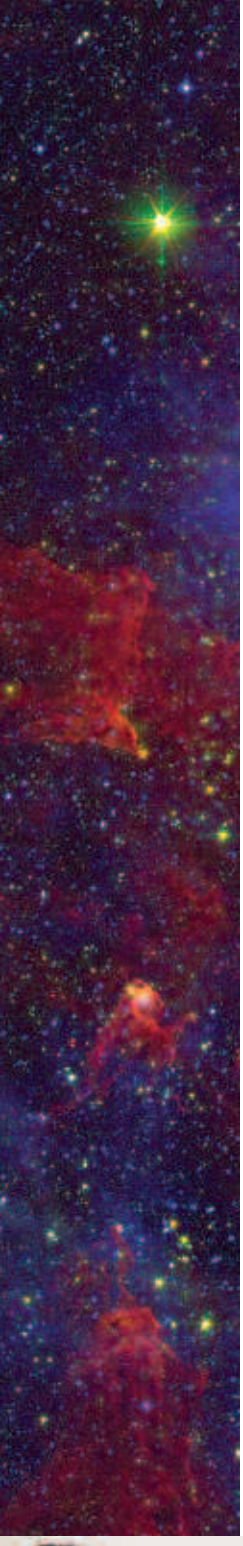
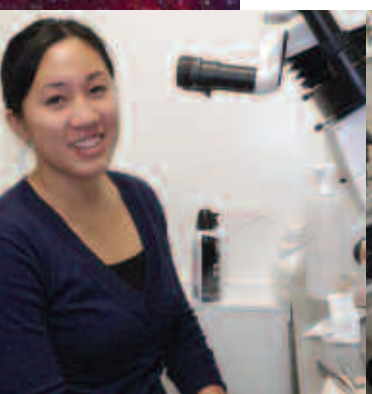
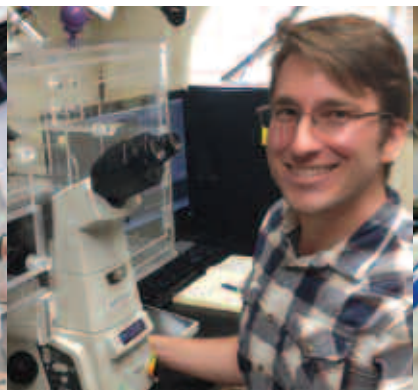
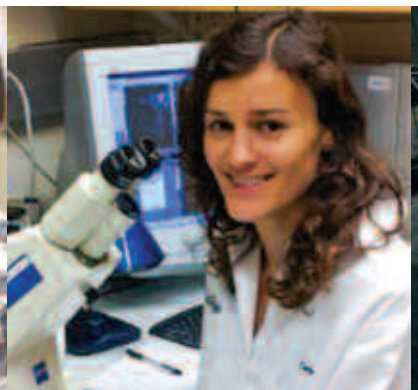
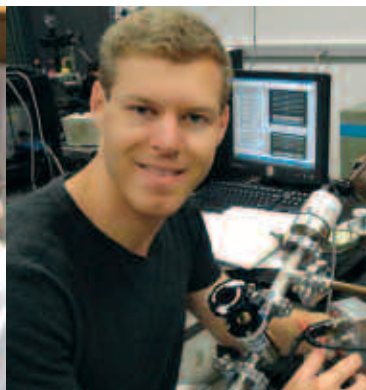


ARCS ADVANCING SCIENCE IN AMERICA®

ACHIEVEMENT REWARDS FOR COLLEGE SCIENTISTS

SCHOLAR DIRECTORY 2013-2014

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 Hirschman, President
San Diego State University

SAN DIEGO STATE UNIVERSITY

"The importance of attracting the brightest students into advanced graduate programs in science cannot be underestimated. We are grateful to ARCS Foundation for its support of our students in Kellogg School of Science and Technology who demonstrate both academic excellence and passion for biomedical research. ARCS Foundation support for students at Scripps Research since 1997 has had great impact, and we are honored to continue that partnership to develop the scientific leaders of the twenty-first century. ARCS Scholar awards provided to Scripps Research are essential to the ultimate success of these talented students and their quest to become leaders in industrial and government laboratories, thus advancing discovery and technology in the United States."

Michael Marletta, President
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

"Your generosity promotes the University of San Diego's mission to offer motivated and capable students superb science and health care education. The philanthropy of ARCS is a gift to the entire community by providing it with science and health care professionals."

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 17 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.

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 2013-2014 ARCS is pleased to support 57 Scholars for a total of $405,000.

[1] As of 2012-2013 Fiscal Year

ARCS® Scholars 2013-2014

San Diego State University

NAME	DEGREE	AREA OF CONCENTRATION	SPECIALIZATION
Martis Cowles	Ph.D.	Cell & Molecular Biology	Stem Cells, Neurodegenerative Disease
Lee Frederickson	M.S.	Mechanical Engineering	Energy and Thermofluids
Michael Gurney	Ph.D.	Cell and Molecular Biology	Autophagy, Inflammation
Marcel Hetu	Ph.D.	Analytical Chemistry	Cancer, Alzheimer's Disease
Vicki Hurless	Ph.D.	Cell and Molecular Biology	Gene Regulatory Networks
Manna Iwabuchi	Ph.D.	Analytical Chemistry	Parkinson's Disease, Disease Detection
Brandon Kim	Ph.D.	Cell and Molecular Biology	Bacterial Infections, Meningitis
Sarah McCullough	Ph.D.	Ecology	Invasion of Native Plant Communities
Tim Montgomery	Ph.D.	Organic Chemistry	Green Organic Chemistry Synthesis
Pearl Quijada	Ph.D.	Cell & Molecular Biology	Stem Cells, Heart Disease
Steven Quistad	Ph.D.	Cell and 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

George Campbell	Ph.D.	Biological Sciences	Neurodegenerative Brain Disease
Jessica Bruhn-Johannsen	Ph.D.	Structural Biology	Henipavirus, Innate Immune Response
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

Elizabeth Light	Ph.D.	Nursing Science	Maternal-Child Health
Connor Lind	B.A./B.S.	Mechanical Engineering	International Development
Catherina Madani	Ph.D.	Nursing Science	Palliative Care, Pulmonary Hypertension
Gabriella Malagon-Maldonado	Ph.D.	Nursing Science	Diabetes
Kathleen McGuire	B.A./B.S.	Engineering	Electrical Engineering
Tawni Paradise	B.A./B.S.	Engineering	Industrial & Systems Engineering
Christine Sloan	Ph.D.	Nursing Science	Palliative Care, Pediatric Patients

UC San Diego

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
Aereas Aung	Ph.D.	Bioengineering	Cellular Mechanics, Muscle Development
Joseph Campanale	Ph.D.	Marine Biology	Embryonic Defense Mechanisms
Monica Chu	Ph.D.	Biological Sciences	Behavioral Learning Activity
Phillip Compeau	Ph.D.	Mathematics	Genome Rearrangement
Chris DeBoever	Ph.D.	Bioinformatics & Systems Biology	Genetics and Genomics
Stephanie Huelga	Ph.D.	Bioinformatics & Systems Biology	RNA Processing
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
Chris Kopp	Ph.D.	Biology	Animal Habitat Ecosystems
Jason Leonard	Ph.D.	Physics	Manipulation of Light Particles
Katherine LeVan	Ph.D.	Biology	Ecological Effects of Invasive Species
Eric Lindsey	Ph.D.	Geophysics	Ocean Patterns of Ground Movement
Michael Lovci	Ph.D.	Biomedical Sciences	RNA Binding Proteins
Frederick Matsuda	Ph.D.	Physics	Science of Early Universe
Morgan Nunn	Ph.D.	Chemistry	Water, Solar System
Jason Oberg	Ph.D.	Computer Science	Hardware Security
Matthew Ondeck	Ph.D.	Materials Science & Engineering	Cell Substrate Stiffness
Michael Porter	Ph.D.	Materials Science & Engineering	Nature Inspired Design
Gabriel Reyes-Rodríguez	Ph.D.	Organic Chemistry	Structure, Mechanism, and Reactivity
Janelle Shane	Ph.D.	Electrical Engineering	Photonics, Computer Imaging
Lauren Shipp	Ph.D.	Marine Biology	Embryonic Development, Toxicology
Ludovic Vincent	Ph.D.	Bioengineering	Stem Cell Environment
Spencer Wei	Ph.D.	Biomedical Sciences	Breast Tumors, Cancer Types
Alex White	Ph.D.	Chemistry	Electron, Energy Transport
Matthew Wingert	Ph.D.	Mechanical Engineering	Nanomaterials, Energy Transport
Thomas Wong	Ph.D.	Physics	Quantum Physics
David Zimmermann	Ph.D.	Mathematics	Functional Analysis

KARMEL ALON ALLISON

University of California, San Diego
Jacobs School of Engineering

Degrees:

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

Scholar Sponsors:

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 and the bench 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:

NSF Graduate Research Fellowship Program Honorable Mention

NIDDK Keystone Symposia Scholarship

University of Eastern Finland International Doctorate Visitor Grant

UC Berkeley Regents' and Chancellor's Scholar

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 MICHELLE 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:

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.; 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 ELENA ANTAL

University of California, San Diego
School of Medicine

Degrees:
B.S. in Marine Science/Biology, University of Miami, Florida

Scholar Sponsors:

Farrell Family Foundation

About the Scholar:

Corina is investigating how mutations identified in diverse human cancers within an important signaling enzyme, protein kinase C, contribute to cancer. 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 or 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, cause 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:

1) NSF Graduate Research Fellowship

2) NIH Pharmacology Training Grant

3) ASBMB Graduate Student Travel Award

4) ASPET Graduate Student Travel Award

5) Outstanding Student Award, University of Miami

Publications and Posters:

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

Scott, A. M.; Antal, C. E.; Newton, A. C. Electrostatic and Hydrophobic Interactions Differentially Tune Membrane Binding Kinetics of the C2 Domain of Protein Kinase Calpha. J Biol Chem 2013.

de Lichtervelde, L.; Antal, C. E.; Boitano, A. E.; Wang, Y.; Krastel, P.; Petersen, F.; Newton, A. C.; Cooke, M. P.; Schultz, P. G. Euphohelioscopin A is a PKC activator capable of inducing macrophage differentiation. Chemistry & biology 2012, 19 (8), 994-1000.

Gould, C. M.; Antal, C. E.; Reyes, G.; Kunkel, M. T.; Adams, R. A.; Ziyar, A.; Riveros, T.; Newton, A. C. Active site inhibitors protect protein kinase C from dephosphorylation and stabilize its mature form. J Biol Chem 2011, 286 (33), 28922-30.

AEREAS AUNG

University of California, San Diego
Jacobs School of Engineering

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

Scholar Sponsors:

The Jerry D. and Cheryl Sawatzke Routh Family Foundation

About the Scholar:

Aereas is researching the role of cell-matrix interactions during the differentiation of stem cells. Improved understanding of this "mechano-biology" of stem cells will establish an added dimension which also must be accounted for to better harness the regenerative potential of stem cells. Aereas enjoys reading and listening to music and he would like to learn how to play the violin.

Benefits to Society:

By initially understanding the fusion process between muscle precursor cells, we can gain insight into how the natural process of muscle development should occur. This will serve as a strong foundation to further understand muscle homeostasis, cell-transplantation-based repair and regeneration, and degenerative diseases by varying the cell types that are analyzed with this method. In this manner, we can, in the future, comprehend how diseased or aged muscle cells deviate from the natural fusion process, giving immeasurable clinical insights into the restoration or maintenance of muscle health.

Awards and Honors:

Robert C. Byrd Scholarship

REU Summer Research Award

Summer Research Scholarship, California Institute of Technology

Tau Beta Pi

Publications and Posters:

Aung, A.; Gupta, G.; Ghassemian, M.; Varghese, S. Osteoarthritic chondrocyte-secreted morphogens induce chondrogenic differentiation of human mesenchymal stem cells. Arthritis and Rheumatism 2011, 63, 148-158.

Ayala, R.; Zhang, C.; Yang, D.; Aung, A.; Hwang, Y.S.; Shroff, S.S.; Arce, F.T.; Lal, R.; Arya, G.; Varghese, S. Engineering the cell-material interface for controlling stem cell adhesion, migration, and differentiation. Biomaterials 2011, 32, 3700-3711.

Lim, H.L.; Chuang, J.C.; Tran, T.; Aung, A.; Arya, G.; Varghese, S. Dynamic Electromechanical Hydrogel Matrices for Stem Cell Culture. Advanced Functional Materials 2010, 21, 55-63.

Zhang, C.; Aung, A.; Liao, L.; and Varghese, S. A novel single precursor-based biodegradable hydrogel with enhanced mechanical properties. Soft Matter 2009, 5, 3831-3834.

JOSEPH PAUL 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, California Polytechnic State University, San Luis Obispo

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. Importantly, embryos have potent defenses to protect them from toxic chemicals and environmental pollutants. Anthropogenic compounds present new challenges for these defenses, particularly during specific windows of vulnerability in development, when defense activity might be lowered as part of the developmental program. Joseph uses embryos of the purple sea urchin to understand how chemical defenses are generally regulated, 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:

During early embryonic development, embryos have few mechanisms to protect themselves from stress and are often at the mercy of the environment during embryogenesis. Even human embryos are not without exposure to their mother's blood which could contain circulating herbicides and pesticides widely used around the world. 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 chemical pollutants, will affect embryos. Joseph is using the embryos of the purple sea urchin to model the effects chemicals can have on the health and development of all animals. On a broader scale, by identifying the cells and developmental processes most vulnerable to chemical stress during early embryogenesis, Joseph hopes his studies will contribute to more informed predictions of the human health risks associated with teratogens.

Awards and Honors:

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

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

Mary E. Smith Memorial Marine Biology Scholarship

Publications and Posters:

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.

Adams, N.L.; Campanale, J.P.; Foltz, K.R. Proteomic responses of sea urchin embryos to stressful ultraviolet radiation. Integr. Comp. Biol. 2012, 52, 665-680.

GEORGE EDWARD CAMPBELL

The Scripps Research Institute
The Kellogg School of Science and Technology

Degrees:

B.S. in Biology, University of Tennessee at Chattanooga

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. In his free time, George enjoys baking, hiking, yoga, 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 neurodegenerative disease, Alzheimer's disease, afflicts millions in the U.S. alone, and this number is expected to grow rapidly in the coming years. This growth in numbers prioritizes research such as understanding the role of axonal transport in neurodegenerative disease, 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

Murray Raney Chemistry Scholarship

Outstanding Research Award

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

Publications and Posters:

Campbell, G.E.; Encalada, S.E. Coordination of Molecular Motors in Axonal Transport and Disease; Graduate Student Retreat, The Scripps Research Institute, Lake Arrowhead, CA.; October 2012.

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 WEI 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, surfing, and occasionally knitting.

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

PHILLIP E. C. COMPEAU

University of California, San Diego
Physical Sciences

Degrees:

M.A. in Pure Mathematics, University of California, San Diego
Master of Advanced Study in Mathematics, Cambridge University
B.S. in Mathematics, Davidson College

Scholar Sponsors:

ARCS Foundation, Hervey Family Non-endowment Fund

About the Scholar:

Phillip is researching combinatorial models for genome rearrangements, which are rare large-scale mutations that drive species evolution. Phillip is also active in the bioinformatics education community and has recently co-founded Rosalind, a website that serves as a platform for beginners to learn bioinformatics through programming and problem solving. Phillip was once a professionally ranked tennis player and is now an avid golfer.

Benefits to Society:

The human genome was sequenced in 2001 at a cost of $3 billion (and led to an economic boom whose value has surpassed $500 billion). In the ten years since this monumental scientific event, several more mammalian genomes have been sequenced at an exponentially decreasing cost. The Genome 10K Project, founded in 2009, aims to sequence 10,000 animal genomes to create a "zoo" of genomes. With each genome containing billions of nucleotides, the most advanced analytic techniques are required to examine the data derived from tens of trillions of nucleotides. Furthermore, a new brand of biologist is needed to handle the increasingly quantitative tasks arising from modern biology, calling for a revolution in the traditional biology curriculum. Resources like Rosalind will hopefully help facilitate this revolution by providing free education for students who have never had access to such a platform, and it will serve as a resource for massively scaling university biology education.

Awards and Honors:

Thomas Smith Scholarship
Phi Beta Kappa

Publications and Posters:

Compeau, P.E.C.; Pevzner, P.A.; Tesler, G. How to apply de Bruijn graphs to genome assembly. Nature Biotechnology. 2011, 29, 987-991.

Compeau, P.E.C.; Pevzner, P. Genome reconstruction: A puzzle with a billion pieces. Chapter appearing in Bioinformatics for Biologists (textbook). Expected publication September 2011.

Compeau, P.E.C. Girth of pancake graphs. Discrete Applied Mathematics 2011, 159 (15), 1641-1645.

Heyer, L.J.; Poet, J.L.; Broderick, M.L.; Compeau, P.E.C.; Dickson, J.O.; Harden, W. L. Bacterial computing: Using E. coli to solve the burnt pancake problem. Math Horizons 2010, 17(3), 5-10.

Compeau, P.E.C. A simplified view of DCJ-indel distance. Lecture Notes in Computer Science 2012, 7534, 365-377

MARTIS COWLES

San Diego State University
College of Sciences

Degrees:

B.S in Biology, San Diego State University

Scholar Sponsors:

Ellen Browning Scripps Foundation

About the Scholar:

Martis is researching the regenerative capacity of the planarian *Schmidtea mediterranea* to model stem cell-based nervous system regeneration. Planarians are flatworms well known for their ability to regenerate all tissue types, including the nervous system, following amputation or injury. Martis is also investigating molecular mechanisms underlying planarian stem cell differentiation into various neuronal fates during tissue homeostasis and regeneration. This study will provide insights into the basic mechanisms that underlie basic stem cell-based tissue replacement and prove useful in treating neuro-degenerative diseases.

Benefits to Society:

Neurogenesis was once believed to only occur during development, but adult neurogenesis has now been observed in most animals (including humans). This new appreciation holds promise for the development of stem cell-based therapies to treat neurodegenerative diseases or spinal cord injuries.

Awards and Honors:

Best Student Poster Award, Society for Developmental Biology Regional Meeting

President's Award, San Diego State University Student Research Symposium

2nd Place, California Student Research Competition

Publications and Posters:

Cowles, M.W.; Hubert, A.; Zayas, R.M. A Lissencephaly-1-like gene is required for mitotic progression in the planarian Schmidtea mediterranea. (In preparation).

Cowles, M.W.; Hubert, A.; Zayas, R.M. A Lissencephaly-1-like gene is required for stem cell maintenance in the planarian Schmidtea mediterranea, 70th Society for Developmental Biology Annual Meeting, Chicago, IL.; July 21-25, 2011.

Cowles, M.W.; Hubert, A.; Zayas, R.M. A planarian ortholog of Lissencephaly-1 is required for stem cell maintenance. San Diego State University Student Research Symposium, Abs. #466, San Diego, CA. March 4-5, 2011.

Cowles, M.W.; Zayas, R.M. Identification and functional analysis of neuronal migration genes in planarians. San Diego State University Student Research Symposium, Abs. #362, San Diego, CA. March 5-6, 2010.

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 next generation RNA-sequencing and high-throughput genomics to study cancer etiology and progression. He is searching for the changes that cause chronic lymphocytic leukemia (CLL) to transform from a dormant, less active cancer, to a more aggressive cancer that requires treatment. His hope is to design a signature that predicts whether patients will require treatment soon after diagnosis. Understanding how CLL evolves to an aggressive disease may lead to new therapeutic targets. 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 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. Next generation sequencing technology is used to characterize and study cancer at a deeper level than ever before. Using sequencing, we can group patients for treatment, identify potential drug targets, and define relationships between specific cancer mutations and treatment efficacy. As more data are collected and methods are refined, society will eventually move into an era of personalized cancer diagnosis and treatment, where cancer profiling via sequencing and other genomic approaches will be the standard of care.

Awards and Honors:

UCSD Genetics Training Program

California Institute for Regenerative Medicine (CIRM) Interdisciplinary Stem Cell Training Program

Sigma Xi

Publications and Posters:

DeBoever, C; Reid, E.G.; Wang, X.; Dumaop, W.; Smith, E.N.; Carson, D.; Richman, D.; Masliah, E.; Frazer, K.A. Whole transcriptome sequencing enables discovery and analysis of viruses in archived primary central nervous system lymphomas. (in preparation).

Nevarez, P.A.; DeBoever, C.M.; Freeland, B.J.; Quitt, M.A.; Bush, E.C. Context dependent substitution biases vary within the human genome. BMC Bioinformatics, 11(1), 462.

DeBoever, C.; De Roes, B. How to skew(er) a parametric curve. Mathematics Teacher, 102(3): 231-237.

LEE THOMAS FREDERICKSON

San Diego State University
College of Engineering

Degrees:

B.S. in Chemical Engineering, University of Minnesota

Scholar Sponsors:

ARCS Foundation

About the Scholar:

Lee's research focuses on the development of a high-temperature receiver used in concentrating solar power. He is working on experimentation of a lab-scale system to characterize receiver performance for the design of a full-scale system. The system is designed to produce a high temperature gas that will be used to run a gas turbine to produce electricity in the full-scale system. Lee enjoys hiking, relaxing at the beach, playing hockey, and cooking.

Benefits to Society:

Concentrating solar power is an emerging technology that is crucial to the future of sustainable energy. There is abundant sunshine in the desert regions of the United States and throughout the world, and concentrating solar power is an effective way to harvest that into usable energy. Within the field of concentrating solar power, this receiver is designed to produce high outlet temperatures and be installed within a Brayton cycle, which is capable of higher efficiencies than a Rankine cycle. Also, water use is major constraint in desert settings where concentrating solar power is appropriate and this technology will allow for dramatic water reduction at a power plant by utilizing a gas turbine rather than a steam turbine. Along with reducing water usage, this receiver allows for decreased carbon emissions compared to burning natural gas directly in a nominal Brayton cycle.

Publications and Posters:

Frederickson, L.; Dordevich, M.; Miller, F. Lab-scale Experimentation and CFD Modeling of a Small Particle Heat Exchange Receiver. Proceedings of SolarPACES 2013, Las Vegas, NV, Sept 17-20, 2013; 48359.

Frederickson, L.; Miller, F.; Kitzmiller, K. Carbon Particle Generation and Preliminary Small Particle Heat Exchange Receiver Lab Scale Testing. Proceedings of ASME 2013 7th International Conference on Energy Sustainability, Minneapolis, MN, July 14-19, 2013; 18215.

Kitzmiller, K.; Miller, F.; Frederickson, L. Design, Construction, and Preliminary Testing of a Lab-Scale Small Particle Solar Receiver. Proceedings of SolarPACES 2012, Marrakech, Morocco, September 11-14, 2012.

MICHAEL GURNEY, JR.

San Diego State University
College of Sciences

Degrees:

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

B.S. Biochemistry and Cell Biology, University of California, San Diego

A.A. University Studies, Grossmont College

Scholar Sponsors:

ARCS Foundation, Betty Jo Williams

About the Scholar:

Michael is researching how lowering caloric intake has the potential to decrease inflammation, improve aspects of immune function, and decrease the amount of dead tissue following heart attack. If inflammation is left unchecked, it has a profound impact on how our bodies repair themselves and how long we live, how our bodies repair themselves following injury and how we handle infectious disease. Michael spends his spare time biking, walking and reading.

Benefits to Society:

For his doctoral thesis, Michael is examining the interaction between inflammation, autophagy, and aging. Autophagy and inflammation work against each other to promote cellular function, survival, and tissue repair following an acute stress, such as heart attack or infection. As organisms age, these processes become dysregulated and the likelihood of successful tissue repair or survival following injury declines, implying that tweaking the autophagy and inflammation pathways could improve survival and tissue repair. Michael recently demonstrated that autophagy declines while others have shown increased inflammation with age. Periodic fasting is thought to increase autophagy (and probably decrease inflammation). Upon intermittently fasting middle-aged mice until they were elderly, Michael found partial restoration of some immune cell function and a decline in the tissue damage done by heart attack in old mice, making fasting a possible therapy to improve heart attack survival, mitigate age-related inflammatory diseases, or perhaps increase vaccine efficacy in the elderly.

Awards and Honors:

Grossmont President Honors

UCSD President Honor

Navy Achievement Medal

Navy Good Conduct Medal

Phi Beta Kappa

Publications and Posters:

Gurney, M.A.; Linton, P.J. Autophagy and Immunology. 2012. (Book chapter in Autophagy in Health and Disease)(in press).

Burnside, K.; Lembo, A.; Harell, M.; Gurney, M.A.; Xue, L.; Binh, T.; Connelly, J.; Jewel, K.; Schmidt, B.; de los Reyes, M.; Tao, W.; Doran, K.S.; Rajagopal, L. The serine/threonine phosphatase Stp1 is important for post-transcriptional regulation of hemolysin and virulence of Group B Streptococci. J. Biol. Chem. 2011, 286(51), 44197-44210.

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, Norma Hidalgo del Rio

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. High sensitivity, selectivity, and small sample size requirements makes the technique ground-breaking for the way diseases could be discovered and treated.

Awards and Honors:

Sigma Xi

Publications and Posters:

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.

Zhang, Y.; Liang, H.; Zakharov, L. N.; Das, S. K.; Hetu, M. Carboxyester hydrolysis promoted by Cu(II) complexes of pyridyl-amine carboxylate-pendant ligands. Inorganica Chimica Acta 2007, 360, 1691-1701.

STEPHANIE HUELGA

University of California, San Diego
Bioinformatics and Systems Biology

Degrees:

B.S. in Bioinformatics, University of California, Santa Cruz

Scholar Sponsors:

ARCS Foundation, Lambert Foundation for Education at Union Bank

About the Scholar:

Stephanie analyzes thousands of gigabytes of sequencing data to understand how RNA binding proteins affect RNA processing events. She is especially interested in identifying the cause of RNA processing defects that occur in many human diseases in hopes of aiding in drug design. While Stephanie spends most of her time performing bioinformatic analyses, she also does bench experiments generating data and validating her findings. Stephanie is an avid rock climber and enjoys hiking and yoga.

Benefits to Society:

Many human diseases result from the mis-regulation of RNA processing, such as Spinal Muscular Atrophy, and Amyotrophic Lateral Sclerosis. By understanding how RNA binding proteins affect the processing of RNA in these diseases, we can help to efficiently target drug design to these proteins to repair the mis-regulation, and potentially reverse the effects of these diseases. The success of this research has the added bonus of helping deconvolute the complexities of RNA processing by RNA binding proteins, a field of great scientific interest to many research groups.

Awards and Honors:

National Science Foundation Graduate Research Fellowship

National Institute of General Medical Sciences Ancillary Training Program Travel Scholarship

Cancer Cell Biology Training Grant, UC San Diego

National Science Foundation AGEP Fellowship, UC San Diego

Publications and Posters:

Wilbert, M.W.; Huelga, S.C.; Kapeli, K.; Stark, T.J.; Liang, T.Y.; Chen, S.X.; Yan, B.Y.; Nathanson, J.L.; Hutt, K.R.; Lovci, M.T.; Kazan, H.; Vu, A.Q.; Massirer, K.B.; Morris, Q.; Hoon, S.; Yeo, G.W. LIN28 binds messenger RNAs at GGAGA motifs and regulates splicing factor abundance. Molecular Cell, 2012. (in press)

Huelga, S.C.; Yeo, G.W. Alternative Splicing in Stem Cells. In Computational Biology of Embryonic Stem Cells; Zhan, M., Ed.; Bentham Science Publishers, 2012. p 147-160.

Huelga, S.C.; Vu, A.Q.; Arnold, J.D.; Liang, T.Y.; Liu, P.P.; Yan, B.Y.; Donohue, J.P.; Shiue, L.; Hoon, S.; Brenner, S.; Ares, M.; Yeo, G.W. Integrative genome-wide analysis reveals cooperative regulation of alternative splicing by hnRNP proteins. Cell Reports, 2012.

VICTORIA LYNNE 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 comprises 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. When Vicki is not researching in the lab, teaching, or volunteering, she enjoys traveling, skiing, and combing tidal pools for marine invertebrates. She also enjoys being "crafty" through jewelry making, sewing, and cooking.

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.

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 Liberal Arts, 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, a protein related to Parkinson's disease. The plan is to develop ultra-sensitive laser-based detection methods for these important proteins. So far these studies indicate that alpha synuclein and serotonin can be detected by this method with better chemical selectivity levels, enhanced detection sensitivity levels and higher spectral and spatial resolution levels as compared to currently available methods. These new tools for early detection would scientifically help Parkinson's patients over the world. Manna enjoys cooking, swimming and working out in the gym.

Benefits to Society:

Manna is especially interested in the early detection of proteins related to Parkinson's disease. Since Manna's great grandfather and grandparents suffered from Parkinson's, she has first-hand knowledge of the challenges associated with the disease. Currently, there is no specific cure, although some medical treatments are available that could slow the progressive course of the disease. In her grandmother's case, it took too many years to diagnose Parkinson's disease, causing her to miss the ideal time window for brain surgery. Manna is very motivated to study and develop new ultrasensitive nonlinear laser-based methods to detect Parkinson's disease at much earlier stages before the symptoms appear. These new tools for early detection could significantly help Parkinson's patients all over the world.

Awards and Honors:

Harry E. Hamber Memorial Scholarship

Wilmia Tyler Trott Memorial Scholarship

International Christian University Dean's List

Publications and Posters:

Jimenez, J.; Gregerson, M.; Neary, T.; Hetu, M.; Iwabuchi, M.; Tong, W. Multi-photon nonlinear laser wave-mixing detection of chemical and biological agents. SACNAS National Conference, San Jose, CA., Oct 27-30, 2011.

Iwabuchi, M.; Hetu, M.; Neary, T.; Tong, W. Sensitive analysis of alpha synuclein by laser wave-mixing detection and capillary electrophoresis. CSUPERB Annual Symposium, Santa Clara, CA., January 7, 2012.

Iwabuchi, M.; Neary, T.; Hetu, M.; Wu, H.; Warren, A.; Tong, W. Ultrasensitive analysis of biomarkers by nonlinear laser wave-mixing detection and capillary electrophoresis. American Chemical Society National Meeting, San Diego, CA, March 25, 2012.

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:

Webster & Helen Kinnaird, Paul Bechtner Foundation

About the Scholar:

Jessica's research is in regard to the Hendra and Nipah virus infections, which at this point have no therapeutics or vaccines for treatment and prevention, even though these viruses are among the world's most deadly. Determining the molecular mechanisms behind host-virus interactions is important to understanding the basic biology driving their virulence and in identifying potential drug candidates. Finding a way to block the viral proteins bound to host factors can allow the immune system a chance to fight off the infection. Jessica enjoys surfing, rock climbing and rafting.

Benefits to Society:

Hendra and Nipah viruses are newly emergent pathogens with mortality rates as high as 90%. Part of what makes these viruses so deadly is their ability to stop the immune system from fighting off the infection. These viruses produce three related proteins that block the immune response. Jessica is trying to better understand how these proteins work by determining their three-dimensional structures. Information provided by these studies should help guide the development of much-needed antiviral therapeutics.

Awards and Honors:

The Scripps Research Institute Dean's Fellowship

Delia and Donald Baxter Fellowship

Perry Research Award

American Chemical Society Award in Analytical Chemistry

Walter Brattain Scholarship

Publications and Posters:

Correia, B.E.; Ban, Y.A.; Holmes, M.A.; Xu, H.; Ellingson, K.; Kraft, Z.; Carrico, C.; Boni, E.; Sather, D.N.; Zenobia, C.; Burke, K.Y.; Bradley-Hewitt, T.; Bruhn-Johannsen, J.F.; Kalyuzhniy, O.; Baker, D.; Strong, R.K.; Stamatatos, L.; Schief, W. Computational design of epitope-scaffolds allows induction of antibodies specific for a poorly immunogenic HIV vaccine epitope. Structure. 2010, 18(9), 1116–26.

Correia, B.E.; Ban, Y.A.; Friend, D.J.; Ellingson, K.; Xu, C.; Boni, E.; Bradley-Hewitt, T.; Bruhn-Johannsen, J.F.; Stamatatos, L.; Strong, R.K.; Schief, W.R. Computational protein design using flexible backbone remodeling and resurfacing: case studies in structure-based antigen design. J. Mol. Biol. 2011, 405(1), 284-97.

Bruhn, J.F. Creating a chimera: studying multiple sclerosis through a myelin basic protein-actin fusion protein. Whitman College. 2009.

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

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, his 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

Poster Awards in the 5th KIAS Protein Folding Winter School

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.

JOSEPH WILLIAM KAUS

University of California, San Diego
Physical Sciences

Degrees:

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

B.S. in Chemistry, University of Pittsburgh

Scholar Sponsors:

Mara & Larry Ybarrondo, ARCS Foundation

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 work currently focuses on improving the design of the calculations used in computer-aided drug design to overcome limitations encountered when using these methods. Once his method has been fully developed, he will use it to study potential antibacterial drugs that will target drug resistant bacteria. Joe enjoys hiking, listening to music, and studying Portuguese.

Benefits to Society:

By improving the methodology used in drug discovery, we reduce the time and costs needed for the development of new drugs. 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 toward 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. (In print).

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

Kaus, J.W.; Zwier, M.C.; Chong, L.T. Efficient Explicit-Solvent Molecular Dynamics Simulations of Molecular Recognition Systems, 240th American Chemical Society National Meeting, Boston, MA, August 2010

BRANDON JONATHAN 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 researching 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 the number one cause of neonatal meningitis. In order 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 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 for 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:

Rees-Stealy Research Fellow

President's Award San Diego State University Student Research Symposium

1st Place, California State University Statewide Student Research Competition

Southern California American Society for Microbiology Most Outstanding Doctoral Student Poster

"The Golden Pipette" (Best poster) San Diego State University Graduate Student Symposium

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. 2013 SNAIL-1 Contributes to Bacterial Disruption and Penetration of Brain Endothelium. (In Preparation)

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.

Krishnan, V.; Dwivedi, P.; Kim, B.J.; Samal, A.; Macon, K.; Ma, X.; Mishra, A.; Doran, K.S.; Ton-That, H.; Narayana, S.V. 2013. Structure of Streptococcus agalactiae tip pilin GBS104: a model for GBS pili assembly and host interactions. Acta Crystallogr D Biol Crystallogr 69:1073-1089.

CHRISTOPHER WILLIAM KOPP

University of California, San Diego
Division of Biological Sciences

Degrees:

M.S. in Plant Science, South Dakota State University, Brookings

B.S. in Range Science, South Dakota State University, Brookings

Scholar Sponsors:

Virginia Lynch Grady Endowment

About the Scholar:

Chris' interest in ecosystems comes from being born and raised on a cattle ranch in South Dakota. The mountainous ecosystems are predicted to experience a greater response to climate change than other systems. His studies allow him to detect rapid shifts in distribution and abundance of several alpine and sub-alpine plants species including sagebrush. He has lived in Southern California since 2007. He enjoys running, hiking, and the outdoors in general.

Benefits to Society:

Alpine environments support a diversity of uses, such as livestock grazing and recreation (skiing, hiking, etc.). These regions are expected to experience above average warming with continued global climate change. The flora in these regions have been found to be particularly sensitive to the impacts of rising temperatures. Changes in phenology (timing of life history events such as flowering) or complete loss of alpine plant species will have detrimental impacts on the organisms that rely on them (pollinators and herbivores). Understanding how alpine floras have been impacted, and will continue to be impacted, by climate change allows land stewards to adjust how they manage and protect these unique environments.

Awards and Honors:

National Science Foundation Graduate Teaching Fellow in K-12 Education (GK-12)

University of California Natural Reserve System Milder E. Mathias Graduate Student Research Grant

American Alpine Club Research Grant

University of California White Mountain Research Center Graduate Student Mini-Grant

California Native Plant Society Research Grant

Publications and Posters:

Hillhouse, H.L.; Master, R.A.; Schacht, W.H.; Sleugh, B.B.; Kopp, C.W. Restoration of Degraded Tallgrass Prairie with Tebuthiuron. (In review)

Kopp, C.W.; Cleland, E. E. Shifts In Plant Species Elevational Range Limits And Abundances Observed Over Nearly Five Decades In A Western North America Mountain Range. J. Veg. Sci., 2013. DOI: 10.1111/jvs.12072

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.; 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. (submitted)

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.

JASON ROBERT 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. The expected benefit to society is that these devices will make it easier to manipulate light, potentially improving optical communication devices.

Benefits to Society:

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. 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.

KATHERINE LEVAN

University of California, San Diego
Division of Biological Sciences

Degrees:

B.S. in Biology, Tufts University
B.A. in Spanish, Tufts University

Scholar Sponsors:

The Thomas C. Ackerman Foundation

About the Scholar:

Katie is studying the ecological consequences of invasion by the Argentine ant. Her work with this introduced species will clarify the side effects of exotic species on pollination of plants and on food webs. A better understanding of the competition between introduced ants and the native species will result in the implementation of removal campaigns that minimize damage to ecosystems and decrease the need for pesticides. When Katie is not working in the field, she is an avid hiker and enjoys backpacking and camping in the outdoors.

Benefits to Society:

Katie's research on an important invasive species will help scientists better understand the consequences of an introduction for biodiversity and ecosystem services (particularly biocontrol and pollination). Some of her data suggest that aphids can distract the Argentine ant from foraging in flowers, increasing pollination services for plants that host aphids. This led to increased seed production in plants. If follow-up experiments support this assessment, then farmers growing pollen-limited (pollinator-dependent) crops may be able to increase their yield and decrease pesticide use in areas with Argentine ants and aphids. Better management of invasive species starts with research that informs scientist of the role they fill in their new habitat. From this starting point, we can implement more effective removal campaigns that minimize damage to native ecosystems.

Awards and Honors:

NSF Graduate Research Fellow

Mildred Mathias Awardee

Jeanne M Messier Research Fellow

Highest thesis honors, Tufts University

Publications and Posters:

LeVan, K.E.; Hung, K.J.; McCann, K.R.; Ludka, J.; Holway, D.A. Floral visitation by the Argentine ant reduces pollinator visitation and seed set in the coast barrel cactus, Ferocactus viridescens. (submitted)

Wilson, E.E.; Sidhu, C.S.; LeVan, K.E.; Holway, D.A. Pollen foraging behaviour of solitary Hawaiian bees revealed through molecular pollen analysis. Mol Ecol. 2010, 19(21): 4823-4829.

LeVan, K.E.; Fedina, T.Y.; Lewis, S.M. Testing multiple hypotheses for the maintenance of homosexual copulatory behavior in flour beetles. J Evol Biol. 2009, 22: 60-70.

South, A.; LeVan, K.; Leombruni, L.; Orians, C.M.; Lewis, S.M. Examining the role of cuticular hydrocarbons in firefly species recognition. Ethol. 2008, 114 (9): 916-924.

ELIZABETH LIGHT

University of San Diego
Hahn School of Nursing and Health Science

Degrees:

M.S. in Nursing Science, University of San Diego
B.S. in Nursing Science, Syracuse University

Scholar Sponsors:

The Beyster Family Foundation Fund IV

About the Scholar:

Elizabeth's goal is to identify strategies that will reduce the long-term adverse consequences of poor maternal and reproductive health in minorities and underserved populations. Her research aims to increase women's awareness of the importance of positive health practices before, during, and after pregnancy to improve maternal-child health outcomes. She aims to maximize access, reduce treatment barriers, and improve public health impact. Elizabeth enjoys spending time with her husband and her daughter.

Benefits to Society:

Diversity remains a significant challenge in healthcare with research on women's health in pregnancy and the postpartum period, and disparities are a public health priority globally. Elizabeth's research will examine the factors surrounding maternal-fetal attachment and maternal health practices. Maternal-fetal attachment describes the relationship between a pregnant woman and her fetus. There is limited research examining this relationship in general and, more specifically, among diverse populations of women. Examining maternal-fetal attachment can elucidate this dynamic and complex bond. Identifying the various elements of maternal behaviors and how they inform women's choices can provide insight into women's health issues in order to improve maternal-child health outcomes.

Awards and Honors:

Dean's Merit Scholar

Blystone Family Scholarship

Sigma Theta Tau International Honor Society for Nursing

Nurse of Excellence Award, Neonatal Intensive Care Unit, Rady Children's Hospital San Diego

Publications and Posters:

Light, E. Viewing Women's Health from an Alternative Lens. Neonatal Network: The Journal of Neonatal Nursing. (In Press)

CONNOR JOHN LIND

University of San Diego
Shiley-Marcos School of Engineering

Scholar Sponsors:

WD-40 Company

About the Scholar:

Connor is pursuing a degree in Mechanical Engineering with a minor in Mathematics. He took to volunteer service and international development at an early age, completing a service trip with Habitat for Humanity in Poland after his sophomore year in high school. Following his freshman year in college, Connor traveled alone to the Jammu and Kashmir region of Northern India to teach English to Tibetan Buddhist nuns in the Himalayas. He continued his study of international development with a university honors seminar in Environmental Studies, which included travel to the Dominican Republic. Additionally, Connor took a spring break to analyze immigration and border issues in Tijuana, Mexico, with University Ministry.

Last year, Connor founded USD's first Engineers Without Borders student chapter, of which he currently serves as president. Connor is also a winner of the 2013 Social Innovation Challenge for his business venture, Roam, an online platform for volunteers to share and review international volunteering opportunities. This past summer Connor was an intern for Bridges to Prosperity and served as the co-project manager for a sixty-meter suspension bridge in rural Haiti. Upon graduation, he will continue working in the field of humanitarian engineering and pursue graduate education in International Development Studies.

Benefits to Society:

Connor's research interests include the applications of engineering to the developing world.

Awards and Honors:

Academic Excellence Award, Mechanical Engineering

Outstanding Engineering Sophomore, Spring 2012

Tau Beta Pi Scholar

USD Alcala Merit Scholar

USD Alumni Association Scholar

ERIC OSTROM 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 such as those Eric is working to develop will lead to a better understanding of the processes responsible for these events. Even if we do not succeed in predicting a specific event, 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, he feels that a better understanding and appreciation for the Earth's natural history and the massive forces that shape it is of itself 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

MICHAEL THOMAS LOVCI

TUniversity of California San Diego
Biomedical Sciences

Degrees:

B.S. in Biology, University of California, San Diego

Scholar Sponsors:

Margaret Roulette, ARCS Foundation

About the Scholar:

Michael started on the road to research with traditional "wet-lab" science but now spends most of his time at a computer. Michael's recent work has been directed at describing the functional role of RNA-binding proteins by applying high-performance computing analyses to sequencing-based experiments in order to measure the consequence of protein-RNA interactions on gene-expression. When he is not crunching numbers, Michael is a surfer and amateur photographer. He spends as much time as he can outside, and enjoys craft beer and good jokes.

Benefits to Society:

Michael studies RNA splicing, which transforms the relatively static DNA code into a myriad of protein products that each perform a presumably different function through development. Michael is interested in understanding how the process of RNA splicing is regulated by RNA-binding proteins, and how that leads to the differences in protein function. High-throughput sequencing has emerged since the early 2000's as a tool for massive data generation. Michael uses principles from the "big data" field of computer science to parse experimentally-generated DNA sequences representing gene-expression (the abundance of RNA produced from a gene a particular cell at a particular time), physical interactions between biomolecules, and genetic variation among populations of individuals. His work has shown that RNA can fold on itself to form "bridges" that associate splicing-regulatory proteins with faraway sites to regulate splicing decisions. His current projects are related to the molecular determinants and regulators of stress in a nematode model system, and the differences in RNA splicing that have led to human-specific cellular phenotypes in cultured human and non-human primate neurons.

Awards and Honors:

NSF GK12 Fellowship

Milton H. Saier Award for Outstanding Original Research in Bioinformatics

Publications and Posters:

Zisoulis, D. G.; Lovci, M. T.; Wilbert, M. L.; Hutt, K. R.; Liang, T. Y.; Pasquinelli, A. E.; Yeo, G. W. Comprehensive discovery of endogenous Argonaute binding sites in Caenorhabditis elegans. Nature structural & molecular biology 2010, 17 (2), 173-9.

Li, H.; Lovci, M. T.; Kwon, Y. S.; Rosenfeld, M. G.; Fu, X. D.; Yeo, G. W. Determination of tag density required for digital transcriptome analysis: application to an androgen-sensitive prostate cancer model. Proceedings of the National Academy of Sciences of the United States of America 2008, 105 (51), 20179-84.

Hunter, S. E.; Finnegan, E. F.; Zisoulis, D. G.; Lovci, M. T.; Melnik-Martinez, K. V.; Yeo, G. W.; Pasquinelli, A. E. Functional genomic analysis of the let-7 regulatory network in Caenorhabditis elegans. PLoS genetics 2013, 9 (3), e1003353.

Wilbert, M. L.; Huelga, S. C.; Kapeli, K.; Stark, T. J.; Liang, T. Y.; Chen, S. X.; Yan, B. Y.; Nathanson, J. L.; Hutt, K. R.; Lovci, M. T.; Kazan, H.; Vu, A. Q.; Massirer, K. B.; Morris, Q.; Hoon, S.; Yeo, G. W. LIN28 binds messenger RNAs at GGAGA motifs and regulates splicing factor abundance. Molecular cell 2012, 48 (2), 195-206.

CATHERINA ANNE MADANI

University of San Diego
Hahn School of Nursing and Health Science

Degrees:

M.S. in Nursing Science, University of San Diego
B.S. in Nursing Science, University of Massachusetts, Amherst

Scholar Sponsors:

Reuben H. Fleet Foundation Fund

About the Scholar:

Catie is facilitating nurses in the prevention of burnout and compassion fatigue in caring for suffering patients over a prolonged period of time by assessing the impact of palliative care integration into an intensive care unit. She is also looking at the occurrence of depression in a pulmonary arterial hypertension (PAH) population to better elucidate the need for palliative care in their treatment. Her aim is to remedy the paucity of nursing research in the care of pulmonary arterial hypertension patients. Catie enjoys biking, hiking, and spinning. She has been on medical missions to Santiago, Chile, and Ensenada.

Benefits to Society:

Up to 1 in 5 Americans die in an ICU setting. Compassion fatigue is a phenomenon that results from expending high levels of energy and compassion over a prolonged period to those who are suffering, often without experiencing the positive outcomes of seeing patients improve. Palliative care providers becoming involved in ICU care earlier may help to ameliorate the helplessness that is often experienced by nurses caring for end-stage patients. Recruiting and sustaining a quality nursing-workforce requires considerable resources. Therefore, steps to prevent nurse burnout or compassion fatigue are a good investment for an organization that places an emphasis on caring for patients with cancer.

Awards and Honors:

Dean's Merit Scholar

UC Center for Health Quality and Innovation Proposal Grant

Sigma Theta Tau

Zeta Mu

Publications and Posters:

Madani, C.A. The Incidence of Reperfusion Pulmonary Injury in Patients who have Undergone Pulmonary Endarterectomy: Distal Versus Proximal Disease, 21st World Congress of the World Society of Cardio-Thoracic Surgeons, Berlin, Germany, June 12-15, 2011.

Madani, C. Impact of palliative care education and consults on the incidence of ICU nurses' moral distress. Podium Presention at the 2012 San Diego Evidence Based Practice Conference. September, 2012.

Madani, C. Impact of palliative care education and consults on the incidence of ICU nurses' moral distress. Poster Presentation: Sigma Theta Tau International Nursing Honor Society Odyssey Conference, Nov 2012, Ontario CA.

GABRIELLA MALAGON-MALDONADO

University of San Diego
Hahn School of Nursing and Health Science

Degrees:

Doctor of Nursing Practice, Western University of Health Sciences

M.S. in Nursing, California State University, Fresno

B.S. in Nursing, California State University, Fresno

B.S. in Science, University of California, Irvine

Scholar Sponsors:

The Beyster Family Foundation Fund IV

About the Scholar:

Gabriella's research focus is on the prevention of gestational diabetes in underserved communities. The goal is to identify social factors that contribute to gestational diabetes mellitus and develop interventions to improve women's health during pregnancy. Other interests include the development and implementation of an Evidence-Based Nursing Practice Program that demonstrates clinical, service, and cost excellence. Gabriella's hobbies include traveling, cooking, exercising, and learning different languages.

Benefits to Society:

Gestational diabetes mellitus not only increases the risk of maternal and fetal complications during pregnancy but also significantly increases a women's risk of both type 2 diabetes mellitus and cardiovascular disease postpartum. Research suggests that the prevalence of gestational diabetes remains high in women living in underserved communities given the lack of resources and services. Additionally, there are overwhelming health care costs associated with treatment of gestational diabetes. A better understanding is needed of early risk prediction factors, population stratification, and interventions in pregnancy that can decrease the incidence of gestational diabetes mellitus in this population. A range of criteria that considers prevalence, risk factors, current practice, acceptability, and adequate treatment and follow-up systems will be explored.

Awards and Honors:

Summa Cum Laude Graduate

Sade E. Smith Scholarship Recipient

Sigma Theta Tau International Excellence in Nursing Award Recipient

California Latino Medical Association Scholarship Hispanic Nursing Scholarship Rounds I, II, III

California State University Research Grant Recipient

Publications and Posters:

Malagon-Maldonado, G. Using an Inquiry-Based Approach to Understand Interprofessional Collaboration, National Association of Clinical Nurse Specialist National Conference Podium Presenter, San Antonio, TX; 2013

Malagon-Maldonado, G. Reframing Interprofessional Collaboration Using an Inquiry-Based Approach, Doctors of Nursing Practice National Conference Podium Presenter, Phoenix, AZ; 2013

Malagon-Maldonado, G. Translating Interprofessional Collaboration into Practice, Sigma Theta Tau International Honor Society of Nursing 42nd Biennial Convention Podium Presenter, Indianapolis, IN; 2013

Malagon-Maldonado, G. Phenomenological, Grounded Theory, and Mixed Methods Research Symposium Presentation. Sigma Theta Tau International Honor Society of Nursing Odyssey Conference Podium Presenter, Pomona, CA; 2012

FREDERICK TAKAYUKI MATSUDA

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

Degrees:

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

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 the Cosmic Microwave Background (CMB) polarization signal or remnant polarized photons from the Big Bang. The main objective is to detect the cosmic primordial B-mode signal originating from inflationary gravitational waves. This theorized inflation is a mechanism of the early universe in which the universe undergoes a super-luminal expansion in which the causal horizon expands. Inflation allows us to explain many of the phenomena currently observed in the universe that cannot be solely explained by Big Bang cosmology. Frederick enjoys cooking and inviting friends over to his apartment to have dinner. He also enjoys going to the beach and just relaxing in the sand on a sunny day.

Benefits to Society:

This research will further the understanding of the physics of the origins of the universe. If the primordial B-modes are detected, this will have a tremendous impact on the astrophysics and physics communities because this will be the strongest evidence that supports the inflationary theory of the Big Bang model that is currently the most widely accepted theory of the early universe. Even if the B-modes are not detected within a certain threshold, 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 and give rise to further research interests not only in cosmology but also in 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:

T. Matsumura, et al. POLARBEAR-2 Optical and Polarimeter Designs. Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy VI. Proc. SPIE 8452. October 2012, 84523E.

T. Tomaru, et al. The POLARBEAR-2 Experiment. Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy VI. Proc. SPIE 8452. September 2012, 84521H.

K. Arnold, et al. The Bolometric Focal Plane Array of the POLARBEAR CMB Experiment. Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy VI. Proc. SPIE 8452. September 2012, 84521D.

Z. Kermish, et al. The POLARBEAR Experiment. Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy VI. Proc. SPIE 8452. September 2012, 84521C.

SARAH ANN MCCULLOUGH

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:

George Smedes Poyner Foundation

About the Scholar:

Sarah is investigating the ecological consequences of wildlife habitat selection when habitat has undergone rapid change due to human activities and species have not adapted quickly enough to negative characteristics of the altered habitat. Through the use of a rigorous Bayesian statistical framework, she is working to evaluate areas of uncertainty in existing published field data on habitat selection by a species of concern, the Western Burrowing Owl. The results will inform a simulation model designed to predict likely outcomes for owl populations in different habitat scenarios, in order to help managers evaluate their management options. In addition, she is a collaborator in a multi-year, replicated field experiment to test squirrel translocation as a method for establishing persistent squirrel colonies and creating the burrow habitat required by the burrowing owl. She chose the field of ecology for both the outdoor pleasures of field work and the intellectual satisfaction of computational projects. In her free time, Sarah is a birder and a quilter.

Benefits to Society:

In many conservation scenarios, the first question is how can we manage the situation in order to improve it and to avoid making it worse. For many wildlife species, enough research has been done to give partial information about how best to manage a species, but there is always some uncertainty in making conservation decisions. The computational and statistical tools Sarah uses can enable synthesis of current knowledge and evaluation of both the information and the uncertainty surrounding possible decisions.

Awards and Honors:

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

UC Davis Plant Sciences Departmental Assistantship

Phi Sigma, Biological Sciences Honor Society

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

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.

KATHLEEN TERESA MCGUIRE

University of San Diego
Shiley-Marcos School of Engineering

Scholar Sponsors:

Bob & Pat Whalen, ARCS Foundation

About the Scholar:

As an undergraduate, Kathleen feels that to excel in electrical engineering one must master a wide range of intertwined disciplines, which is one of the reasons she is drawn to this major. 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. 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 and at the same time, 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. Kathleen likes the challenge of manipulating known equations in order to get the outcome that she desires. Although Kathleen has not decided the specifics of her studies, in the future she sees herself continuing to graduate school. She enjoys playing tennis, reading, and especially playing with her dogs. As she is from Colorado, she has a natural inclination toward the outdoors.

Awards and Honors:

Dean's List

Mortar Board

Highest Scholastic Standing for Sophomore Engineering

TIMOTHY ROBERT 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 is focused on developing new methodologies utilizing a proprietary copper catalyst and its applications toward more efficient, economic, and "greener" synthetic routes of natural product compounds. He is currently using this methodology to synthesize azaspirene, a new, potent anticancer drug, and other members of the pseurotin structural family. The end goal is to enable ample amount of these potent therapeutics for aid in drug development studies. In his spare time Tim enjoys surfing and cooking.

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.

MORGAN NUNN

University of California, San Diego
Department of Physical Science

Degrees:

B.S. in Chemistry,
Georgia Institute of Technology

Scholar Sponsors:

ARCS Foundation, Arthur and Jeanette Pratt Memorial Fund

About the Scholar:

Morgan's research includes quantifying water in meteorites and lunar rock samples by extraction of volatiles through stepwise pyrolysis. By measuring the oxygen isotopic ratios in the water, information can be obtained about the formation and equilibration history of the meteorite parent body or the moon. These results can help determine which processes controlled the formation of our solar system. Morgan enjoys running, reading, traveling and studying other languages.

Benefits to Society:

The benefits of Morgan's research will allow us to more accurately predict where water can exist, thereby narrowing the search for extraterrestrial planets that could be habitable. As NASA's "follow the water" slogan reflects, where there is water, there is likely to be life. Consequently, understanding the formation and distribution of water in our solar system is one of the most fundamental and important challenges scientists face today.

Awards and Honors:

Zonta International Amelia Earhart Fellowship

HOPE Scholarship Recipient

Dr. Richard W. Fink Memorial Scholarship

Chemical Rubber Company Award in Freshman Chemistry

Publications and Posters:

Nunn, M.; Thiemens, M. Oxygen Isotopic Analyses of Water in Bjurböle Matrix and Chondrules, 74th Meteoritical Society Meeting, London, UK, Aug 8-12, 2011.

JASON OBERG

University of California, San Diego
Jacobs School of Engineering

Degrees:

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

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

Scholar Sponsors:

Donald C. & Elizabeth Dickinson Foundation

About the Scholar:

Jason is researching the security of computer applications that we rely on for both our safety and personal health. These include automobiles, commercial airlines, implantable medical devices, and many others. His research resolves part of the problem by providing techniques and tools for evaluating security of the hardware in a formal way. This will allow the designers of these systems to be confident in the security of their hardware, opening the door for more versatile, compact, and secure systems.

Benefits to Society:

Developing methods and tools for evaluating the security of hardware opens the doors for more versatile, compact, and secure systems. Traditionally, if a designer has two parts of a system (e.g. user and flight-control system on an airline) which have stringent security requirements, he/she simply makes two of them. This not only makes things physically larger, but also increases the system complexity. Jason's research takes a step forward in solving this problem, showing that mix-trusted hardware components can be intertwined in a provably secure way. By showing information-flow isolation, it can be proven that it is not possible for a less secure device to affect a more secure one (excluding physical phenomena such as observing the power consumed). This opens the doors to more versatile and complex systems with strong security. Not only will this research help our current systems become more reliable, but future systems will be able to handle aspects of our lives which we never thought possible.

Awards and Honors:

Harold J. and Mary E. Miller Engineering Scholarship

The International Engineering Consortium William L. Everitt Award of Excellence

National Science Foundation Graduate Research Fellowship

Jacobs School of Engineering Undergraduate Mentor

Publications and Posters:

Oberg, J; Kastner, R. Information Flow Isolation in a Mix-trusted System on Chip. (submitted)

Oberg, J.; Eguro, K.; Bittner, R.; Forin, A. Random decision tree body part recognition using FPGAs. The International Conference on Field-Programmable Logic and Applications, 2012

Oberg, J.; Hu, W.; Irturk, A.; Tiwari, M.; Sherwood, T; Kastner, R. Information flow isolation in I2C and USB. In Proceedings of the Design Automation Conference, 2011.

Oberg, J.; Hu, W.; Irturk, A.; Tiwari, M.; Sherwood, T; Kastner, R. Theoretical analysis of gate level information flow tracking. In Proceedings of the Design Automation Conference, 2010.

MATTHEW ONDECK

University of California, San Diego
Jacobs School of Engineering

Degrees:

M.S. University of California, San Diego
B.S. Carnegie Mellon University

Scholar Sponsors:

Hervey Family Non-endowment Fund

About the Scholar:

Matthew is developing a material for use in stem cell research simulating disease and developmental states. Stem cells differentiate based on cues within the tissue, one being the temporal and spatial variance in stiffness of the cell's substrate. Evidence has shown that the stiffness of diseased or developing tissue behaves dynamically, which is difficult to model in *in vitro* and *in vivo* stem cell research. His material implements dynamic cues that will more accurately mimic these states, facilitating research to investigate a myriad of cellular states. Matthew enjoys a variety of activities including sailing, hiking, and 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 stem cell 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 is poised to contribute to the overall wealth of knowledge in the scientific and stem cell community.

Awards and Honors:

Carnegie Mellon University SURF Fellowship

Intel First-Year Research Experience (IFYRE) Fellowship

Publications and Posters:

Habib, A.; Ondeck, M.; Miller, K.; Swaminathan, R.; McHenry, M. Novel solder-magnetic particle composites, their reflow using AC magnetic fields. IEEE Journal; Trans on Magnetics. 2010, 46(6), 2187-90.

Habib, A.H.; Xu, S.; Walker, E.; Ondeck, M.G.; Swaminathan, R.; McHenry, M.E. The role of eddy currents and nanoparticle size on AC magnetic field-induced reflow in solder/magnetic nanocomposites. J. Appl. Phys. 2012, 111(07B305).

TAWNI PARADISE

University of San Diego
Shiley-Marcos School of 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. She is mimicking the compost setting as it occurs in a landfill, but in a controlled setting. Accelerating decomposition rates at landfills will improve the efficiency with inflow and the amount of time materials spend in the dump. In her spare time, Tawni enjoys being with her Alaskan Malamute and her domestic short haired cat.

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.

Awards and Honors:

National Society of Collegiate Scholars

Alcala Scholarship

University of Technology Sydney Study Abroad Excellence Scholarship

University of San Diego Dean's List

University of San Diego Alcala Club

MICHAEL MARTIN PORTER

University of California, San Diego
Jacobs School of Engineering

Degrees:

M.S. in Biological Engineering, University of Hawaii

B.S. in Engineering Science and Mechanics, Virginia Tech

Scholar Sponsors:

Wally Schirra Memorial Fund

About the Scholar:

Michael turns to nature to inspire, design, and manufacture new high-performance materials, mechanical devices, and robotics. He is currently involved in two primary research projects: (1) the fabrication of hybrid ceramic-polymer composites for bone replacement applications, and (2) the development of flexible hard-soft robotics inspired by the seahorse tail. Both projects involve the investigation of the nano-/micro-structural properties of biological materials, such as bone and abalone nacre, to inspire new materials processing methods and mechanical designs. In the course of his research, he invented a novel materials processing method, known as magnetic freeze casting, to manufacture high-performance composite materials. Michael is an avid surfer and enjoys exploring the natural world in his free time as well as in research.

Benefits to Society:

Nature is the ultimate experimental scientist, having had billions of years of evolution to design, test, and adapt complex systems and materials for a multitude of diverse applications. Learning from biological systems and applying modern engineering techniques to emulate these systems, scientists and engineers from a wide range of interdisciplinary fields are able to develop surprising new technologies. Research in biomimetic materials, such as those that mimic bone and abalone nacre, has led to the development of stronger, tougher, and more lightweight materials for applications ranging from bone implants to lightweight fuselages. Bioinspired robotics research has the potential to develop next-generation robots with more flexibility and motion control, as well as better human-interface systems and multifunctionality.

Awards and Honors:

Gordon Scholarship, Gordon Engineering Leadership Center

Best Student Paper Award, Society of Experimental Mechanics

Kunzel/Powell Fellowship, Jacobs School of Engineering, UCSD

Golden Key Research Grant, Golden Key International Honour Society

Publications and Posters:

Porter, M. M.; McKittrick, J.; Meyers, M. Biomimetic Materials by Freeze Casting. JOM 2013, 1-8.

Porter, M. M.; Novitskaya, E.; Castro-Ceseña, A. B.; Meyers, M. A.; McKittrick, J. Highly deformable bones: unusual deformation mechanisms of seahorse armor. Acta Biomaterialia 2013, 9 (6), 6763-6770.

Porter, M. M.; Lee, S.; Tanadchangsaeng, N.; Jaremko, M. J.; Yu, J.; Meyers, M. A.; McKittrick, J. Porous Hydroxyapatite-Polyhydroxybutyrate Composites Fabricated by a Novel Method Via Centrifugation. In Mechanics of Biological Systems and Materials, Prorok, B. C.; Barthelat, F; Korach, C. S.; Grande-Allen, K. J.; Lipke, E.; Lykofatitits, G.; Zavattieri, P., Eds. Springer: New York, 2013; Vol. 5, pp 63-71.

Porter, M. M.; Yeh, M.; Strawson, J.; Goehring, T.; Lujan, S.; Siripasopsotorn, P.; Meyers, M. A.; McKittrick, J. Magnetic freeze casting inspired by nature. Materials Science and Engineering: A 2012, 556, 741-750.

PEARL QUIJADA

San Diego State University
College of Sciences

Degrees:

M.S. in Biology emphasis in Physiology, San Diego State University
B.S. in Biology, University of California, Riverside

Scholar Sponsors:

Kathryn Crippen Hattox Fund

About the Scholar:

Pearl is studying the signaling and treatments of heart disease. She is focusing on integrating molecular and cellular techniques in order to advance cellular therapy and mitigate damage after a heart attack. Her research involves working with animal models and determining overall cardiac function after treatments by echocardiography and *in vivo* hemodynamics to measure pressure and volume measurements. Outside of the laboratory, she enjoys going to the beach, running, and playing with her dog.

Benefits to Society:

Pearl believes that her studies and research will have positive implications for society in the future. Cardiovascular disease affects millions of people in the United States, where injury from primary or recurrent heart attacks is the main contributor of heart failure. Researchers and clinicians have been particularly interested in adult stem therapy in order to mediate damage, because not only is it safe, but also it has been proven efficacious in several studies. Although the desired effect of stem cell therapy often supports modest effects in cardiac function, 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:

Provost Award for Outstanding Poster Presentation

National Heart Lung and Blood Graduate Research Supplement Grant

President's Award for Outstanding Oral Presentation Student Research Symposium 2012

Publications and Posters:

Sussman, M.A.; et al. Myocardial AKT: The Omnipresent Nexus. Physiol Rev. 2011, 91, 3, 1023-1070.

Fischer, K.M.; Din, S.; Gude, N.; Konstandin, M.H.; Wu, W.; Quijada, P.; Sussman, M.A. Cardiac progenitor cell commitment is inhibited by nuclear Akt expression. Cir Res. 2011, 108, 8, 960-70.

Quijada, P; et al. Preservation of myocardial structure is enhanced by Pim-1 engineering of bone marrow cells. Circ. Res. 2012, 111, 1, 77-86.

Mohsin, M; et al. Human cardiac progenitor cells engineered with Pim-I kinase enhance myocardial repair. J. Am. Coll. Cardiol. 2012.

STEVEN DOUGLASS QUISTAD

San Diego State University
Department of Biology

SDSU/UCSD Joint Doctoral Program in Cell and Molecular Biology

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 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 triathlons, SCUBA diving, swimming, and catching up on last week's *Economist.*

Benefits to Society:

Corals were once believed to be "primitive" animals providing spectacular diving while on vacation, but not 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

Innovator of the Future Scholarship, Rambus Corp.

President's Award, Student Research Symposium, SDSU

Provost Award, Student Research Symposium, SDSU

University of California, Santa Barbara Award of Distinction

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)

GABRIEL REYES-RODRÍGUEZ

University of California, San Diego
Physical Sciences

Degrees:

M.S. in Chemistry, University of California, San Diego
B.S. in Chemistry, Universidad de Puerto Rico, Río Piedras

Scholar Sponsors:

Carlos & Sharon Arbelaez

About the Scholar:

Gabriel is studying a novel pathway for incorporating nucleophiles into aromatics to uncover the unknowns of chemical reactivity by relating reactivity and isotope effects. The questions asked do not have a direct application to society. Instead, they will become a foundation for further research. His project trains the graduate student to generate questions, solve problems, to use and learn about instrumentation, and to analyze data and propose explanations. His outside interests include music, sports, and orchids.

Benefits to Society:

Gabriel's research is important in its contribution to basic research. The reaction being studied represents a novel pathway for incorporating nucleophiles into aromatics. Not only will the results answer important and interesting questions about chemical reactivity, but also the project trains the graduate student to generate questions, solve problems, to use and learn about instrumentation, and to analyze data and propose explanations. There is a desire to uncover the unknowns of chemical reactivity by relating reactivity and isotope effects, generating very interesting questions that will contribute to defining novel mechanistic pathways of organic reactions. The questions asked do not aim for direct application in society. Instead, they will be foundation for future research. The answers will be long-lasting and they could be included in organic chemistry textbooks.

Awards and Honors:

Chemistry and Biochemistry Graduate Diversity and Outreach Award

American Chemical Society Division of Organic Chemistry Travel Award

Isidoro Alberto Colón's Medal for the Outstanding Student in Chemistry

Colegio de Químicos de Puerto Rico Award for 2nd Best Chemistry Student of Puerto Rico

Faculty of Natural Sciences Honor Student

Publications and Posters:

Perrin, C. L.; Reyes-Rodríguez, G. J. Reactivity of nucleophiles toward a p-benzyne derived from an enediyne, J. Phys. Org. Chem. 2012. doi: 10.1002/poc.2994.

Gioda, A.; Reyes-Rodríguez, G. J.; Santos-Figueroa, G; Collett Jr., J. L.; Decesari, S.; Ramos, M. D. C. K. V.; Netto, H. J. C. B.; Neto, F. R. D. A. and Mayol-Bracero, O. L. Speciation of water-soluble inorganic, organic, and total nitrogen in a background marine environment: cloud water, rainwater, and aerosol particles, J. Geophys. Res. 2011, 116, D05203. doi: 10.1029/2010JD015010.

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:

Virginia Lynch Grady Endowment

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,* we can estimate the levels of gene flow, genetic divergence, and effective population sizes while evaluating spatially explicit genetic patterns. This information can be used to assess concordance of functional and structural linkages across multiple species, and 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.

JULIA MICHELLE 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 condensates in semiconductor microcavities. Unlike atomic Bose-Einstein condensates (BECs) that need operating temperatures close to absolute zero (of the order of nano Kelvin), polariton condensates exist at much higher temperatures. Polariton condensates, consisting of short-lived exciton-photon quasiparticles, are excellent candidates 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 toward understanding and driving cutting-edge technological developments. Julia enjoys surfing, snowboarding, Pilates and painting in her spare time..

Benefits to Society:

Polariton condensates are formed when excitons (bound electron-hole pairs) are confined and coupled with light, making an exciton-photon hybrid quasiparticle. Remarkably, due to their much lighter mass, polariton condensates occur at high temperatures (including room temperature) in contrast to traditional atomic condensates that need temperatures of the order of nano Kelvin. Polariton condensates exhibit remarkable features such as superfluidity. The properties of these condensates, based on their quantum dynamical essence, allow 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. Therefore, it is crucial to study the key characteristics of such polaritonic systems and understand the dynamics and interactions of the basic structures, such as quantum vortices, that it supports. 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

NICOLE THERESE SCHIRLE

The Scripps Research Institute

The 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.

JANELLE SHANE

University of California, San Diego
Jacobs School of Engineering

Degrees:

M.Phil. in Physics, University of St. Andrews, Scotland

B.S. in Electrical Engineering, Michigan State University

Scholar Sponsors:

Kenneth & Marjorie Blanchard, ARCS Foundation

About the Scholar:

Janelle is working to make computers faster by replacing electronics-based components with light-based (photonic) components. Photonic connections between different computer chips, or within parts of a single chip, will improve the speed and energy consumption of the world's computers and networks. As the speed increases, the light that carries the data starts experiencing new optical effects. In her research, Janelle hopes to compensate for the harmful fast optical effects and exploit the ones that may be useful. Janelle plays the Irish flute, and is learning old-style Irish dance. She also enjoys hiking, writing, and making jewelry from discarded photonic chips.

Benefits to Society:

Computers enable much of today's beneficial technology, and Janelle's lab seeks to make them faster by improving the way their components communicate with each other, using fast and energy-efficient light instead of electronics.

Awards and Honors:

National Science Foundation Graduate Research Fellowship

Mondialogo Engineering Project, Finalist

Barry M. Goldwater Scholarship

Alumni Distinguished Scholarship

Most Outstanding Electrical and Computer Engineering Student, Michigan State University

Distinguished Service Award, Department of Electrical and Computer Engineering, Michigan State University

Publications and Posters:

Shane, J.; Mazilu, M.; Lee, W. M.; Dholakia, K. Effect of pulse temporal shape on optical trapping and impulse transfer using ultrashort pulsed lasers. Optics Express 2010, 18(7), 7554-7568.

Harris, D. A.; Shane, J. C.; Lozovoy, V. V.; Dantus, M. Automated phase characterization and adaptive pulse compression using Multiphoton Intrapulse Interference Phase Scan in air. Optics Express 2007, 15, 1932-1938.

Shane J.; Lozovoy V.; Dantus M. Binary search space mapping: Getting a picture of coherent laser control. Journal of Physical Chemistry A 2006, 110, 40, 11388-11391.

Lozovoy, V. V.; Zhu, X.; Gunaratne, T. C.; Harris, D. A.; Shane, J. C.; Dantus, M. Control of molecular fragmentation using binary phase-shaped femtosecond laser pulses. Journal of Physical Chemistry A 2006, 7, 2471-2473.

LAUREN SHIPP

University of California, San Diego
Scripps Institution of Oceanography

Degrees:

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

Scholar Sponsors:

The Reuben H. Fleet Foundation Fund

About the Scholar:

Lauren's research is to advance basic knowledge of how marine invertebrates deal with toxicants, in order 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 be used to improve policies that manage industrial chemicals in the ocean. Lauren is a former gymnast who now enjoys swimming, gardening, and playing the piano when 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's goal is to advance basic knowledge of how marine invertebrates 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 and Engineering Graduate Fellowship

Undergraduate Research Apprenticeship Program Summer Fellowship, UC Berkeley

NCAA Academic All-American

NCAA Athletic Scholarship, Gymnastics, UC Berkeley

Publications and Posters:

Shipp, L.E.; Hamdoun, A. ATP-binding cassette (ABC) transporter expression and localization in sea urchin development. Dev. Dyn. 2012, 241(6), 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(10), e13754.

Koliwad, S.K.; Kuo, T.; Shipp, L.E.; Gray, N.E.; Backhed, F.; So, A.Y.; Farese, R.V. Jr.; Wang, J.C. Angiopoietin-like 4 (ANGPTL4, fasting-induced adipose factor) is a direct glucocorticoid receptor target and participates in glucocorticoid-regulated triglyceride metabolism. J. Biol. Chem. 2009, 284(38), 25593-601.

JOSHUA SILVERMAN

The Scripps Research Institute
Kellogg School of Science and Technology

Degrees:

B.S. in Physics, Duke University

Scholar Sponsors:

Mara & Larry Ybarrondo

About the Scholar:

Josh is focusing on strategies that a cell uses to grow and survive according to what resources are available and the condition of its environment. Different circumstances call for different cells, so cells must morph to fit the situation. Using global surveillance of the proteins that make up the cell mass of the proteome, he performs experiments to observe the management of the proteome in response to different stresses and energy sources. This has implications for understanding cancer, treating bacterial infections as well as the optimal expression of genes in the design of cellbased biofuels. Josh enjoys playing softball and plays often.

Benefits to Society:

The strategies used by cells for maintenance of or transition between growth phases should underlay all cells. Cancer in mammals, in at least some ways, reflects the reversion of differentiated cells towards single cell behavior as well as the significant redesign of the proteome in order to facilitate proliferation. For instance, for an *E. coli* cell to grow at the fastest rate, it must devote a maximum portion of its proteome to ribosomal proteins, at the expense of metabolic enzymes. Understanding these strategies of proteome management in terms of rules and constraints will give a much clearer picture of what a cell can and cannot do in attempts to switch growth states. This has implications for understanding cancer, treating bacterial infections, as well as in the optimal expression of genes in the effort to design cellbased biofuels.

Publications and Posters:

Chen, S.; Silverman, J.; Sperling, E.; Williamson, J. Dynamics of ribosome biogenesis in E. coli using *in vivo* pulse labeling and quantitative mass spectrometry. (In submission).

Silverman, J.; Changes in proteome allocation with growth rate: theory and experiment, TSRI Graduate Symposium, 2010.

Silverman, J.; Self assembling DNA networks, Molecular Biomimetics & Bionanotechnology Conference, University of Washington, 2009.

Silverman, J.; Novel miRNA: Just a few clicks away, Cold Spring Harbor Laboratory Undergraduate Research Symposium, 2007.

CHRISTINE SLOAN

University of San Diego
Hahn School of Nursing and Health Science

Degrees:

M.S.N. in Nursing Education, Point Loma Nazarene University
B.S.N. in Nursing, University of Arizona

Scholar Sponsors:

Hervey Family Non-endowment Fund

About the Scholar:

Christine's research will focus on implementation of palliative care in the pediatric population. Palliative care offers a holistic approach to aggressively treating and managing distressing physical and psychological symptoms, focusing on comfort and quality of life. Despite best efforts some children succumb to their disease or condition. Parents and caregivers often view palliative care measures as "giving up." As a result children often receive more aggressive and futile care at end of life. Christine enjoys spending time on their sailboat.

Benefits to Society:

Despite our technological and scientific advances, not all children with a life-threatening illness can be saved. Christine's objectives are to explore barriers to obtaining and providing palliative care, to evaluate the impact of palliative care on patients and their families, and ultimately, to reduce suffering.

Publications and Posters:

Holt, D.M.; Lewis, C.; Klimpel, K.; Sloan, C.; Aguda, C. The effects of focused nursing education on 3F Groshong PICC occlusion rates: The experience of one tertiary care facility. Journal of the Association of Vascular Access 2011, 15, 4, 204-212.

Meisenberg, B.R.; Callaghan, M.; Sloan, C.; Sampson, L.; Miller, W.E.; McMillan, R. Complications associated with central venous catheters used for the collection of peripheral blood progenitor cells to support high-dose chemotherapy and autologous stem cell rescue. Supportive Care in Cancer 1997, 5, 3, 223-227.

Meisenberg, B.R.; Miller, W.E.; McMillan, R.; Callaghan, M.; Sloan, C.; Brehm. T, Kosty, M.P.; Kroener,J.; Longmire, R.; Saven, A.; Piro, L.D. Outpatient high-dose chemotherapy with autologous stem-cell rescue for hematologic and nonhematologic malignancies. Journal of Clinical Oncology 1997, 15, 1, 11-17.

Sloan, C. The Effect of a Unit-Based Palliative Care Program on End-of-Life Variables Among Children with Cancer. Pediatric Nursing Conference, Orlando, FL; 2009.

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:

ARCS Foundation

About the Scholar:

John's research focuses on using CKs protein over-expression in breast cancer as a biomarker for research and development of a novel anti-breast cancer therapy. This proposed therapy will not only provide a means to exert maximal cytotoxicity against certain breast tumors, but also generate minimal toxicity on healthy, proliferating cells, therefore minimizing the adverse side effects such as anemia, dry mouth, and alopecia. In his leisure time John enjoys running and mentoring younger students.

Benefits to Society:

The gold standard of breast cancer research is to create therapies that will selectively kill breast cancer cells from a background of healthy cells, thereby minimizing the adverse side effects a patient must endure. To achieve this goal, researchers need to identify markers and/or mechanisms that make a breast cancer cell different. Cyclin-dependent kinase subunits (Cks 1 and Cks2) frequently occur in breast cancer and have been linked to poorer clinical prognoses. Validation of this hypothesis in tissue culture works and animal studies will take us one step closer to personalized medicine in terms of breast cancer treatment where cytotoxicity against breast cancer cells is maximized while systemic toxicity is minimized.

Awards and Honors:

Richard G. Lambert Foundation for Education Pre-doctoral Fellowship

UCSD Biological Sciences Student Association Service Award

Armin Rappaport Prize

Erion Scholarship

Change A Life Foundation Scholarship

Publications and Posters:

Duong, J; Tat, J; Sadler, GR. The story of two tumors, San Diego Chinese Tribune, 22 Nov. 2008:C6.

Tat, J; Wu, P; Sadler, GR. Children's advise, We Chinese in America Weekend, 24 Oct. 2008(C) No.95:20.

LUDOVIC VINCENT

University of California, San Diego
Jacobs School of Engineering

Degrees:

B.S.E. in Bioengineering, University of Pennsylvania

Scholar Sponsors:

The Legler Benbough Foundation

About the Scholar:

Ludovic is focusing his research on the regenerative potential of adult stem cells found in human marrow and fat. His project aim is to mimic the environment around stem cells, especially the stiffness, composition, and structure, to better understand cell migration and to selectively guide these stem cells into muscle cells for the eventual treatment of muscle wasting diseases such as muscular dystrophy. Ludovic enjoys competing in endurance events, specifically marathons and triathlons.

Benefits to Society:

Understanding how stem cells "feel" their environment and migrate as a response to physical and chemical cues helps scientists comprehend how cells home to damaged and diseased tissues. Equally important is how the stem cell's environment dictates the ultimate cell type, i.e. muscle, bone, fat, that these stem cells become in diseased environments and their participation in tissue regeneration. Such fundamental understanding is largely lacking and could prove beneficial to treat fibrotic muscle diseases and help devise strategies to treat heart muscle after a heart attack.

Awards and Honors:

National Science Foundation Graduate Research Fellow

Herman P. Schwan Bioengineering Award

Publications and Posters:

Choi, Y. S.; Vincent, L. G.; Lee, A. R.; Dobke, M. K.; Engler, A. J., Mechanical derivation of functional myotubes from adipose-derived stem cells. Biomaterials 2012.

Choi, Y. S.; Vincent, L. G.; Lee, A. R.; Kretchmer, K. C.; Chirasatitsin, S.; Dobke, M. K.; Engler, A. J., The alignment and fusion assembly of adipose-derived stem cells on mechanically patterned matrices. Biomaterials 2012.

Zubair, A.; Burbelo, P. D.; Vincent, L. G.; Iadarola, M. J.; Smith, P. D.; and Morgan, N. Y. Microfluidic LIPS for serum antibody detection: demonstration of a rapid test for HSV-2 infection. Biomedical Microdevices 2011.

Vincent, L.; and Engler, A.J. Effect of substrate modulus on cell function and differentiation. In Comprehensive Biomaterials, Healy, K.E.; Ducheyne, P.; and J. Kirkpatrick, Ed.; Elsevier: New York, 2011.

Metter, R. B.; Ifkovits, J. L.; Hou, K.; Vincent, L.; Hsu, B.; Wang, L.; et al. Biodegradable fibrous scaffolds with diverse properties by electrospinning candidates from a combinatorial macromer library. Acta Biomaterialia 2010.

SPENCER WEI

University of California, San Diego
School of Medicine

Degrees:

B.A. in Molecular and Cell Biology, Emphasis in Genetics, University of California, Berkeley

Scholar Sponsors:

ARCS Foundation, Samuel & John Henry Fox Foundation

About the Scholar:

Spencer is researching how increasing tissue stiffness promotes breast tumor metastasis and is identifying the factors that are involved in this process. Understanding how these events unfold (what goes awry in cancer cells) during carcinogenesis may lead to the development of treatments for prevention of tumor metastasis and aid in the diagnosis of aggressive breast tumors. Spencer enjoys outdoor activities including basketball, football, cycling and soccer.

Benefits to Society:

Tissue stiffness and other mechanical signals are poorly described, particularly in terms of their role in carcinogenesis. By understanding the molecular events that drive tumor progression and metastasis, scientists may be able to predict, or even prevent, such events from occurring. Thus, Spencer's work may aid in the diagnosis of aggressive breast tumors and lead to the development of novel therapies aimed at preventing breast tumor metastasis. These results will likely apply to other types of cancers as the relationship between tumor tissue stiffness and metastasis has been described in other tumor types. This is a particularly attractive goal as the main cause of mortality in cancer patients is metastasis, so preventing the growth of metastasis is of the utmost urgency. Furthermore, because the relationship between patient outcome, metastasis, and tumor tissue stiffness correlates well in a variety of cancer types, the therapies developed from this approach may be effective in a wide range of patients.

Publications and Posters:

Blanvillain, R.; Wei, S.; Wei, P.; Kim, J.H.; Ow, D.W. Stress tolerance to stress escape in plants: role of the OXS2 zincfinger transcription factor family. EMBO J. 2011, 30, 18, 3812-22.

Wei, S.; Blanvillain, R.; Ow, D.W. Effects of histone acetylation at the SOC1 locus in Arabidopsis. UC Berkeley Honors Poster Session, Berkeley, CA.; 2008.

ALEXANDER JAMES WHITE

University of California, San Diego
Division of Physical Sciences

Degrees:

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

B.S. in Chemistry, California Polytechnic State University, San Luis Obispo

Scholar Sponsors:

Reuben H. Fleet Foundation Fund

About the Scholar:

Alexander is interested in the theoretical and computational study of electron and energy transport in single molecule junctions. As the size of molecular electronic devices decreases to a single (or few) molecule(s), quantum effects play an increasingly important role. In these systems, interactions between electrons, vibrations, plasmons and excitons affect electrical conductance, heating, and optical properties of the junction. Alexander's research focuses on developing methods that can treat such intra-system interactions exactly. In his spare time, Alexander enjoys reading, hiking, and playing softball with his fellow chemistry students.

Benefits to Society:

Understanding the single molecule junction system may help in minimizing computer circuit dimensions, allowing for increased performance and new applications in electronics. These small devices are within the quantum mechanical regime in which coherence and decoherence, quantum interference, and many-body interactions play an important role. Understanding the role of such effects is crucial to the development of nanoscale devices. In addition to the development of novel devices, the advances made in the theoretical treatment of open, nonequilibrium, quantum systems may have implications in other areas of condensed phase chemical physics.

Awards and Honors:

Department of Energy Young Researcher Sponsorship to 63rd Lindau Nobel Laureate Meeting

Publications and Posters:

White, A. J.; Galperin, M. Inelastic transport: a pseudoparticle approach. Phys. Chem. Chem. Phys. 2012, 14, 13809-13819

White, A. J.; Fainberg, B.D.; Galperin, M. Collective Plasmon-Molecule Excitations in Nanojunctions: Quantum Consideration. J. Phys. Chem. Lett. 2012, 3, 2738-2743

White, A. J.; Sukharev, M.; Galperin, M. Molecular nanoplasmonics: Self-consistent electrodynamics in current-carrying junctions. Phys. Rev. B. 2012, 86, 205324

White, A. J.; Migliore, A.; Galperin, M.; Nitzan, A. Quantum transport with two interacting conduction channels. J. Chem. Phys. 2013, 138, 174111

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:

Matthew is combining his interest in the traditional mechanical engineering field of heat transfer and his interest in nanotechnology. His goal is to measure the thermal properties of nanomaterials at new size scales, as small as several nanometers, to improve the understanding of nanoscale heat transport. He has developed new measurement techniques 100 times more sensitive than current techniques to measure properties at these scales. By understanding the thermal properties of low thermal conductivities, more efficient thermoelectric devices can be designed. Matthew enjoys biking along the coast.

Benefits to Society:

The thermal conductivity of one-dimensional nanostructures, such as nanowires, nanotubes, and polymer chains, is of significant interest for understanding nanoscale thermal transport phenomena as well as for practical applications in nanoelectronics, 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. Thermoelectric devices with higher efficiencies would allow us to harness waste heat from power production, industrial processes, and transportation to generate electricity, thereby increasing the overall energy efficiency of important economic sectors. Meanwhile, with the advent of faster, smaller, and more dense electronic devices, understanding thermal properties of small nanostructures becomes important for the design of these future nanoscale electronics. Heat dissipation becomes an important design consideration in these devices, especially in personal handheld devices, and understanding how heat will flow through the basic components is important to their development.

Awards and Honors:

Tau Beta Pi

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 Letters 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. Review of Scientific Instruments 2012, 83, 024901.

THOMAS GIECHAUNG WONG

University of California, San Diego
Office of Graduate Studies

Degrees:
M.S. in Physics, University of California, San Diego
B.S. in Physics, Computer Science, and Mathematics, Santa Clara University

Scholar Sponsors:
ARCS Foundation Endowment

About the Scholar:

Tom is developing computer search algorithms for a new type of quantum computer that he and his research advisor have proposed, which take advantage of the collective nonlinear behavior that some quantum systems with many interacting particles exhibit. Nonlinear systems are notoriously difficult to analyze, but Tom has turned these foes into friends, using them to achieve computational speedup not possible with standard, linear quantum systems. In fact, their algorithms are so fast, they can find a particular item among a million items in the same time it would take to search among ten items. Aside from research, Tom enjoys backpacking and the outdoors.

Benefits to Society:

The advent of computers and the Internet has led to astonishing increases in our access to information. With so much information being shared, the ability to search for data quickly has led to the rise and fall of many search engine companies. The need for fast searching extends beyond users of the Internet. Businesses, data centers, and researchers frequently look for information stored in databases. So the ability to search continues to be an actively researched topic.

At some point, however, classical computers will reach a limit as to how quickly they can search because of fundamental physical limitations. To get around this, we can use quantum computers instead. It has been known for nearly two decades that quantum computers can solve unstructured search faster than classical computers. Our research extends these speedups by utilizing nonlinear quantum systems, which has the potential to effect every area in which searching is needed.

Awards and Honors:

Orella Prize - Senior science student with highest average in scientific subjects

Paul R. Halmos Prize - Distinguished senior in math or computer science beyond course work

David Blockus Prize - Most outstanding senior in physics

Carl H. Hayn Physics Prize - Most outstanding in the introductory physics sequence

Phi Beta Kappa

Publications and Posters:

Meyer, D. A.; Wong, T. G. Nonlinear Quantum Search Using the Gross-Pitaevskii Equation. New J. Phys. 2013, 15, 063014.

Ostrov, D. N.; Wong, T. G. Optimal Asset Allocation for Passive Investing with Capital Loss Harvesting. Appl. Math. Finance 2011, 18, 291-329.

Wong, T.G.; Foster, M.; Colgan, J.; Madison, D.H. Treatment of ion-atom collisions using a partial-wave expansion of the projectile wavefunction. Eur. J. Phys. 2009, 30, 447-452.

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 is studying a family of inequalities called Logarithmic Sobolev inequalities 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 Logarithmic Sobolev inequality. He is showing that there is a large class of measures that do satisfy such an inequality. This makes Logarithmic Sobelov inequalities a widely applicable tool, so results in these other areas of mathematics can be proven. David enjoys rock climbing, 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.

What Does this Award Mean to You?

Chris DeBoever

It is exciting to see donors continue to support promising young scientists during difficult financial times. ***ARCS Foundation Scholar Award lessens my financial burden*** *and allows me to focus on the important (and fun) stuff, the science.*

Katie LeVan

Before receiving ARCS Foundation Scholar Award, I was concerned about funding my project. ***Without this Award, I would have had to take on additional teaching responsibilities*** *slowing my academic progress significantly. This Award means that I can spend more time working on my project and writing my dissertation.*

Matthew Ondeck

ARCS Foundation funding will be very important to my career as a young researcher. ***It will provide me the opportunity to disseminate my research through a variety of journals and symposiums.*** *With ARCS Foundation funding I will attend and present my work at the Biomedical Engineering Society and Materials Research Society Annual Meetings, as well as the American Society for Cell Biology Conference.*

Tawni Paradise

ARCS Foundation Scholar Award gives me more time to focus on and observe things I did not have time to observe before. This Award means spending more time contemplating my research and the certain ways that it reacts and focus on my studies and to really engage in the learning experience.

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.*

Gabriel Reyes-Rodríguez

ARCS Foundation Scholar Award means a lot to me. The fact that my advisor is an eminence in his research field and he decided to nominate me for ***this Award means that he believes in me,*** *and he sees a bright future in my research/teaching career.*

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.*

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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There are two ways to support ARCS Scholars.

1. **Annual Gifts to the Scholar Award Fund** may be made by check, credit card, or through gifts of appreciated securities. Gifts made during the fiscal year July 1 – June 30 are awarded at the beginning of the following academic year.

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.

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

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