
UCSD Physics Excellence Award
Undergraduate Research Apprentice Program Summer Employment Award

Publications and Posters:

POLARBEAR Collaboration. Measurement of the Cosmic Microwave Background Polarization Lensing Power Spectrum with the POLARBEAR Experiment. Physical Review Letters. July 2014, 113, 021301.

POLARBEAR Collaboration. A Measurement of the Cosmic Microwave Background B-Mode Polarization Power Spectrum at Sub-Degree Scales with POLARBEAR. The Astrophysical Journal. October 2014, 794, 171.

POLARBEAR Collaboration. Evidence for Gravitational Lensing of the Cosmic Microwave Background Polarization from Cross-Correlation with the Cosmic Infrared Background. Physical Review Letters. April 2014, 112, 131302.

T. Tomaru et al. The POLARBEAR-2 Experiment. Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy VI. Proc. SPIE 8452.

SARAH MCCULLOUGH-HENNESSY

San Diego State University
College of Sciences

Degrees:

M.S. in Horticulture & Agronomy,
University of California, Davis

B.A. in Biology, Yale University

Scholar Sponsors:

Thomas C. Ackerman Foundation

About the Scholar:

Sarah studies the consequences when threatened species choose to settle in habitat that has been recently changed by human activities, exposing them to new dangers. Her work links individual (wildlife) behavior to population-level outcomes and habitat management. Her research combines field-based and computational approaches to support local populations of the Western Burrowing Owl, by developing both better management methods, and better prediction of likely outcomes for owl colonies in different habitat scenarios, in order to help managers evaluate their options and make good decisions. Sarah and her husband welcomed the birth of a daughter in 2014.

Benefits to Society:

When urban development pressure and species habitat needs collide, science-based analysis is crucial for good conservation decisions that avoid making situations worse. For many wildlife species, enough research has been done to give partial information about how best to manage a species, but there are always unanswered questions. These computational and statistical tools evaluate the current knowledge and uncertainty in conservation and management decision-making, to support good decisions.

Awards and Honors:

Sefton Summer Fellowship, San Diego Zoo's Institute of Conservation Research, 2009

UC Davis Plant Sciences Departmental Assistantship for 2008-2009

Phi Sigma, Biological Sciences Honor Society, 2008

Henry A. Jastro and Peter J. Shields Graduate Research Scholarship Awards, 2007

Publications and Posters:

McCullough, S.A.; Whiting, M.L.; O'Geen, A.T.; Sarr, D.A.; Tate, K.W. Quantifying the impact of conifer succession on understory diversity in aspen stands: reduced function in a biodiversity-supporting community. Environ. Monitor. Assess. 2013, 185(7), 5563-5576.

McCullough, S.A.; Endress, B.A. Do postfire mulching treatments affect plant community recovery in California sage scrub lands? Environ. Manage. 2012, 49(1), 142-150.

Beard, K.H.; McCullough, S.; Eschtruth, A. A quantitative assessment of habitat preferences for the Puerto Rican terrestrial frog, Eleutherodactylus coqui. J. Herpetol. 2003, 37(1), 10-17.

FRITZI MCDONALD

University of San Diego
Hahn School of Nursing

Degrees:

M.B. A., Naval Postgraduate School, Monterey, CA

M.S. in Nursing Informatics, University of Maryland, Baltimore

B.S. in Nursing, University of Texas Health Science Center, San Antonio

Scholar Sponsors:

Hervey Family Non-Endowment Fund

About the Scholar:

Fritzi is a registered nurse and served in the Navy for 22 years. Her work experience has been in the specialty field of healthcare informatics. The focus of her research is how to leverage health information technology to improve the work of clinicians and patient outcomes. Fritzi is examining clinical decision support and its application to nursing. She is looking to define the key characteristics of clinical decision support. Her aim is to improve the development of clinical decision support by developing standard requirements based on the key characteristics.Fritzi spends her off time enjoying her family, traveling and antiquing.

Benefits to Society:

This research will further the understanding of how health information technology can be used to promote patient safety and improve patient outcomes. Clinical Decision Support provides information to clinicians to support decision making and interventions while caring for patients. The adoption rate of electronic health records has increased significantly in recent years. Clinical Decision Support continues to evolve and there are multiple delivery formats. Electronic health records have different functionalities and capabilities based on the software vendors. Healthcare organizations work with software vendors to develop clinical decision support. It is unknown which delivery format has the most significance in providing the right information, at the right time, to the right clinician. The value of clinical decision support in healthcare includes quality of the care delivered, patient safety, decreasing cost, documentation, and communication.

KATHLEEN MCGUIRE

University of San Diego
Shiley-Marcos School of Engineering

Degrees:

B.S./B.A. in Electrical Engineering

Scholar Sponsors:

WD-40 Company

About the Scholar:

As an undergraduate, Kathleen has always felt an unquenchable need to learn. Whether the topic is the vastness of space, the interactions between molecules, or the derivations of mathematical equations, she is interested in learning and excited to explore new topics. By studying engineering, she is able to understand the interconnected relationship between electrical engineering and different fields of study, providing her with a way to learn about and explore a multitude of topics. At the same time, she gets to work to find innovative answers to the complex problems of today's society. Another draw to electrical engineering is its heavy dependence on mathematics and the understanding of physics. She enjoys taking the concepts and theories of math and physics and applying them to create real-world solutions. In the future Kathleen sees herself continuing to graduate school, although her exact area of study is still unknown. She enjoys playing tennis, reading, and playing with her dog. As she is from Colorado, she has a natural inclination toward the outdoors, gravitating towards hiking and swimming.

Benefits to Society:

The research Kathleen has worked on will help future generations of undergraduate engineers coming through the University of San Diego. The device that she has created will allow for a hands-on experience in lab, which will help the students grasp the concepts they've learned in lecture better. Instead of just seeing derivations and theories on the board, the students will be able to go into the lab and use the simulator to physically manipulate the properties of three-phase power systems that they've learned about. This is important because it will provide a deeper and different understanding, which otherwise would not be possible. Everyone learns differently, so providing multiple ways to see a concept is important in creating an inclusive and efficient learning environment.

Awards and Honors:

2013/2014 Outstanding Sophomore/Junior Engineer Award

Dean's List and First Honors, all semesters

Alcala Academic Scholarship

TIM MONTGOMERY

San Diego State University
College of Sciences

Degrees:

B.S. in Chemistry, The College of William and Mary

Scholar Sponsors:

Tyler & Diane Miller

About the Scholar:

Tim's research focuses on developing new methodologies utilizing a proprietary copper catalyst and its applications towards more efficient, economic, and "greener" synthetic routes of natural product compounds. He is currently using this methodology to help him synthesize the natural product azaspirene, a new potent anticancer drug, and other members of the pseurotin structural family that show a wide range of potential therapeutic properties including anti-fungal and anti-bacterial properties. The end goal is to enable ample amount of these potent therapeutics for aid in drug development studies. His research interests are in synthetic organic chemistry as it applies to the total synthesis of therapeutically active natural product compounds. Specifically, he is interested in new methodologies allowing for more efficient and economic synthesis of natural product molecules but in his free time he enjoys surfing and camping.

Benefits to Society:

Tim's research benefits society by supporting efficient, economic and "greener" synthetic routes for new therapeutically active natural product compounds to facilitate drug development. New natural product compounds are constantly being discovered that show potential as new drug compounds. However, obtaining an ample amount of these novel, natural product compounds can be problematic. An abundant supply of a new drug compound is necessary to undergo the rigorous drug development process required for these compounds to become commercialized drugs.

Publications and Posters:

Schmit, D.; Barker, M.; Montgomery, T.; Mendez, Y.; Bergdahl, M. Diversity Oriented Total Synthesis of Pseurotin Analogs: Powerful Inhibitors of Angiogenesis and Inflammation, 2012 CSU Biotechnology Symposium, Santa Clara, CA, January 2012.

EMILY NARDONI

University of California, San Diego
Department of Physics

Degrees:

B.S. in Physics, Massachusetts Institute of Technology

Scholar Sponsors:

Ellen Browning Scripps Foundation

About the Scholar:

Emily is interested in studying the mathematical structure of the most fundamental theories of nature--theories of particle physics. To this end, she studies the framework of quantum field theory, which is one of the most accurate in modern physics and best describes particle physics. There are still many conceptual gaps in our understanding of quantum field theory which she hopes her research can help close. By trying to understand the language in which physical theories are written, she hopes to gain a better understanding of particle physics itself. She is interested in studying quantum field theory via nonperturbative methods in supersymmetric theories. Often the only method available in the framework of quantum field theory is perturbation theory, which breaks down at strong coupling. To get around this limitation, particle theorists utilize the powerful tools of supersymmetry and duality. Supersymmetric models have an extra symmetry which often allows exact determination of some nonperturbative properties of field theories. The concept of duality is fundamental to the structure of physical theories, relating two seemingly different physical theories in unexpected ways. Emily's research hinges on the many insights that have come from studying the role of duality in strongly coupled non-Abelian gauge theories. She studies, in particular, the many puzzling aspects of duality in supersymmetric quantum chromodynamics, a class of quantum field theories that exhibit Seiberg duality. Emily enjoys cooking, making espresso, running, and watching movies.

Benefits to Society:

The framework of quantum field theory encompasses the mathematical structure of particle physics, condensed matter systems, and the physics of the early universe, accurately describing experiments in all contexts. Because it is such a broad and fundamental framework in modern physics, it is important that we better understand what it can and cannot teach us, and search for new ways to ask questions in physics whose answers are not limited by the current framework. Already progress towards new and more efficient ways of thinking about quantum field theory has led to new insights across several disciplines in physics, from fluid dynamics to general relativity, and it is likely that continuing this line of research will continue to have far-reaching and unexpected consequences across the whole field of physics.

Awards and Honors:

Disney Scholars award, provided by Walt Disney Co. Foundation

MORGAN NUNN MARTINEZ

University of California, San Diego
Division of Physical Sciences

Degrees:

M.S. in Chemistry, University of California, San Diego

B.S. in Chemistry, Georgia Institute of Technology

Scholar Sponsors:

Virginia Lynch Grady Endowment

About the Scholar:

Morgan seeks to refine theories of how water was formed and distributed throughout our solar system through her research. To accomplish this, she measures the oxygen isotopic composition of water she extracts from meteorite and lunar rock samples. She is working to help elucidate the primary source(s) of water in the Earth-Moon system, knowledge of which is crucial in the search for potentially habitable planets besides our own. When not in lab, Morgan enjoys cycling, yoga, traveling, and making myriad forms of art.

Benefits to Society:

This research could be used to better understand why life arose uniquely on Earth in our solar system and which exoplanets could host liquid water, and therefore, be potentially habitable. Analyses of water in a meteorite from Mars have already been used to refine theories of how the Mars planet formed. The excitement engendered by describing this work is infectious and will, I hope, inspire a curiosity for science and the pursuit of knowledge.

Awards and Honors:

NASA Earth and Space Science Fellowship recipient (2012-present)

Zonta International Amelia Earhart Fellowship for women pursuing doctoral degrees in aerospace-related sciences recipient (2013 and 2011)

Association for Women in Science (AWIS) Scholarship Award recipient (May 2012)

Dr. Richard W. Fink Memorial Scholarship for academic excellence, awarded by the Georgia Institute of Technology Department of Chemistry and Biochemistry, recipient (2004)

Chemical Rubber Company (CRC) Award in Freshman Chemistry for obtaining the highest grade point average of freshman students majoring in chemistry, awarded by the Georgia Institute of Technology Department of Chemistry and Biochemistry, recipient (2004)

Publications and Posters:

Jenniskens, P., et al. (2012) Science, 338, 1583.

Agee, C. B., et al. (2013) Science, 339, 780-785.

Martinez, M. H. and M. H. Thiemens (2014) AGU Fall Meeting in San Francisco, CA, #P11D-06.

Martinez, M. H. and M. H. Thiemens (2014) 77th Annual Meteoritical Society Meeting in Casablanca, Morocco, #5192.

EDWARD O'BRIEN

University of California, San Diego
Jacobs School of Engineering

Degrees:

B.S. in Mathematics, Tufts University
B.S. in Engineering Science, Tufts University

Scholar Sponsors:

Legler Benbough Foundation

About the Scholar:

Edward studies the evolution of microbes. He develops mathematical models to predict the behavior of microbes after evolution: how fast they will grow, what they will consume and produce, and what proteins they will express. As microbes grow so quickly, the response and time-course of evolution under specific selection pressures (e.g., nutrient availability, temperature, the presence of other organisms) can be observed in the lab. He compares the genetic and molecular changes observed in the lab to his model predictions to validate and refine the model. In his free time, Edward enjoys the San Diego sun by running and going to the beach.

Benefits to Society:

All of biology is grounded in evolution. Consequently, the optimality principles and biological constraints that underlie the evolution of microbes apply to more complex organisms and ecosystems as well. Furthermore, microbial evolution can be used as an engineering tool in biotechnology: with this mathematical model, selection pressures can be designed to evolve organisms to perform useful functions. Some of these useful functions include the degradation of environmental pollutants and the production of chemicals or pharmaceuticals.

Awards and Honors:

Summa Cum Laude

Tau Beta Pi

NSF Graduate Research Fellowship Honorable Mention

Publications and Posters:

O'Brien, E.J.; Lerman, J.A.; Chang, R.L.; Hyduke, D.R.; Palsson, B.O. Genome-scale models of metabolism and gene expression extend and refine growth phenotype prediction. Mol Syst Biol. 2013, 9:693.

Lerman, J.A.; Hyduke, D.R.; Palsson, B.O.; O'Brien, E.J. Method for in silico modeling of gene product expression and metabolism. U.S. Patent Appl. WO2013170031 A1, Nov. 14, 2013.

LaCroix, R.A.; Sandberg, T.E.; O'Brien, E.J.; Utrilla, J.; Ebrahim, A.; Guzman, G.I.; Szubin, R.; Palsson, B.O., Feist A.M. Use of Adaptive Laboratory Evolution To Discover Key Mutations Enabling Rapid Growth of Escherichia coli K-12 MG1655 on Glucose Minimal Medium. Appl. Environ. Microbiol. 2014, pii: AEM.02246-14.

O'Brien, E.J.; Liu, J.; Ebrahim, A.; Utrilla, J.; Lerman, J.A.; LaCroix, R.A.; Feist, A.M.; Palsson, B.O. Computing Proteome Abundance and Activity with a Genome-scale Model of Metabolism and Gene Expression, Metabolic Engineering X, Canada, Vancouver, June 15-19 2014.

MATT ONDECK

University of California, San Diego
Sanford Consortium for Regenerative Medicine

Degrees:

M.S. in Materials Science and Engineering, University of California San Diego
B.S. in Materials Science and Engineering & Bioengineering, Carnegie Mellon Univ.

Scholar Sponsors:

Hervey Family Non-Endowment Fund

About the Scholar:

Matthew's current research consists of designing a material to simulate various cellular states such as breast cancer, while his past research has included magnetic materials and diagnostic devices. Matthew enjoys a variety of activities including sailing, hiking, and playing basketball.

Benefits to Society:

Critical processes such as development and tumor formation are all based out of dynamically stiffening tissues. Due to the complexities of developing a dynamic model, these systems are rarely simulated, which hinders researchers ability to fully understand the mechanisms by which they evolve. The ability to mimic a variety of dynamic biological substrates will allow researchers to investigate a myriad of cellular states, such as a myocardial infarction, where the resulting scar tissue is much stiffer than the surrounding heart tissue. The novelty and innovativeness of this project poses to contribute to the overall wealth of knowledge in the scientific community.

Awards and Honors:

NSF GRFP Fellowship 2013

ASCB 2013-2014 Poster Presentee

Publications and Posters:

Hribar, K.C., Choi, Y.S., Ondeck, M., Engler, A.J., and Chen, S. Digital Plasmonic Patterning of Hydrogels. Adv Funct Mat. 2014, 24(31) 4922-26

Young, J.L, Kretchmer, K, Ondeck, M.G., Zambon, A.C., Engler, A.J. Mechanosensitive Kinases Regulate Stiffness-Induced Cardiomyocyte Maturation. Scientific Reports. 2014, 4(6425).

Ondeck, M.G., Engler, A.J., Dynamic Materials Mimic Deveolpmental and Diesease Changes in Tissues. IN Bio-inspired Materials for Biomedical Engineering. Brennan, A.B, Kirschner, C.M. Wiley-Soceity for Biomaterials, 25-45.

A.Habib, M.Ondeck, K.Miller, R.Swaminathan, M.McHenry; Novel solder-magnetic particle composites, their reflow using AC magnetic fields; IEEE Journal; Trans on Magnetics;Vol.46,No.6, 2187-90; 6/2010

TAWNI PARADISE

University of San Diego
Shiley-Marcos School of Engineering

Degrees:

B.S. & B.A. in Industrial & Systems Engineering

Scholar Sponsors:

WD-40 Company/ARCS Foundation

About the Scholar:

Tawni is focusing on green compost to find bacteria that will speed the decomposition rates of some materials. When certain items get dumped into a landfill, it can take a long time for them to decompose and break down. Accelerating decomposition rates at landfills will improve the efficiency with inflow and the amount of time materials spend in the dump. In addition to this research, she is conducting research in regards to the mechanical properties of composite samples when they are coated with an acidic or basic coating before they are coated with the resin of the composite. She is also involved in a project dedicated to improving the design of a stove that is commonly used in the Dominican Republic. She recently visited there and had the privilege of building and installing these stoves into family homes. In her spare time, Tawni enjoys volunteering with animal rescue organizations, from which she previously rescued her Saint Bernard and her two domestic short haired cats.

Benefits to Society:

When materials decompose, there are bacteria that grow on the surface of the material that can aid in the decomposition rates. In other words, some bacteria can lessen the time it takes to break down materials in a landfill. Tawni hopes that by mimicking the landfill environment she will be able to identify bacteria on the surface, and in the future if these identified bacterias are added to landfills, they can aid in speeding up the decomposition rates. The mechanical properties research, if positive, will serve to inform society of stronger and more capable composite options. In addition, the stove project will benefit the society in the Dominican Republic greatly by reducing the cost of making a stove; thus making stoves more available to families in need.

Awards and Honors:

Alcala Scholarship from USD

UPS Scholarship for Women from Institute of Industrial Engineers

Tau Beta Pi Scholarship

Academic Excellence in Industrial & Systems Engineering at a Senior standing level

University of San Diego Alcala Club

KATY PATRAS

San Diego State University/
UC San Diego Joint Doctoral Program

Cell and Molecular Biology, College of Sciences, San Diego State University

Degrees:

B.S. in Animal Science, University of Nebraska-Lincoln

Scholar Sponsors:

ARCS Foundation

About the Scholar:

Kathryn researches the interactions of bacteria within the female reproductive tract. One bacteria, Group B Streptococcus (GBS), colonizes the vaginal tract of healthy women. However, during pregnancy and labor, GBS can be transmitted to newborns and cause serious diseases such as pneumonia and meningitis. GBS is currently the leading cause of invasive neonatal disease in the United States. Kathryn focuses on identifying bacterial factors that promote GBS vaginal colonization and characterizing the host immune responses to GBS. In her free time, Kathryn enjoys running and spending time with her family.

Benefits to Society:

Since there is currently no vaccine available for GBS, and current antibiotic prophylaxis is not completely effective with over 2000 births affected with GBS each year in the U.S., there is a need for novel strategies to prevent colonization of the vaginal tract and subsequent spread to the newborn. This research project has already identified several GBS bacterial surface proteins and regulatory genes that promote colonization within the host, as well as established several early and late host immune responses. Additionally, this mouse model of GBS vaginal colonization has been utilized to test two therapeutic therapies which have both demonstrated preliminary success. This work also has broader implications in understanding the host and bacterial dynamics of the human vaginal microbiota.

Awards and Honors:

San Diego State University (SDSU) Inamori Fellowship

SDSU Student Research Symposium President's Award

SDSU Instructionally Related Activities Travel Grant

SDSU Student Research Symposium Provost's Award

CSUPERB Student Travel Grant

Publications and Posters:

Patras, K.A.; R?sler, B.; Thoman, M.L.; Doran, K.S. Characterization of host immunity during persistent vaginal colonization by Group B Streptococcus. Mucosal Immunology. 2014, (In Revision).

Wang, N.Y.; Patras, K.A.; Seo, H.S.; Cavaco, C.K.; R?sler, B.; Neely, M.N.; Sullam, P.M.; Doran, K.S. Group B streptococcal serine-rich repeat proteins promote interaction with fibrinogen and vaginal colonization. J. Infect. Dis. 2014, 210, 982-91.

Patras, K.A.*; Cavaco, C.K.*; Zlamal, J.E.; Thoman, M.L.; Morgan, E.L.; Sanderson, S.D.; Doran, K.S. 2013. A novel C5a-derived immunobiotic peptide reduces Streptococcus agalactiae colonization through targeted bacterial killing. Antimicrob. Agents. Chemother. 2013, 57, 5492–5499. *These authors contributed equally.

Patras, K.A., Wang, N.Y.; Fletcher, E.M.; Cavaco, C.K.; Jimenez, A.; Garg, M.; Fierer, J.; Sheen, T.R.; Rajagopal, L.; Doran, K.S. Group B Streptococcus CovR regulation modulates host immune signaling pathways to promote vaginal colonization. Cell Micro. 2013, 15, 1154–1167.

ANDREW PETERS

University of California, San Diego
Neurosciences Graduate Program

Degrees:

B.S. in Neuroscience, Emory University

Scholar Sponsors:

Virginia Lynch Grady Endowment

About the Scholar:

Andrew's research focuses on the neural basis of voluntary movements. He uses high-resolution imaging with behaving mice to visualize the activity of large populations of neurons while the animals learn simple motor tasks. Changes in activity can then be correlated with changes in movements made by the mice throughout learning. By focusing on the motor cortex, which is the last stop out of the brain to the spinal cord, these changes can provide a window into how brain learns to produce novel movements. Outside of lab, Andrew likes engaging in motor learning of his own by playing music.

Benefits to Society:

Movement disorders like Parkinson's disease, ALS, stroke, and even normal motor deficits with age represent a significant detriment to quality of life and are better understood and treated by this type of research. More generally, basic research of this sort serves a much greater spectrum of benefits to society by driving towards a deeper understanding of ourselves and the world in which we live. Determining how the brain drives movement is a crucial step in explaining brain function as a whole, which ultimately strikes at a more enlightened view of what it means to be human.

Awards and Honors:

Phi Beta Kappa

Publications and Posters:

Peters, A.J.; Chen, S.X.; Komiyama, T. Emergence of reproducible spatiotemporal activity during motor learning. Nature 2014, 510, 263-267

Kato, H.K.; Gillet, S.N.; Peters, A.J.; Isaacson, J.S.; Komiyama, T. Parvalbumin-expressing interneurons linearly control olfactory bulb output. Neuron 2013, 80, 1-14.

Schmid, M.C.; Mrowka, S.W.; Turchi, J.; Saunders, R.C.; Wilke, M.; Peters, A.J.; Ye, F.Q.; Leopold, D.A.; Blindsight depends on the lateral geniculate nucleus. Nature 2010, 466, 373-7

Lacey, S.; Peters, A.; Sathian, K. Cross-modal object recognition is viewpoint-independent. PLoS ONE 2007, 2, e890

PEARL QUIJADA

San Diego State University
College of Sciences

Degrees:

M.S. in Cell and Molecular Biology, San Diego State University

B.S. in Biology, University of California, Riverside

Scholar Sponsors:

Kathryn Crippen Hattox Fund

About the Scholar:

Pearl is studying adult stem cell treatment to help in the repair of the heart after myocardial damage. She is focusing on integrating novel molecular and cellular techniques in order to advance cellular therapy. Her research involves working with animal models of heart disease and the protective effects of cell treatment in the heart by measuring overall cardiac function by echocardiography and in vivo hemodynamics. Outside of the laboratory, Pearl enjoys musical concerts, running and reading at home with her cat.

Benefits to Society:

Pearl believes that her research will have positive implications for society in the future. Cardiovascular disease affects millions of people in the United States. The most common form of cardiovascular disease is coronary heart disease, which leads to primary or recurrent heart attacks and is the main contributor of heart failure. In the past decade, researchers and clinicians have been particularly interested in adult stem therapy in order to mediate cardiac damage. Although the stem cell therapy supports modest effects in cardiac function and recovery, the improvements in patient survival and morale are great. Stem cell therapy in combination with traditional interventions, such as vascular stents and pharmaceutical drugs, can have a long-lasting impact on treating heart injury and heart failure for society.

Awards and Honors:

Ruth L. Kirschstein National Research Service Award-F31 Pre-doctoral Fellowship

American Heart Association Pre-doctoral Fellowship

Rees-Stealy Research Foundation Fellowship

Basic Cardiovascular Sciences Minority Travel Grant

Carl Storm Underrepresented Minority Fellowship

Publications and Posters:

Quijada P.; Toko H.; Fischer K.M.; Bailey B.; Reilly P.; Hunt K.D.; Gude N.A.; Avitabile D.; Sussman M.A. Preservation of myocardial structure is enhanced by pim-1 engineering of bone marrow cells. Circ Res. 2012, Jun 22;111(1):77-86.

Quijada P.; Sussman M.A. Making it stick: chasing the optimal stem cells for cardiac regeneration. (Review) Expert Rev Cardiovasc Ther. 2014, Nov;12(11):1275-88.

Hariharan N.; Quijada P.; Mohsin S.; Joyo A.; Samse K.; Monsanto M.; De La Torre A.; Avitabile D.; Ormachea L.; McGregor M.;, Tsai E.J.; Sussman M.A. Nucleostemin rejuvenates cardiac progenitor cells and antagonizes myocardial aging. J Am Coll Cardiol. 2015, Jan 20; 65(2):133–47.

Völkers M.; Konstandin M.H.; Doroudgar S.; Toko H.; Quijada P.; Din S.; Joyo A.; Ornelas L.; Samse K.; Thuerauf D.J.; Gude N.; Glembotski C.C.; Sussman M.A. mTORC2 Protects the Heart from Ischemic Damage. Circulation. Circulation. 2013, Nov 5;128(19):2132-44.

STEVEN QUISTAD

San Diego State University/
UC San Diego Joint Doctoral Program

Cell and Molecular Biology College of Sciences, San Diego State University

Degrees:

B.A. in Biology, University of California, Santa Barbara

Scholar Sponsors:

Virginia Lynch Grady Endowment

About the Scholar:

Steven is researching how viruses interact with the coral immune system and what coral can teach us about our own immune system. He is generally interested in understanding where the immune system came from and how much has really changed in the last 500 million years. Steven utilizes the tools of molecular biology to understand specific immune mechanisms in coral. Those immune mechanisms are then applied to the broader context of evolutionary biology to understand how immune systems evolved. Outside of the lab Steven can be found participating in triathalons, SCUBA diving, swimming, and reading the *Economist.*

Benefits to Society:

Corals were once believed to be "primitive" animals providing spectacular diving opportunities while on vacation, but were not considered of much value to human health. However, Steven's work thus far has provided novel insight into programmed cell death, or apoptosis. Apoptosis is a cellular process involved in a broad range of diseases from cancer to Alzheimer's. Therefore, in addition to the immense ecological value of coral reefs, they also have a lot to teach us about how our own immune system functions with potential application to human disease.

Awards and Honors:

National Science Foundation Graduate Research Fellowship (2010-2013)

Innovator of the Future Scholarship, Rambus Corp. (2006-2010)

Innovator of the Future Scholarship, Rambus Corp. (2006-2010)

Provost Award, Student Research Symposium, SDSU (2013)

University of California, Santa Barbara Award of Distinction (2010)

Publications and Posters:

Quistad, S. D.; Valentine, D. L. Anaerobic oxidation of propane in marine sediments. Geochimica et cosmochimica, 2011, 75 2159-2169

Quistad, S.D.; Stotland, A.; Barott, K.L.; Hilton, B.; Grasis, J.; Wolkowicz, R.; Rohwer, F. The evolution of TNF-induced apoptosis reveals 550 million years of functional conservation. (Submitted)

Quistad, S.D.; Stotland, A.; Barott, K.L.; Hilton, B.; Grasis, J.; Wolkowicz, R.; Rohwer, F. The evolution of TNF-induced apoptosis reveals 550 million years of functional conservation Immunology 2013, Hawaii, USA. Poster (2013)

Quistad, S.D.; Rohwer, F. Identification of a novel coral virus with global distribution. SDSU Student Research Symposium. Poster (2013)

STEPHEN EDWARD RICE

San Diego State University
College of Sciences

Degrees:

M.S. in Biology, Old Dominion University

B.A. in Biology, University of North Carolina, Asheville

Scholar Sponsors:

ARCS Foundation

About the Scholar:

Stephen is a first-generation college student from a working-class family in the Appalachians. His love of the outdoors and wildlife led him to study biology, as it provides him with both intellectual stimulation and the opportunity to be outdoors. He is currently working on three projects: a coupled niche-population model simulation and population structural analyses utilizing molecular genetics. Stephen enjoys hiking, exploring the green space of San Diego, herping (catching/identifying herpetofauna), and doing outreach to help people understand the wildlife and the world around them.

Benefits to Society:

Coupled niche-population models involve linking habitat suitability models, which describe the probability of species occupancy, with stochastic population models to simulate range-wide population responses in context of climate change, urbanization, altered fire regime, and management actions. These models quantify the extinction risk of the big-eared woodrat in context of threats within the California Floristic Province through the year 2100. The best management strategies to maintain species persistence can be evaluated through probabilistic frameworks to model fire suppression and evaluation of translocation strategies. This project is among the first to evaluate these threats for a rodent in a fire-prone ecosystem.

Molecular genetic data is used to assess population connectivity within protected areas of San Diego County that are fragmented by major roadways and subject to altered land usage. Using genetic data for species that represent common ecotypes, *Peromyscus maniculatus, Crotalus oreganus helleri* and *Batrachoseps major,* the levels of gene flow, genetic divergence, and effective population sizes can be estimated while spatially explicit genetic patterns can be evaluated. This information can be used to assess concordance of functional and structural linkages across multiple species, and to identify key landscape features that support microevolutionary processes. In addition, we can elucidate cryptic species biology through genetic data that will allow us to evaluate migration rates, dispersal distances, and patterns of reproduction.

Awards and Honors:

Laurel Scholar

Asheville Civitan Club Scholar

Western North Carolina Leadership Scholar

Publications and Posters:

Rose, R.K.; Rice, S.E. 2013. Patterns of Transience, Sex Bias, and Body Mass in Open-habitat Rodent Populations. American Society of Mammalogists, Philadelphia, PA. June 14-18, 2013.

Rice, S.E.; Anderson, K.A.; Regan, H.M.; Syphard, A.; Franklin, J.; Bonebrake, T.; Winchell, C. Threat Assessment and Dispersal of the Big-eared Woodrat (Neotoma macrotis). University of California Riverside Gradfest Symposium, Riverside, CA. March 9, 2013.

Schuett, G.W.; Hoss, S.K.; Rice, S.E. Crotalus atrox (Western diamond-backed rattlesnake), Crotalus ruber (Red-diamond rattlesnake). Loss of rattle and style/matrix. Herpetological Review, 2012, 43(2), 341-342.

DUSTIN RICHMOND

University of California, San Diego
Jacobs School of Engineering, Computer Science & Engineering Department

Degrees:

B.S. in Computer Engineering, University of Washington

B.S. in Electrical Engineering, University of Washington

Scholar Sponsors:

ARCS Foundation

About the Scholar:

Dustin is developing an easy-to-use, high bandwidth communication framework for heterogeneous devices like processors, GPU's, storage media, and customizable chips called Field Programmable Gate Arrays (FPGA). This communication framework will support different types of interconnects such as Ethernet, PCI Express, and Arm Interconnects (AXI) to facilitate computationally complex applications.

Dustin is also also involved in the program "Engineers for Exploration", a program that drives exploration through technology. In E4E, his work is focused on tools for collecting and processing point clouds - collections of points in 3D Space thatcan be used to model the surfaces of objects.

Benefits to Society:

Research into communication frameworks will have impact in a wide range of fields. Facilitating heterogeneous communication will allow researchers to do a variety of tasks, for example: tackle large computationally complex problems in bioinformatics, communicate between datacenter applications, and build drivers for internet systems. This framework is will be used in an accelerated Structure From Motion application. Structure From Motion (SFM) creates a 3D model of an object from a collection of pictures from different angles. SFM is used heavily in Engineers for Exploration to increase general knowledge of culturally and environmentally significant objects, among others. Recently, this E4E used this technique to document Maya temples, tombs, and architecture in Guatemala. The data produced was demonstrated at USC and UCSD.

Awards and Honors:

Charles Lee Powell Fellowship

National Science Foundation Graduate Research Fellowship

Eta Kappa Nu Honor Society President (Iota Upsilon chapter)

Publications and Posters:

Jacobsen, M.; Richmond, D.; Hogains, M.; Kastner, R. RIFFA 2.1: A Reusable Integration Framework for FPGA Accelerators, In ACM Transactions on Reconfigurable Technology and Systems

Gautier, Q.; Shearer, A., Matai, J.; Richmond, D.; Meng, P.; Kastner, R. Real-time 3D Reconstruction for FPGAs: A Case Study for Evaluating the Performance, Area, and Programmability Trade-offs of the Altera OpenCL SDK, In Proceedings of The International Conference on Field Programmable Technology 2014

Richmond, D.; Kastner, R.; Irturk, A.; McGarry, J. "A FPGA design for high speed feature extraction from a compressed measurement stream" In Proceedings of The International Conference on Field Programmable Logic 2013

Brossard, E.; Richmond, D.; Green, J.; Ebeling, C.; Ruzzo, L.; Olson, C.; Hauck, S. "A Model for Programming Data-Intensive Applications on FPGAs: A Genomics Case Study," In Proceedings of Symposium on Application Specific High Performance Accelerators 2012

JULIA ROSSI

San Diego State University
College of Sciences, Computational Science Research Center

Degrees:

M.S. in Physics, San Diego State University

B.A. in Physics, University of San Diego

B.A. in Biology, University of San Diego

Scholar Sponsors:

Cymer, Inc.

About the Scholar:

Julia is using computational methods to research polariton Bose-Einstein condensates (BECs) in semiconductor microcavities. Unlike atomic BECs that need operating temperatures close to absolute zero (of the order of nano Kelvin), polariton BECs exist at much higher temperatures. Polariton BECs, consisting of short-lived exciton-photon quasiparticles, are an excellent candidate for solid-state applications in quantum computing, quantum clocks, and other high-precision devices. Julia's objective is to utilize a synergistic approach by bringing together mathematics, physics, and state-of-the-art computational methods towards understanding and driving cutting-edge technological developments. Julia enjoys surfing, snowboarding, and painting in her spare time.

Benefits to Society:

Polariton condensates exhibit remarkable features such as superfluidity allowing for a broad range of applications including spin switches, light-emitting diodes, quantum computing, quantum clocks, and lasers operating at much higher efficiency than traditional lasers. One of the most exciting technological applications of Bose-Einstein condensates is perhaps in quantum computing whereby a new computational paradigm, based on quantum information, could enable ultra-fast computers to perform a multitude of simultaneous operations by virtue of laws of quantum mechanics.

Awards and Honors:

Wilmia Tyler Trott Memorial Scholarship

State University Grant

Summer Undergraduate Research Experience

Publications and Posters:

Rossi, J.M., Atomic Factorization of Molecular Interactions. M.S. Thesis, San Diego State University, San Diego, CA, 2011

SUCHOL SAVAGATRUP

University of California, San Diego
Jacobs School of Engineering

Degrees:

B.S. in Chemical Engineering, University of California, Berkeley

Scholar Sponsors:

Lambert Family Foundation for Education at Union Bank

About the Scholar:

Suchol studies the mechanical properties and degradation behaviors of semiconducting polymers. Semiconducting polymers are ubiquitous to organic electronics such as organic solar cells, light-emitting diodes, and sensors. Understanding the interplay between mechanical resilience and high-performance semiconducting properties will enable the engineering of efficient electronic devices that can withstand extreme mechanical deformation, for example, in ultra-low-cost solar panels and wearable applications. When not working in the lab, Suchol enjoys cooking, following sports, and beer tasting.

Benefits to Society:

Mechanically robust semiconducting polymers have numerous applications for our future energy needs. They could potentially allow for roll-to-roll printing of organic solar panels that are portable and extremely lightweight, which will significantly reduce the cost of manufacturing, installing, and repairing solar panels on a massive scale. Additionally, this research on stretchable semiconductors directly impacts the healthcare industry because of their applications in prosthetic sensors and conformable devices for monitoring electrical, chemical, and mechanical signals inside and outside the human body.

Awards and Honors:

National Science Foundation Graduate Research Fellowship

Magna Cum Laude Graduate, UC Berkeley

College of Chemistry Dean's Honor List, UC Berkeley

Melvin J. Heger-Horst Fellowship, UC Berkeley

Publications and Posters:

Savagatrup, S.; Printz, A. D.; O'Connor, T. F.; Zaretski, A. V.; Rodriquez, D.; Sawyer, E. J.; Rajan, K. M.; Acosta, R. I.; Root, S. E.; Lipomi, D. J. Mechanical Degradation and Stability of Organic Solar Cells: Molecular and Microstructural Determinants. Energy Environ. Sci. 2014. DOI: 10.1039/C4EE02657H.

Savagatrup, S.; Printz, A. D.; O'Connor, T. F.; Zaretski, A. V.; Lipomi, D. J. Molecularly Stretchable Electronics. Chem. Mater. 2014, 26, 3028.

Savagatrup, S.; Printz, A. D.; Rodriquez, D.; Lipomi, D. J. Best of Both Worlds: Conjugated Polymers Exhibiting Good Photovoltaic Behavior and High Tensile Elasticity. Macromolecules 2014, 47, 1981.

Savagatrup, S.; Makaram, A. S.; Burke, D. J.; Lipomi, D. J. Mechanical Properties of Conjugated Polymers and Polymer-Fullerene Composites as a Function of Molecular Structure. Adv. Funct. Mater. 2014, 24, 1169.

NICOLE SCHIRLE

The Scripps Research Institute
Kellogg School of Science and Technology

Degrees:

M.S. in Chemistry, Pharmaceutical Chemistry, University of California, Davis

B.S. in Chemistry, University of California, Davis

Scholar Sponsors:

Reuben H. Fleet Foundation Fund

About the Scholar:

Nicole is researching a human pathway called RNA interference, which is a broad-spread eukaryotic mechanism of gene silencing. By using x-ray crystallography, she is determining the 3-dimensional structure of a protein central to this pathway, called Argonaute. Argonaute proteins are key players in the RNA interference pathway because they incorporate small RNAs, termed guide RNAs, into their structure and use them to select specific genes to be silenced. Genes that have been targeted for silencing by Argonaute will no longer be made into proteins. By visualizing Argonaute and its guide RNA atom-by-atom, we will better understand how Argonaute discriminates between the vast pool of cellular genes, enabling it to choose very specific genes for silencing. Nicole enjoys running, swimming, and spending time with her two cats.

Benefits to Society:

Argonaute is a powerful molecule in that we can program it to target the messenger RNA of any protein for destruction, which directly reduces the amount of protein produced by the cell. Short-interfering RNAs can be introduced into the cell and loaded into an Argonaute protein as a guide to targeted messenger RNAs. Therefore, short-interfering RNAs could be used to reduce proteins implicated in human diseases. A three-dimensional model of human Argonaute would reveal the atomic interactions Argonaute makes with guide RNAs to enable more efficient design of potent short-interfering RNAs to treat human disease.

Awards and Honors:

American Heart Association Pre-Doctoral Fellow

National Science Foundation Graduate Research Fellowship Program Honorable Mention

Best Oral Presentation, 21st West Coast Protein Crystallography Workshop

Publications and Posters:

Schirle, N.T.; MacRae I.J. The Crystal Structure of Human Argonaute2. Science. 2012, 336, 1037-40.

Schirle, N.T.; MacRae, I.J. Structure and Mechanism of Argonaute Proteins. In The Enzymes: Eukaryotic RNases and Their Partners in RNA Degradation and Biogenesis, Part B; 1st Ed. Guo & Tamanoi, Eds. Elseveir, Academic Press, 2012.

Yeo, J.; Goodman, R. A.; Schirle, N. T.; David, S. S.; Beal, P. A. RNA Editing Changes the Lesion Specificity for the DNA Repair Enzyme NEIL1. Proc. Natl. Acad. Sci. USA. 2010, 107, 20715-9.

Schirle, N. T.; Goodman, R. A.; Krishnamurthy, M.; Beal, P. A. Selective Inhibition of ADAR2-Catalyzed Editing of the Serotonin 2c Receptor Pre-mRNA by a Helix-Threading Peptide. Org. Biomol. Chem. 2010, 8, 4898-4904.

LAUREN E. SHIPP

University of California, San Diego
Scripps Institution of Oceanography

Degrees:

M.S. in Oceanography, University of California, San Diego

B.A. in Integrative Biology, University of Califonia, Berkeley

Scholar Sponsors:

Reuben H. Fleet Foundation Fund

About the Scholar:

Lauren is motivated by her excitement for scientific discovery, and her sense of responsibility to generate scientifically sound information that can be used for the greater good of society. She was influenced by her undergraduate experience at UC Berkeley where her classroom studies introduced the idea that scientists can conduct research that both advances basic knowledge and positively influences environmental policy. Subsequently, her enjoyment and success with undergraduate and post-graduate research cemented her intentions to become just such a scientist. Lauren is a former collegiate gymnast who now enjoys biking, swimming, and playing the piano when she is not in the lab.

Benefits to Society:

The number of industrial chemicals produced today far exceeds the capacity of regulatory bodies to test their biological effects and environmental penetration. There is a significant gap in our knowledge of which new chemicals will be bioaccumulative, persistent pollutants, or otherwise especially hazardous. To begin to fill this gap, Lauren studies the cellular biology of embryos as relates to the effects of pollutants on development.

Lauren's goal is to advance basic knowledge of how marine organisms deal with toxicants, and to better understand the cellular processes that mediate chemical defenses. Her studies will contribute to a better understanding of which chemicals should be strongly regulated, and what biological processes are particularly vulnerable to chemical pollution. This knowledge can then be used to improve policies that manage industrial chemicals in the oceans.

Awards and Honors:

National Science Foundation Graduate Research Fellowship

National Defense Science & Engineering Graduate Fellowship

Philanthropic Educational Organization (P.E.O.) Scholarship

Athletic Scholarship, NCAA Division I Women's Gymnastics, UC Berkeley

NCAA Academic All-American

Publications and Posters:

Gokirmak, T.; Shipp, L.E.; Campanale, J.P.; Nicklisch, S.C.; Hamdoun, A. Transport in technicolor: Mapping ATP-binding cassette transporters in sea urchin embryos. Mol. Repro. Dev. 2014, 81, 778-793.

Shipp, L.E.; Hamdoun, A. ATP-binding cassette (ABC) transporter expression and localization in sea urchin development. Dev. Dyn. 2012, 241, 1111-1124.

Shipp, L.E.; Lee, J.V.; Yu, C.Y.; Pufall, M.; Zhang, P.; Scott, D.K.; Wang, J.C. Transcriptional regulation of human dual specificity protein phosphatase 1 (DUSP1) gene by glucocorticoids. PLoS One. 2010, 5, e13754.

Patek, S.N.; Shipp, L.E.; Staaterman, E. The acoustics and acoustic behavior of the California spiny lobster (Panulirus interruptus). J. Acoust. Soc. Am. 2009, 125, 3434-43.

JOSH MAX SILVERMAN

The Scripps Research Institute
Department of Integrative Structural and Computational Biology

Degrees:

M.S. in Biophysics, The Scripps Research Institute

B.S. in Physics, Duke University

Scholar Sponsors:

Webster and Helen Kinnaird/Paul Bechtner Foundation

About the Scholar:

Josh is interested in the physical laws underlying cell growth and metabolism.

Josh studied the economics of bacterial metabolism in environments where nutrients are abundant. He is currently studying what happens when the cell faces the uncertain prospect of starvation.

Benefits to Society:

Unlike other areas of science, biology does not have a quantitative tradition, and few experiments are defined to the point that another scientist can easily replicate previous work, and biology currently suffers from a famous problem of irreproducibility. The constraints on a single celled bacterium in growth, starvation, etc. should yield insight to the basic constraints on a cell in a multicellular context, especially for cells that have reverted to single cell-like behavior, like cancer. One hopes that a quantitative understanding of growth processes will benefit the ability to deal with unavoidable human diseases and inform lifestyle changes for the prevention of others.

Awards and Honors:

NSF Honorable Mention

Publications and Posters:

Chen, S. S., Sperling, E., Silverman, J. M., Davis, J. H., and Williamson, J. R. (2012) Measuring the dynamics of E. coli ribosome biogenesis using pulse-labeling and quantitative mass spectrometry. Mol. BioSyst. 8, 3325.

Hui, S, Silverman, J.M., Erickson, D.W., Chen, S.S., Basan, M., Wang, J., Hwa, T. Williamson, J.R. (2015) Quantitative proteomic analysis reveals a simple strategy of global resource allocation in bacteria. MSB (accepted).

MIKE TAIT

University of California San Diego
Division of Physical Sciences

Degrees:

C.Phil. In Mathematics, University of California, San Diego

M.S. In Mathematics, University of Delaware

B.S. In Mathematics and Economics, University of Delaware

Scholar Sponsors:

Donald C. and Elizabeth M. Dickinson Foundation

About the Scholar:

Mike is researching a variety of problems in graph theory and extremal combinatorics. He mainly uses algebraic and probabilistic methods to attack such problems. However, one of the reasons he enjoys this area of mathematics is that it seems to be connected to many other research areas, allowing him to learn about lots of interesting topics. In his free time, Mike enjoys reading, cooking, and exercising, and he is a member of the UCSD cycling team.

Benefits to Society:

Graph theory has many applications in the real world, from scheduling, to route-planning, to modeling social and information networks, to understanding atomic structure. In addition, his area of research has applications to other areas of mathematics, and one can use this theory to solve problems in fields seemingly unrelated to it. Further, the applications are interdisciplinary. His research area builds cryptography and electrical engineering.

Awards and Honors:

David A. Sharp Academic Excellence Award for Men's Track/Cross-Country

Clarks Award: Presented only when a senior majoring in mathematics has unusual ability in the area

Stephen J. Wolfe Memorial Scholarship: Awarded to a student who has demonstrated both love and talent for the subject

ESPN the Magazine Academic All-American Nominee

Publications and Posters:

Cioaba, S.M.; Tait, M.; More counterexamples to the Alon-Saks-Seymour Conjecture and the Rank-Coloring Conjecture. Electronic J. Comb. 2011, P26, 1—9.

Cioaba, S.M.; Tait, M.; Variations on a theme of Graham and Pollak. Disc. Math. 2013, 313-5, 665—676.

Tait, M.; Timmons, C.; Sidon sets and graphs without 4-cycles. J. Comb. 2014, 5-2, 155—165.

JOHN TAT

The Scripps Research Institute
Kellogg School of Science and Technology

Degrees:

B.A. in History, University of California, San Diego
B.S. in Physiology and Neuroscience, University of California, San Diego

Scholar Sponsors:

Hervey Family Non-Endowment Fund

About the Scholar:

Given the diverse nature of cancer, John believes that cancer researchers need to approach these diseases from multiple perspectives so that the therapies they create will cure both the disease and the person. This mantra is demonstrated in the way John practices science. As a basic researcher, he investigates the molecular mechanisms that regulate the cell cycle, an integral system that when goes awry, may cause cancer. As a translational biologist, John is using human cell lines and animal models to develop a safer but more potent chemotherapeutic strategy to treat breast cancer. Finally, as a public health educator, John is in constant communication with community members to raise awareness about the dangers associated with late-stage cancer detection, as well as the cutting-edge medical breakthroughs that can help patients.

Benefits to Society:

Everyone deserves a long and fulfilling life that should not be shortened by cancer. John hopes that the research he conducts today can lend insights into how cancer develops, and how they may be treated. But John also understands that being sick is more than just about biology and economy. It is also about the family and soul. Thus, John hopes that by taking several approaches to studying cancer, his therapies will be able to treat the disease and the patient for what they are, as they are.

Awards and Honors:

Scripps Translational Science Institute's TL1 Fellowship, 2013

Ellen Browning Scripps Foundation Fellowship, 2013

R. Daviline Carter Presidential Award for Best Manuscripts, 2nd place, 2013

Richard G. Lambert Foundation for Education Award, 2012

Biological Sciences Student Association Service Award, 2011

Publications and Posters:

Tat et al. Strategy for disseminating tobacco control information to Asians and Pacific Islanders. J Canc Educ. advance online publication, 28 Jun 2014.

del Rincón et al. Cks overexpression enhances chemotherapeutic efficacy by overriding DNA damage checkpoints. Oncogene. advance online publication, 26 May 2014; doi:10.1038/onc.2014.1377

Farber-Katz et al. DNA damage triggers Golgi dispersal via DNA-PK and GOLPH3. Cell. 2014 Jan 30:156(3):413-27.

Zheng et al. A posttranslational modification cascade involving p38, Tip60, and PRAK mediates oncogene-induced senescence. Mol Cell. 2013 Jun 6;50(5):699-710.

CALI TURNER TOMASZEWICZ

University of California, San Diego
Division of Biological Sciences

Degrees:

MAS in Marine Biodiversity and Conservation, University of California, San Diego, Scripps Institution of Oceanography

B.S. in Environment, Economics & Politics, Claremont McKenna College

Scholar Sponsors:

ARCS Foundation and ARCS Endowment Fund

About the Scholar:

Cali uses two techniques, skeletochronology and stable isotope analysis to investigate the migration and habitat-use patterns of two endangered species of sea turtles in the Pacific, the green turtle (Chelonia mydas) and loggerhead turtle (Caretta caretta). These turtles are listed as endangered on the International Union for Conservation of Nature (IUCN) Red List and by the U.S. Endangered Species Act (ESA). Both are significantly impacted by fisheries along the West Coast of the U.S. and Mexico. Her research is focused on helping to reduce the impact of these fisheries on the protected sea turtle populations. This research is conducted in partnership with NOAA's National Marine Fisheries Service, and findings from Cali's research are directly applied to national and international conservation management.

Benefits to Society:

The population of green turtles that breed in Mexico, once the target of a large fishery that peaked in the 1970's, is gradually recovering, and, despite decades of ongoing research, much of these turtles' complex life history remains unknown. The North Pacific Loggerhead population, suffers one of the highest-documented rates of bycatch globally, with thousands of turtles killed each year along the Baja California Peninsula. By applying this newly developed, cost-effective approach to determine the amount of time these endangered turtles occupy the "bycatch hotspot" region in the eastern Pacific, international management is being made more efficient and effective.

Awards and Honors:

UCSD NIH Cellular and Molecular Genetics Training Grant

NOAA NMFS Stock Assessment Improvement Plan

Archie Carr Student Award for Best Biology Oral Presentation; 2014 Sea Turtle Biology & Conservation Symposium

Jeanne Messier Memorial Fellowship

Hearts di Vite Research Scholarship

Publications and Posters:

Turner Tomaszewicz, C.; Seminoff, J.A. Turning off the heat: impacts of power plant decommissioning on green turtle research. Coastal Management Journal 2012, 40(1):73-87.

Turner Tomaszewicz, C.; Seminoff, J.A.; Avens, L.A.; Goshe, L.R.; Peckham, S.H.; Kurle, C.M. Habitat use of north pacific loggerhead turtles (Caretta caretta) and duration spent in a bycatch hotspot area near Baja California Peninsula using skeletochronology and stable isotope analysis. Sea Turtle Biology & Conservation Symposium, New Orleans, LA.; April 14-18 2014.

Turner Tomaszewicz, C.N.; Seminoff, J.A.; Avens, L.A.; Goshe, L.R.; Peckham, S.H.; Rodriguez-Baron, J.M.; Bickerman, K.; Kurle, C.M. Determining age and residency duration of loggerhead turtles at a North Pacific bycatch hotspot using skeletochronology. (In Preparation)

Turner Tomaszewicz, C.N.; Seminoff, J.A.; Ramirez, M.; Kurle, C.M. A standardized method for sequentially sampling annual bone growth layers for stable isotope analysis. (In Preparation)

STEPHANIE WENG

University of California, San Diego
Biomedical Sciences Graduate Program, School of Medicine

Degrees:

B.S. in Microbiology, University of California Santa Barbara

Scholar Sponsors:

ARCS Foundation

About the Scholar:

Stephanie is investigating the mechanisms of t(8;21) Acute Myeloid Leukemia (AML) development. She is particularly interested in understanding how loss of a sex chromosome, which is observed in around 50% of these patients, contributes to the disease. The goal of her research is to broaden our current understanding of and reveal important genes and/or pathways that are involved in driving this disease. With this new knowledge, the hope is that improved therapeutic strategies can be developed to more specifically and efficiently target this form of cancer. Stephanie enjoys live music, going to the beach, traveling, and trying new food.

Benefits to Society:

Acute myeloid leukemia (AML) is the most common form of leukemia affecting adults. The t(8;21) mutation is observed in around 12-15% of AML patients. Although t(8;21) AML is considered to be a good-prognosis leukemia, there has been little advancement towards the treatment of this disease and around 50% of patients eventually relapse. Stephanie's research aims to improve our understanding of disease development and progression so that novel targeted t(8;21) AML therapies can be developed in efforts to reduce relapse rates.

Awards and Honors:

NIH Cancer Cell Biology Training Grant

Best Poster Award at the Biomedical Sciences Program Retreat

Publications and Posters:

Weng S.; Matsuura S.; Mowery C.; Lam K.; Scholl, A.; Lo M.C.; Zhang D.E. AML1-ETO Hematopoietic Stem Progenitor Cells display a hypersensitivity to GM-CSF which reduces leukemogenic potential. (In preparation)

Lam K.; Muselman A.; Du R.; Harada Y.; Yan M.; Matsuura S.; Weng S.; Harada H.; Zhang D.E. Hmga2 is a direct target gene of RUNX1 and regulates expansion of myeloid progenitors. Blood. 2014, 124(14), 2203-12.

Arimoto K.; Burkart C.; Yan M.; Ran D.; Weng S.; Zhang D.E. Plakophilin-2 Promotes Tumor Development by Enhancing Ligand Dependent and -Independent Epidermal Growth Factor Receptor Dimerization and Activation. Molecular and Cellular Biology. 2014, 34(20), 3843-54.

Dekelver R.C.; Lewin B.; Weng S.; Yan M.; Biggs J.; Zhang D.E. RUNX1-ETO induces a type I interferon response which negatively effects t(8;21)-induced increased self-renewal and leukemia development. Leukemia & Lymphoma. 2014, 55(4), 884-891.

MATTHEW WINGERT

University of California, San Diego
Jacobs School of Engineering

Degrees:

M.S. in Mechanical Engineering, University of California, San Diego

B.S. in Mechanical Engineering, University of California, Santa Barbara

Scholar Sponsors:

Marti & Larry Showley

About the Scholar:

While attending college at the University of California, Santa Barbara, Matthew was introduced to nano-engineering through undergraduate lab research and some great professors. Combining his interest in the traditional mechanical engineering field of heat transfer and his newfound interest in nanotechnology, he decided to persue thermal properties and effects in nanoscale materials at the graduate level.

Benefits to Society:

The thermal conductivity of nanostructures, nanowires, nanotubes, and polymers, is of significant interest for understanding nanoscale thermal transport phenomena as well as for practical applications in nano-electronics, energy conversion, and thermal management. By understanding the thermal properties of small semiconducting nanostructures with low thermal conductivities, more efficient thermoelectric devices could be designed. Meanwhile, with the advent of faster, smaller, and denser electronic devices, understanding thermal properties of small nanostructures becomes important for the design of these future nanoscale electronics.

Awards and Honors:

Initiation into Tau Beta Pi honor society.

Publications and Posters:

Wingert, M. C.; Chen, Z. C. Y.; Dechaumphai, E.; Moon, J.; Kim, J.; Xiang, J.; Chen, R. Thermal Conductivity of Ge and Ge-Si Core-Shell Nanowires in the Phonon Confinement Regime. Nano Lett. 2011, 11, 5507-5513.

Wingert, M. C.; Chen, Z. C. Y.; Kwon, S.; Xiang, J.; Chen, R. Ultra-sensitive Thermal Conductance Measurement of One-dimensional Nanostructures Enhanced by Differential Bridge. Rev. Sci. Instrum. 2012, 83, 024901.

Zheng, J.; Wingert, M. C.; Dechaumphai, E.;Chen, R. Sub-picowatt/kelvin resistive thermometry for probing nanoscale thermal transport. Rev. Sci. Instrum. 2013, 84, 114901.

Zhong, Z.; Wingert, M. C.; Strzalka, J.; Wang, H. H.; Sun, T.; Wang, J.; Chen, R.; Jiang, Z. Structure-induced enhancement of thermal conductivities in electrospun polymer nanofibers. Nanoscale 2014, 6, 8283-8291.

CHRISTINE WITTICH

University of California, San Diego
Jacobs School of Engineering

Degrees:

M.S. in Structural Engineering, University of California, San Diego
B.S. in Civil and Environmental Engineering, Lafayette College

Scholar Sponsors:

ARCS Foundation/Betty Jo Williams

About the Scholar:

Christine studies the response of large, freestanding structures to seismic excitation. This class of structures includes various mechanical and electrical equipment, nuclear radiation shields, as well as marble statues. These structures have repeatedly been shown to respond poorly during post-earthquake reconnaissance. In an effort to develop predictive tools for their seismic response, Christine has conducted extensive shake table testing campaigns at UC San Diego's Powell Laboratory. The results of these experiments are used to validate three-dimensional multi-modal numerical models. Her primary objective is to develop a series of easy-to-use predictive tools for the non-engineering community as well as recommended actions for seismic mitigation. Outside of the laboratory, Christine enjoys running, cooking, and spending time with friends and family.

Benefits to Society:

Post-earthquake reconnaissance efforts highlight the vulnerability of freestanding structures to even moderate seismic events in which no damage to buildings is observed. These freestanding structures are components within buildings (e.g. mechanical/electrical equipment or museum contents) that are not engineered to be earthquake-resistant. Furthermore, maintenance of these components is typically handled by non-engineers. Christine's current research aims to produce easy-to-use predictive tools for the seismic response of these structures. These tools will allow non-engineers to determine the vulnerability of their components and provide recommendations as to their restraint.

Awards and Honors:

National Science Foundation Integrative Graduate Research and Education Traineeship

Poster Award, Jacobs School of Engineering Research Expo 2013

The Moles National Construction Organization Scholarship

Marquis Scholar, Lafayette College

Sigma Xi

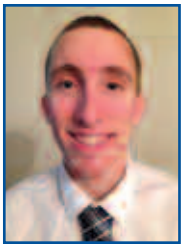
Publications and Posters:

Wittich, C.E.; Hutchinson, T.C. Shake table tests of stiff, unattached, asymmetric structures. Earthquake Eng. Struct. Dyn. (submitted)

Wittich, C.E.; Hutchinson, T.C.; Wood, R.L.; Seracini, M.; Kuester, F. Characterization of Full-Scale Human-Form Culturally Important Statues: A Case Study. J. Comput. Civ. Eng. (submitted)

Wittich, C.E.; Hutchinson, T.C. Development of a Rocking-Period Centered Protocol for Shake Table Testing of Unattached Stiff Components. Proceedings of 10th National Conference in Earthquake Engineering, 2014.

Wittich, C.E.; Hutchinson, T.C. Computing Geometric and Mass Properties of Statues for Rigid Body Rocking Analysis. Proceedings of ASCE International Workshop on Computing in Civil Engineering, 2013.



DAVID ZIMMERMANN

University of California, San Diego
Physical Sciences

Degrees:

M.S. in Mathematics, San Jose State University
B.A. in Mathematics, University of California, Berkeley

Scholar Sponsors:

Reuben H. Fleet Foundation Fund

About the Scholar:

David studies a class of inequalities called Logarithmic Sobolev inequalities (LSI) that certain mathematical objects, called measures, satisfy. These inequalities are a useful tool in mathematics with applications to many other areas such as probability, functional analysis, geometry, and physics. Not all measures satisfy a LSI. His project is to demonstrate a large class of measures that do satisfy a LSI. This makes LSIs a widely applicable tool, so results in these other areas of mathematics can be proven.

In his free time, he enjoys ultimate Frisbee and board games.

Benefits to Society:

Logarithmic Sobolev inequalities are a useful tool in analysis that has applications to many areas of mathematics, such as probability, functional analysis, geometry, and physics. Expanding the class of measures which are known to satisfy logarithmic Sobolev inequalities will increase the applicability of this tool, enhancing our ability to discover and prove new results in these areas.

Publications and Posters:

Zimmermann, D. Logarithmic Sobolev inequalities for mollified compactly supported measures. J. Funct. Anal. 2013, 265, 1064-1083.

Zimmermann, D. Bounds for logarithmic Sobolev constants for Gaussian convolutions of compactly supported measures. Submitted.

Zimmermann, D. Elementary proof of logarithmic Sobolev inequalities for Gaussian convolutions on $\mathbb{R}$. Submitted.

What Does this Award Mean to You?

Maggie Johnson

Receiving the ARCS Foundation award is a tremendous honor. I am incredibly grateful for the network it provides me, and the professional and financial support. ***With this award I am now able to complete the final chapter of my dissertation research and travel to conferences to present the results of my work.*** *I am able to spend additional time doing field work in Hawaii at the Hawaii Institute of Marine Biology and in Moorea, French Polynesia. With this I can add to the body of work for my dissertation and provide data quantifying the impacts of human driven global change on coral reef ecosystems.* ***I am proud and honored to be an ARCS scholar, and am deeply grateful and thankful for everyone who has made this possible.***

Gene Ko

The ARCS Foundation award helps to significantly alleviate much of the financial burdens that we encounter in our dissertation year in the joint doctoral program in Computational Science with SDSU and Claremont Graduate University. ***With this award, I can focus on completing my dissertation without having to work for an additional source of income*** *in order to pay for the expensive graduation fees in our program.*

Aditya Kumar

The ARCS Foundation award will provide me the opportunity to present my work and learn more about the current research in the field in a number of academic settings. In addition, ***I have gained invaluable connections through the newly created Roche/ARCS collaboration.***

Andrew Peters

Besides being a great honor, the ***ARCS Foundation award is very beneficial for setting off on a career in science.*** *As a senior graduate student, the process of transitioning to a postdoctoral position by finding a lab and then moving to a new city is made much easier by the security afforded by the award. This type of assistance is invaluable but often not recognized or made possible by other kinds of awards.*

Pearl Quijada

ARCS Foundation has made a great impact in my life in the past year. *I have made great contacts with not only my mentor* ***Kathryn Hattox and her husband Dr. John Hattox,*** *but also with other members of ARCS Foundation and Award recipients across San Diego. This Award has supplemented my cost of living, which in turn* ***eases my stress and increases my confidence*** *in the laboratory to perform experiments and write my first author publication, which was accepted in the "Journal of Circulation Research," June 2012. I am grateful to ARCS Foundation.*

John Tat

Winning the ARCS Foundation Scholar Award could not have come at a better time for me, *as it means that a portion of my stipend will be secured. This will give me more time to focus on my research work, a project that might revolutionize the way we treat breast cancer.*

Cali Turner Tomaszewicz

Not only is it an honor to receive the ARCS Foundation award, but ***it helps tremendously in taking some financial pressure off of me*** *while I continue conducting high quality research, while living in an expensive part of the country.*

Stephanie Weng

To receive the ARCS Foundation award is a great honor, *and will provide me freedom to purchase some essential tools that will aid in my research.*

Christine Erin Wittich

The ARCS Foundation Scholar Award has provided me with the much needed time to synthesize my research without additional teaching and financial responsibilities. ***I am now able to compile my experimental and numerical analyses into useful predictive tools*** *for the non-engineering community. I am truly grateful to the ARCS Foundation for this award and the resultant ability to enhance my doctoral research.*

Investing In America

The ARCS Foundation invests in innovation. Our venture philanthropy approach provides a unique, cost-effective, and quality-assured mechanism through which corporate, civic and philanthropic organizations, as well as individuals, can have an impact on American scientific and technological capacity. Our model is unique in that it focuses on:

- **Individuals** rather than projects;
- **Potential** for outstanding future research and innovation rather than established or already proven work;
- **Flexible, facilitative funding** that is discretionary and unrestricted. This type of funding is rarely if ever available to researchers and provides much needed support.

The following principles are integrated throughout our operation:

- **Quality control,** ensured via:
  - o Vetting of university departments and programs and approval by ARCS for participation
  - o Strict criteria for Scholar selection
  - o Accountability and monitoring processes

- **Cost effectiveness.** Our self-sustaining operating budget, funded by membership dues, ensures that one hundred percent of funds raised for ARCS Foundation awards is passed through directly to the Scholars.

- **Proven Effectiveness** -- ARCS Foundation is already one of the largest contributors to basic scientific education of any private membership organization in the United States. In July 2009, ARCS Foundation was nationally recognized for its promotion of science and engineering education and received the Council for Advancement and Support of Education's (CASE) highest award - the *James L. Fisher Award for Distinguished Service to Education.*

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2. **Gifts to ARCS Foundation Endowment Fund** may be made by designating your annual gift to the Endowment Fund; designating ARCS Endowment in your estate plans (Legacy Society); and by giving a gift in memory of a loved one, or in honor of an individual on the occasion of a birthday, anniversary, or other special event. Interest generated by the Endowment provides additional funds for Scholar awards.

To donate by credit card, go to ARCS website at **www.arcsfoundation.org/san_diego.**
Click the turquoise "Donate" button found at the bottom of this homepage. Then click the blue "Donate Now" button found at the bottom of the linked page.

To donate by check, mail to ARCS Foundation, Inc., San Diego Chapter,
P.O. Box 8394, Rancho Santa Fe, CA 92067-8394.

FOR MORE INFORMATION, PLEASE CONTACT:
Marti Showley, ARCS Vice President, Fund Development
lgshowley@cox.net | 619.466.9406

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See an error or omission? Please contact Mary Lou Quick

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The purpose of ARCS® Foundation, Inc. San Diego Chapter Community Advisory Council (CAC) is to assist the organization in achieving its mission. The CAC is composed of distinguished professionals drawn from diverse science and technology industries represented in San Diego. Through the members of the Council, the chapter has access to a larger network of individuals, businesses and professional organizations interested in the advancement of science and technology. They help the chapter accomplish its goals, promote activities and facilitate fundraising. For the ARCS Scholar, the Council organizes activities that enrich the Scholars' professional experience and serves as a bridge to the entrepreneurial community. We thank them for their continued support.

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