ARCS ADVANCING SCIENCE IN AMERICA®

SAN DIEGO CHAPTER

ACHIEVEMENT REWARDS FOR COLLEGE SCIENTISTS

INTRODUCING THE SCHOLARS

2019-2020

CELEBRATING

35 YEARS

SUMMARY

ARCS Foundation - San Diego Chapter 2019-2020 Scholars

All ARCS Scholars supported by the San Diego Chapter are enrolled in doctoral programs

Navigate document by clicking on the Scholar name or click to the section by clicking on an institution.

SAN DIEGO STATE UNIVERSITY

John Matthew Allen - Cell and Molecular Biology
Erik Alexander Blackwood - Cell and Molecular Biology
Mariel Manaloto Cardenas - Chemistry
Corey Allyn Clatterbuck - Ecology
Molly Elizabeth Clemens - Ecology
Liwen Deng - Cell and Molecular Biology
Joshua Terence Kelly - Geological Sciences
Lucas Aaron Luna - Biochemistry
Clifford Dennis Pickett Jr. - Cell and Molecular Biology
Adriana Sara Trujillo - Cell and Molecular Biology
Janet Kathleen Walker - Ecology
Melissa Ann Ward - Marine Ecology
Joi LaGrace Weeks - Cell and Molecular Biology
Nicholas Benjamin Williams - Chemistry

SCRIPPS RESEARCH

Carlos Andres Aguirre - Neuroscience
Lisa Marie Barton - Chemistry
Christopher Andrew Cottrell - Immunology
Joseph Michael McGraw - Biomedical Sciences
Anthony Nicholas Milin - Biomedical Sciences
Jessica Danielle Rosarda - Chemical Biology
Sophia Louise Shevick - Chemistry
Mia Shin - Biomedical Sciences
Leonard Heekyu Yoon - Chemical Biology

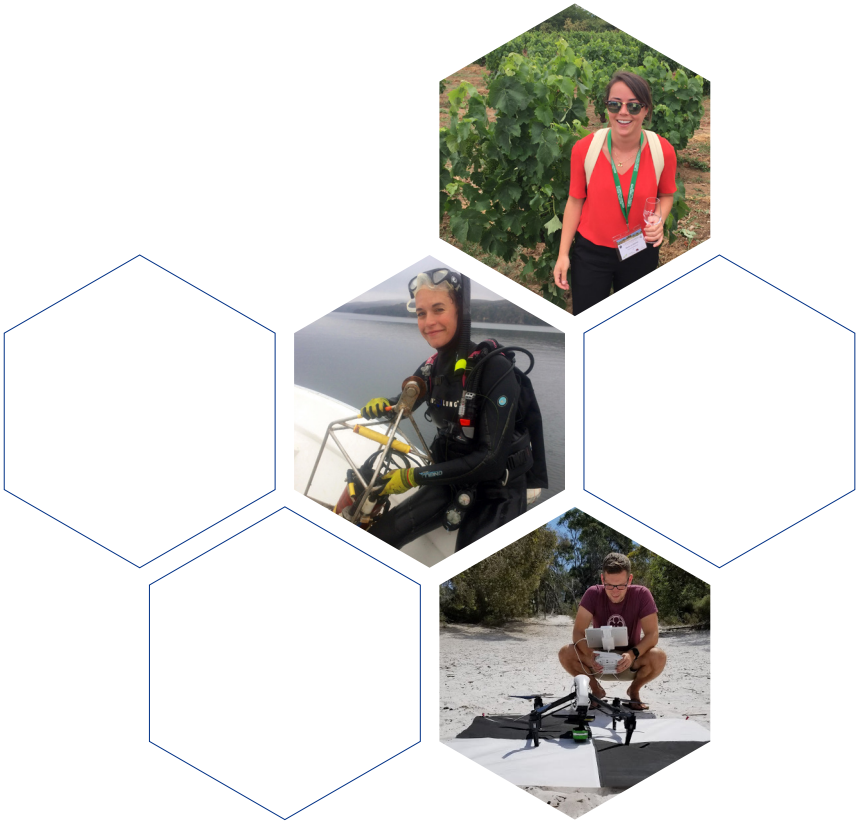
UNIVERSITY OF CALIFORNIA SAN DIEGO

Bryce Eric Ackermann - Biochemistry
Miriam Kathleen Bell - Mechanical Engineering
Laura Brown Chipman - Biological Sciences
Gabrielle Marie Colvert - Bioengineering
Bethanny Patricia Danskin - Neurosciences
Cayce Elizabeth Dorrier - Biomedical Sciences
Michelle T Dow - Bioinformatics and Systems Biology
Mickey Finn III - NanoEngineering
Shereen Georges Ghosh - Biomedical Sciences
John Patrick Gillies - Biological Sciences
Mark Kalaj - Chemistry
Emil Mario Karshalev - Materials Science and Engineering
Kevin Richard Kaufmann - NanoEngineering
Andrew Thomas Kleinschmidt - Chemical Engineering
Jenna Joaquin Lawrence - Mechanical and Aerospace Engineering
Chi-Wei Man - Biochemistry
Ryan Jared Marina - Biomedical Sciences
Nicole Patricia Mlynaryk - Neurosciences
Colman Arthur Moore - NanoEngineering
Jessica Yi-Jun Ng - Geochemistry
Victor Wingtai Or - Chemistry
Jason Alexander Platt - Biophysics
Homa Rahnamoun - Biological Sciences
Dimitrious Adrian Schreiber - Electrical and Computer Engineering
Benjamin Shih - Mechanical and Aerospace Engineering
Matthew David Stone - Public Health - Health Behavior
Anthony Quoc Vu - Biomedical Sciences
Alexander Jeffrey Whitehead - Bioengineering
Andrew Ying - Statistics
Jiarong Zhou - NanoEngineering

UNIVERSITY OF SAN DIEGO

Byron Batz - Nursing
Nicole Tamara Martinez - Nursing
Allison Kathleen Perkins - Nursing
Brooke Haley Rakes - Nursing

San Diego State University



The San Diego State University doctoral programs here are offered jointly with either the University of California Davis or the University of California San Diego as noted in the Scholars' profiles.

JOHN MATTHEW ALLEN

San Diego State University / University of California San Diego

College of Sciences

Concentration: Cell and Molecular Biology

Specialization: Stem Cell Biology and Regeneration

Donor: Reuben H. Fleet Foundation Fund

John's project works towards understanding how cells make fate decisions. How DNA, or the "blueprints" of the cell, are physically packaged by histone proteins in the nucleus can regulate gene levels and directly influence cell fate. His work focuses on a complex that modifies histone proteins that wind DNA around them. The effect of this modification is to cause a localized compaction of the DNA and histones and cause genes to become silenced. His lab studies this complex during regeneration and examines how stem cells are regulated as re-form tissues.

ERIK ALEXANDER BLACKWOOD

San Diego State University / University of California San Diego

College of Sciences

Concentration: Cell and Molecular Biology

Specialization: Molecular Cardiology

Donor: ARCS Foundation - San Diego Chapter / Karen and Bob Bowden

Ischemic heart disease is the leading cause of human deaths worldwide and is mainly due to acute myocardial infarction (AMI), where coronary artery occlusion causes rapid, irreparable damage to the heart, increasing susceptibility to progressive cardiac degeneration and heart failure. Erik has identified several lead candidate small molecules that can enhance adaptive signaling and responses in the heart and confer protection against cardiac damage during an AMI. Furthermore, because of the nature of the adaptive response targeted, he is investigating its beneficial effects in disease models targeting other organ systems.

MARIEL MANALOTO CARDENAS

San Diego State University / University of California San Diego

College of Sciences

Concentration: Chemistry

Specialization: Organic Chemistry, Chemical Methodology

Donor: ARCS Foundation - San Diego Chapter / Robin Luby

Mariel is developing various catalytic atroposelective syntheses towards pharmaceutically relevant compounds. Reactions that she is currently working on are nucleophilic substitutions and additions of specific functionalities that medicinal chemistry would be interested in (e.g. various amines, methoxy-groups). Examples of pharmaceutically relevant compounds that Mariel has worked on include: 3-aryl pyrrolopyrimidines (well-studied compounds that have direct implications in modern chemotherapeutics) and 3-aryl quinolines (which are found in many FDA-approved drugs and bioactive compounds). Her chemistry is applicable to improving workflow behind drug discovery, as the state of industry lacks cost-efficient and timely chemical methodologies to make large amounts of these biologically active compounds.

COREY ALLYN CLATTERBUCK

San Diego State University / University of California Davis

College of Sciences

Concentration: Ecology

Specialization: Marine Ecology and Conservation

Donor: Virginia Lynch Grady Endowment

Seabirds are a highly-threatened taxon that are also ecological sentinels of ocean conditions, including chemical pollution. Corey's research examines contaminants found in seabird tissues to better describe the chemical environments sea life are exposed to. She uses targeted approaches to assess contaminants that are highly regulated and well-established as harmful to human health, in addition to non-targeted approaches that detect new, currently unmonitored, and unregulated contaminants of interest. The primary objective is to determine concentrations and spatial extent of contaminants and potential impacted species before the levels of these contaminants become problematic in the environment.

MOLLY ELIZABETH CLEMENS

San Diego State University / University of California Davis

College of Sciences

Concentration: Ecology

Specialization: Viticulture

Donor: The Heller Foundation of San Diego

Molly is studying the impact of rising carbon dioxide levels on grapevine functions, including lifecycle shifts and leaf morphology. She has worked with researchers in France and Italy to investigate the genetics of grapevine graft compatibility. Molly will be working this year on a genetic transformation to increase drought tolerance in grapevine as a step towards more sustainable viticulture. Her work at San Diego State involves an experimental vineyard investigating alternative varieties for California from hotter and drier regions of the world.

LIWEN DENG

San Diego State University / University of California San Diego

College of Sciences

Concentration: Cell and Molecular Biology

Specialization: Microbiology

Donor: Hervey Family Non - Endowment Fund

Liwen is interested in how the typically commensal bacterium Group B Streptococcus (GBS) is able to cause severe disease in vulnerable populations such as newborns. GBS normally colonizes the vaginal tract of healthy women asymptomatically but can be transmitted to the newborn with devastating consequences. Currently, GBS is a leading cause of neonatal pneumonia, sepsis, and meningitis in the United States. Since beginning her work in Dr. Doran's lab, Liwen has identified several bacterial factors that contribute to how asymptomatic colonization can transition and cause invasive disease in newborns.

JOSHUA TERENCE KELLY

San Diego State University / University of California San Diego

College of Sciences

Concentration: Geological Sciences

Specialization: Coastal Geomorphology, Remote Sensing

Donor: ARCS Foundation - San Diego Chapter

Josh's research involves understanding how climate influences shoreline change along the southeast coast of Queensland, Australia. He has used satellite imagery to construct a decades long shoreline change curve that was correlated to global climate cycles such as the El Niño-Southern Oscillation. He ultimately found that shoreline dynamics (erosion/growth) are controlled by variability in the Interdecadal Pacific Oscillation. He is currently using emerging satellite technologies to rapidly assess tropical cyclone impacts on Australia's coast.

LUCAS AARON LUNA

San Diego State University / University of California San Diego

College of Sciences

Concentration: Biochemistry

Specialization: Enzymology; Molecular Mechanisms of Diseases

Donor: ARCS Foundation - San Diego Chapter

The Sohl Lab in the Chemistry & Biochemistry Department at SDSU aims to help alleviate disease by investigating mechanistic questions at the intersection of biochemistry, cell biology, and medicine. We explore how altered enzyme activity impacts human health using kinetic, structural and cellular tools. By understanding the molecular mechanisms of enzyme dysfunction, we can illuminate structure-function relationships, probe subsequent global cellular consequences of mutations, identify drug targets, and ultimately develop platforms for targeted therapy.

CLIFFORD DENNIS PICKETT JR.

San Diego State University / University of California San Diego

College of Sciences

Concentration: Cell and Molecular Biology

Specialization: Developmental Genetics

Donor: Drs. Mara and Larry Ybarrondo / ARCS Foundation - San Diego Chapter

The development of an embryo from a single cell has always fascinated C. J. Particularly, he is interested in the study of the genetic program of embryogenesis. His research aims to understand the advent of a particular cell type in a marine chordate, a ciliated neuron that is homologous to our inner ear hair cells. He is discovering what genes are responsible for producing this cell type. Due to our evolutionary connections to this organism that he studies, the properties of how this cell type develops are transferable to fields such as human hearing-loss research.

ADRIANA SARA TRUJILLO

San Diego State University / University of California San Diego

College of Sciences

Concentration: Cell and Molecular Biology

Specialization: Molecular Mechanisms of Heart Disease

Donor: ARCS Foundation - San Diego Chapter

Adriana's research uses the fruit fly model system to explore the disease mechanisms by which mutations can cause dilated cardiomyopathy, a type of heart disease associated with heart enlargement. This disease can be caused by mutations in myosin, the protein responsible for producing muscle contraction. She is currently implementing multidisciplinary approaches (molecular, cellular, and whole tissue) to better understand how changes within the structure of the myosin molecule lead to biochemical defects and how these abnormalities relate to the structural and physiological decline of muscles.

JANET KATHLEEN WALKER

San Diego State University / University of California Davis

College of Sciences

Concentration: Ecology

Specialization: Marine and Wetland Ecology

Donor: Virginia Lynch Grady Endowment

In southern California, over 85% of natural salt marsh habitat has been lost to human development, and while there have been attempts to restore marsh habitat, the overall outcomes tend to be variable. Restoration success of marine plant habitats is largely determined by the abundance of foundational species, like salt marsh cordgrass. However, we often lack an understanding of the factors influencing cordgrass density and their spatiotemporal variation. The central goal of Jan's research is to help address this research gap by focusing on the role of Pacific coast crabs in structuring salt marsh habitats along the California coast.

MELISSA ANN WARD

San Diego State University / University of California Davis

College of Sciences

Concentration: Marine Ecology

Specialization: Ocean Biogeochemistry, Chemical Oceanography

Donor: Reuben H. Fleet Foundation Fund

Seagrass meadows improve water quality, stabilize sediments, and are home to many economically and ecologically valuable species; yet most of California's seagrass meadows have been lost. By exploring the ability of seagrass to sequester carbon and alter water chemistry, we can quantitatively evaluate the carbon services gained through seagrass conservation and restoration. This work will help inform state and federal management efforts to restore these habitats while maximizing the carbon services they provide, which will become increasingly more important in the face of climate change.

JOI LAGRACE WEEKS

San Diego State University / University of California San Diego

College of Sciences

Concentration: Cell and Molecular Biology

Specialization: Cancer Biology

Donor: Legler Benbough Foundation

To study amplified malate dehydrogenase 1 (MDH1) in lung cancer, Joi created two cell clones that reveal increased MDH1 levels and enzymatic activity in non-small cell lung cancer (NSCLC). Metabolic studies on MDH1 knock out (KO) cells reveal a 50% reduction in TCA cycling suggesting that decreased activity of MDH1 has the potential to slow down tumor progression. Her studies will increase our understanding about the effects of changing MDH1 levels on cell behavior and how changes in MDH1 activity can eradicate cancer cells.

NICHOLAS BENJAMIN WILLIAMS

San Diego State University / University of California San Diego

College of Sciences

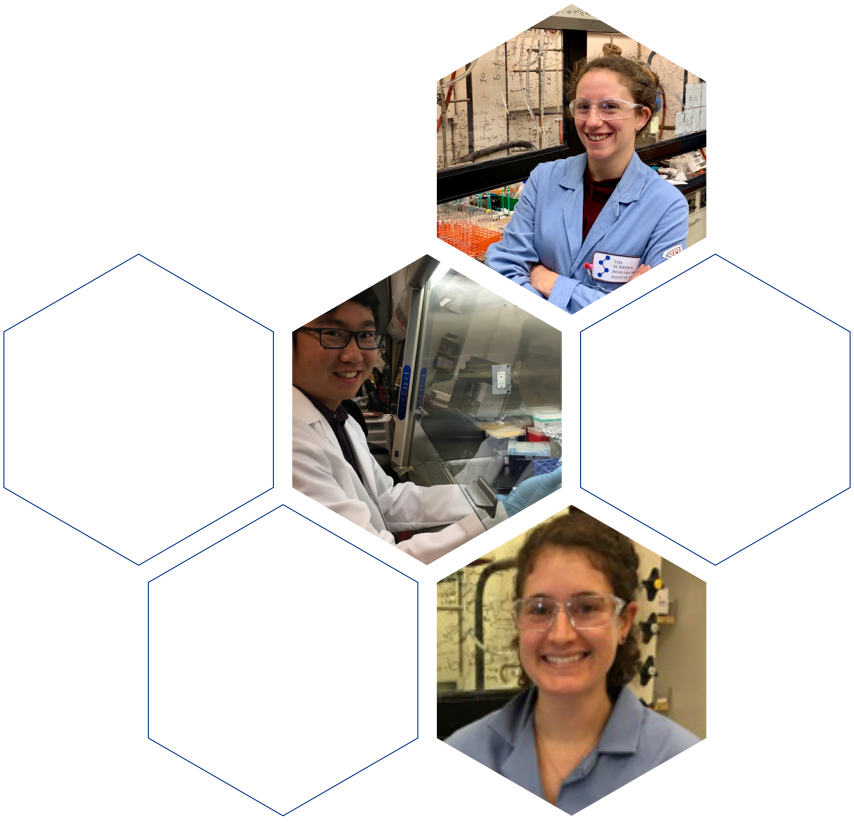
Concentration: Chemistry

Specialization: Inorganic Chemistry

Donor: ARCS Foundation - San Diego / Virginia Lynch Grady Endowment

Currently, Nick is investigating the decomposition of a molecular catalyst-semiconductor hybrid system designed to produce Hydrogen gas. Understanding the mechanism of decomposition has led to the design of better molecular catalysts expected to inhibit degradation during the photoelectrochemical production of Hydrogen. Fundamental studies such as this are necessary for the rational design of better, more efficient and cost-effective solar fuel producing systems in the times to come which we so readily need.

Scripps Research



CARLOS ANDRES AGUIRRE

Scripps Research

Skaggs Graduate School of Chemical and Biological Sciences

Concentration: Neuroscience

Specialization: Neurodegeneration and Neuroinflammation

Donor: ARCS Foundation - San Diego Chapter

Carlos' research focuses on understanding how inflammation of the brain contributes to Parkinson's disease. Parkinson's disease is primarily characterized by degeneration of dopaminergic neurons, dopamine-producing brain cells, in a specific area of the brain termed the substantia nigra pars compacta. Recently, inflammation has been proposed to contribute to the neuronal loss in Parkinson's disease. Carlos is investigating whether two regulators of immune response interleukin-13 and its receptor alpha-1 (IL-13Rα1) contribute to the neuronal loss characterized in Parkinson's disease. His work may reveal novel targets for treating Parkinson's disease.

LISA MARIE BARTON

Scripps Research

Skaggs Graduate School of Chemical and Biological Sciences

Concentration: Chemistry

Specialization: Organic Chemistry

Donor: Larry and Marti Showley / ARCS Foundation - San Diego

As a graduate student in the lab of Professor Phil Baran, Lisa's research focuses on the development of novel chemical transformations that aid in the synthesis of highly strained molecules. Rapid access to these motifs is useful to many different areas of organic chemistry, including the synthesis of pharmaceuticals, natural products and energetic molecules. The ability to access novel strained scaffolds, that would otherwise be very challenging to synthesize, will aid other chemists in their own research.

CHRISTOPHER ANDREW COTTRELL

Scripps Research

Skaggs Graduate School of Chemical and Biological Sciences

Concentration: Immunology

Specialization: Vaccine Design

Donor: Webster & Helen Kinnaird / Paul Bechtner Foundation / ARCS Foundation - San Diego

Despite over 30 years of effort, an effective HIV vaccine has yet to be developed. Current experimental HIV vaccines are capable of eliciting neutralizing antibodies against the vaccine strain of HIV, but do not produce antibodies capable of neutralizing the diverse strains of HIV circulating throughout the world. Chris's research seeks to combine high-resolution structural biology information with immunological and bioinformatics data to engineer a series of HIV immunogens designed to broaden vaccine-induced neutralizing antibody responses.

JOSEPH MICHAEL MCGRAW

Scripps Research

Skaggs Graduate School of Chemical and Biological Sciences

Concentration: Biomedical Sciences

Specialization: Immunology

Donor: Reuben H. Fleet Foundation Fund

Cancer immunotherapies direct our immune system to kill tumor cells and can completely cure a subset of patients. However, many patients still do not see any clinical benefit, and additional treatment options are needed. γδ T cells are a subset of immune cells with unique tissue-homing and tumor killing capabilities and are therefore a promising therapeutic target. Joseph's research aims to harness the potential of these cells and develop new cancer diagnostics and immunotherapies to improve clinical outcomes for a wider range of patients.

ANTHONY NICHOLAS MILIN

Scripps Research

Skaggs Graduate School of Chemical and Biological Sciences

Concentration: Biomedical Sciences

Specialization: Phase Separation in Biology

Donor: ARCS Foundation - San Diego Chapter

Each year in America, nearly 1.7 million adults develop sepsis, nearly 270,000 Americans die as a result of sepsis, and 1 in 3 patients who die in hospitals have sepsis. Recent research has identified the growth-arrested state of bacteria as essential to understanding pathogenesis, yet its physiology remains poorly understood. Early investigations point towards liquid-liquid phase separation as one potential starvation protection mechanism for bacteria. By deciphering the physical basis of phase separation and the proteins/molecules that regulate this process, we hope to contribute to the future development of novel antibiotics.

JESSICA DANIELLE ROSARDA

Scripps Research

Skaggs Graduate School of Chemical and Biological Sciences

Concentration: Chemical Biology

Specialization: Cellular Stress Signaling

Donor: Mike and Laurie Roeder

Strokes are caused by a blood clot that impedes blood flow to the brain. While starved for oxygen and glucose, cells suffer severe stress that can lead to cell death. One way to prevent cell death is to increase the amount of stress a cell can handle by turning on pathways, like ATF6. Jessica's project is to identify protective mechanisms by which pharmacologic ATF6 activation protects neurons against stroke-associated damage. Furthermore, she will investigate the role of ATF6 in dictating the efficacy of other stroke therapeutics currently in development to treat ischemic stroke, such as Activated Protein C (APC).

SOPHIA LOUISE SHEVICK

Scripps Research

Skaggs Graduate School of Chemical and Biological Sciences

Concentration: Chemistry

Specialization: Organic Chemistry

Donor: Virginia Lynch Grady Endowment

Sophie's current project is the synthesis of a natural product (originally isolated from mushrooms) that targets the kappa opioid receptor (KOR). Sophie plans to make this same natural product in the lab, using commercially available starting materials. A synthetic route to this natural product will provide enough material for biological study, while also allowing for deep-seated changes to be made to the chemical scaffold. In the process, Sophie hopes to learn about chemical reactivity while synthesizing this tool to study opioid pharmacology. There is potential for this molecule to serve as a starting point for a non-addictive pain medication.

MIA SHIN

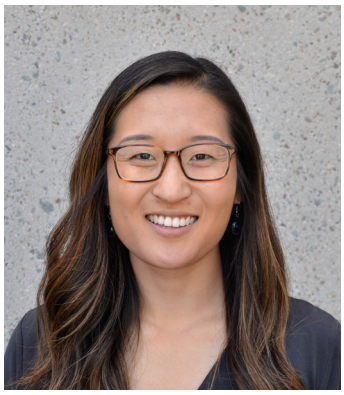
Scripps Research

Skaggs Graduate School of Chemical and Biological Sciences

Concentration: Biomedical Sciences

Specialization: Biophysics and Structural Biology

Donor: Peggy Hanley and Hamp Atkinson



For her graduate studies, Mia is using state-of-the-art electron microscopes to solve the structures of proteins that regulate mitochondrial health. By understanding the structure of these essential proteins, she is looking to understand the mechanism of how they work in the cell to maintain health and how they are dysregulated in the context of human disease, as well as to consider potential therapeutic strategies for neurodegenerative diseases such as Alzheimer's and Parkinson's.

LEONARD HEEKYU YOON

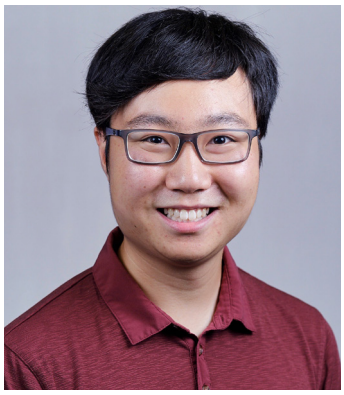
Scripps Research

Skaggs Graduate School of Chemical and Biological Sciences

Concentration: Chemical Biology

Specialization: Molecular Medicine

Donor: ARCS Foundation - San Diego Chapter



In the Kelly lab, Leonard is following up on a high-throughput screen that yielded small molecule autophagy activators. After discovering transcriptional and translational targets of these small molecules, he aims to ultimately develop them into neurodegenerative disease therapies. In the Dawson lab, Leonard is working towards synthesizing a D-space Fyn SH2 superbinder for phosphotyrosine-containing substrates. He aims to inhibit overactivated signaling pathways found in various cancers using the superbinder, which will be less susceptible to proteolysis in cells.

UC San Diego

BRYCE ERIC ACKERMANN

University of California San Diego

Division of Physical Sciences

Concentration: Biochemistry

Specialization: Structural Biology

Donor: Lambert Foundation for Education at Union Bank

Bryce studies the mechanisms of DNA compaction within human cells. He aims to describe the structure of the molecules involved in this process by developing the use of superconducting magnets to harness the innate magnetic properties of atoms. While genome sequencing has been extremely valuable, it is the 3-D structure of the genome that determines how DNA is expressed. The development of this technology will both provide insight into DNA organization and equip researchers with an unparalleled tool to study the molecular details of drugs and disease.

MIRIAM KATHLEEN BELL

University of California San Diego

Jacobs School of Engineering

Concentration: Mechanical Engineering

Specialization: Computational Neuroscience, Computational Biophysics

Donor: Reuben H. Fleet Foundation Fund

Miriam uses computational and mathematical tools to investigate the biophysics behind various biological phenomena in neurons and other cell lines. Most of her current projects focus on the shape-function relationship of dendritic spines, small protrusions on neurons that are centers of synaptic communication. Dendritic spines are known to have different shapes that are characteristic of aging, disease, and learning. Therefore, studying how these various shapes relate to dendritic spine and neuronal function provides valuable insight into underlying neural principles that can help combat various neurological diseases and conditions.

LAURA BROWN CHIPMAN

University of California San Diego

Division of Biological Sciences

Concentration: Biological Sciences

Specialization: Molecular Biology

Donor: Lambert Foundation for Education at Union Bank

Laura's research focuses on how aging is regulated on a molecular level. She studies how a small non-coding RNA molecule that is a fundamental regulator of gene expression, the microRNA, can regulate aging. MicroRNAs act as the traffic cops of genetic information, with the ability to block gene expression. Specifically, she studies how individual microRNAs can either increase or decrease lifespan, and how the pathway can be regulated to effect organismal lifespan.

GABRIELLE MARIE COLVERT

University of California San Diego

Jacobs School of Engineering

Concentration: Bioengineering

Specialization: Cardiovascular Imaging

Donor: Ellen Browning Scripps Foundation

The development of minimally invasive transcatheter procedures as alternatives to open-heart surgery demands new imaging techniques. Recent advances in noninvasive imaging have supported the success of these procedures by providing the exact size and location of cardiac pathologies and surrounding anatomy. Using noninvasive imaging, Gabrielle is developing novel methods for evaluating cardiovascular function beyond static anatomical measurements. These tools will improve diagnosis and prevention of cardiac events, enable patient stratification for transcatheter interventions, and yield new understanding of how diseases and implanted cardiac devices alter and restore normal function.

BETHANNY PATRICIA DANSKIN

University of California San Diego

School of Medicine

Concentration: Neurosciences

Specialization: Systems Neuroscience

Donor: Hervey Family Non-Endowment Fund

Making a decision based on internal representation of value is a critical component of animal behavior, from a bee foraging between flower patches to complex human behaviors like economic choice or gambling. In interacting with the world, we need to weigh alternative choices with the expected value of outcomes. Bethanny's research uses cutting-edge neurobiological techniques to characterize the encoding of decision by neurons in the brains of awake, behaving mice.

CAYCE ELIZABETH DORRIER

University of California San Diego

School of Medicine

Concentration: Biomedical Sciences

Specialization: Neuroscience and Pharmacology

Donor: The Donald C. and Elizabeth M. Dickinson Foundation

Cayce's research focuses on scar tissue buildup that occurs following neuroinflammation such as in multiple sclerosis, where there are few treatment options that aid in tissue repair. She has shown that a fibrotic scar forms in the spinal cord following neuroinflammation and has an impact on how the tissue is able to recover by blocking agents that aid in repair from reaching the inflammation. She hopes to learn more about how scar tissue can be targeted in disease to improve recovery.

MICHELLE T DOW

University of California San Diego

School of Medicine

Concentration: Bioinformatics and Systems Biology

Specialization: Genetics and Computational Genomics

Donor: Dottie Georgens

Michelle's research focuses on understanding how genetic variation impacts the gene function in anti-cancer drug responses. Translation of cancer genomic data to therapeutic treatment remains challenging. To characterize how these alterations affect therapeutic responses, Michelle analyzes molecular characteristics to see if the changes in the genomic and transcriptomic profiles are associated with the responses. Using these associations, she hopes to capture the mechanisms underlying the tumor-immune interactions and thus better model the functionality impacts on these cancer patients.

MICKEY FINN III

University of California San Diego

Jacobs School of Engineering

Concentration: NanoEngineering

Specialization: Organic Haptics

Donor: Reuben H. Fleet Foundation Fund

Current virtual reality environments grant ersatz immersion using display screens and speakers but tend to neglect the sense of touch. Mickey's current project utilizes dense arrays of microfabricated electrodes that are designed to be contacted by the finger pads and safely energized in ways that convey movement and/or surface texture. Previous work in electrotactile haptics employed fewer electrodes that were comparatively large with inadequate explanation of how people perceive them. Mickey intends to provide a more definitive understanding of this through human subject testing and statistical methods common in the biological sciences.

SHEREEN GEORGES GHOSH

University of California San Diego

School of Medicine

Concentration: Biomedical Sciences

Specialization: Neurogenetics

Donor: Hervey Foundation Non-Endowment Fund

Shereen's research is focused on identifying mechanisms of, and treatments for, rare pediatric brain disease by solving the mysteries of brain development. Her research has identified a group of families with affected children who exhibit early-onset neurodegeneration, seizures, and death. She has been able to identify the causative gene, which has never been implicated in disease before; and has some early hints of potential treatments for this disease through her work in human cells. Shereen is now working to elucidate the mechanism by which loss of this gene's encoded protein is leading to stress-induced seizures and ultimately death in these children.

JOHN PATRICK GILLIES

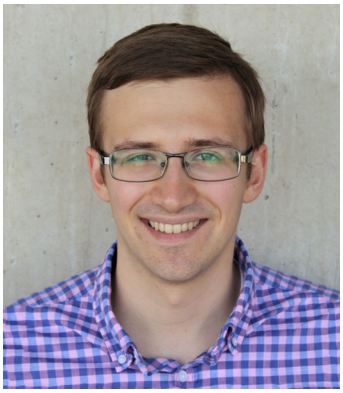
University of California San Diego

Division of Biological Sciences

Concentration: Biological Sciences

Specialization: Biochemistry and Biophysics

Donor: The Donald C. and Elizabeth M. Dickinson Foundation



Ensuring that cellular components are in the right place at the right time is one of the major jobs a cell must perform. Motor proteins are responsible for transporting these components throughout the cell. John is particularly interested in how the motor protein dynein functions. He uses single-molecule methods to observe individual dynein molecules moving along their tracks to understand how dynein is regulated by a host of interacting proteins.

MARK KALAJ

University of California San Diego

Division of Physical Sciences

Concentration: Chemistry

Specialization: Materials and Inorganic Chemistry

Donor: Virginia Lynch Grady Endowment

Mark's work focuses on the design of materials that protect soldiers and civilians from chemical warfare agents. Current materials used to protect soldiers from these harmful chemicals involve porous carbons that function simply as adsorbents. Mark's work is concentrated on designing novel materials that can chemically degrade chemical warfare agents and adsorb them. The materials being used in his research are inherently crystalline solids known as metal-organic frameworks. Mark's work also centers on tailoring these solid materials with flexible polymers for their incorporation in protective textile fibers.

EMIL MARIO KARSHALEV

University of California San Diego

Jacobs School of Engineering

Concentration: Materials Science and Engineering

Specialization: Micro/Nano-Robotics

Donor: Beyster Family Foundation Fund IV

Emil's research is in the area of micro/nano-machines. He uses these small-scale objects to deliver a multitude of drugs, nutritional compounds or imaging agents efficiently. The micromotors autonomously propel in biological fluids such as gastric acid and intestinal fluid. This motion translates into embedding or lodging of the micromotors into the mucosal membranes. This leads to an increased residence time and a more efficient absorption of the therapeutic agents. So far results show that the active propulsion outperforms static counterparts in all gastrointestinal scenarios.

KEVIN RICHARD KAUFMANN

University of California San Diego

Jacobs School of Engineering

Concentration: NanoEngineering

Specialization: Machine Learning

Donor: Timkin-Sturgis Foundation

Kevin is researching the application of artificial intelligence to material design, discovery, and analysis. His research efforts are reducing the time and money spent searching for materials with enhanced properties by aiding researchers in selecting the best candidate elemental compositions. After synthesizing these candidates, complete characterization is the next hurdle in material development. Kevin is developing advanced machine learning algorithms capable of characterizing many aspects of the material with little to no a priori knowledge required.

ANDREW THOMAS KLEINSCHMIDT

University of California San Diego

Jacobs School of Engineering

Concentration: Chemical Engineering

Specialization: Polymer Physics

Donor: Lakeside Foundation / Laura Mateo / ARCS Foundation - San Diego

Andrew creates computational models of polymers (plastics) which can be used in making cheap, flexible solar cells. These polymers are long chains of atoms which can create complex folded structures. The conformations these chains take in solution determine the eventual nanostructure of the solar cell. By creating a model to predict these folded structures, he can design new, higher performance materials to help make affordable solar energy a reality.

JENNA JOAQUIN LAWRENCE

University of California San Diego

Jacobs School of Engineering

Concentration: Mechanical and Aerospace Engineering

Specialization: Biological Fluid Mechanics

Donor: Wally Schirra Memorial Endowment

Jenna studies the flow of cerebrospinal fluid in the central nervous system, both the overall flow characteristics and the small-scale features of the flow. She uses a combination of theoretical fluid mechanics, numerical simulations, and magnetic resonance imaging to investigate these flows. These results help inform her work on intrathecal drug delivery, in which medication is injected to the lumbar region of the spinal canal with the intent of delivering the medication to locations along the spinal canal or to the brain.

CHI-WEI MAN

University of California San Diego

Division of Physical Sciences

Concentration: Biochemistry

Specialization: Molecular and Cellular Engineering

Donor: ARCS Foundation - San Diego Chapter

Chi-Wei's research project is to create a cell-based biosensor that can specifically target and report markers of cancer. These cells could be injected into a cancer patient, and if the patient's tumor expresses the specific target protein of the biosensor, the injected cells will glow. This would provide physicians with information about the location of tumors and the proteins they express. Using the information gained from these biosensors, doctors could prescribe the appropriate treatment for the patient's cancer. The adaptability of this system would allow these cells to not only act as diagnostics but therapeutics as well.

RYAN JARED MARINA

University of California San Diego

School of Medicine

Concentration: Biomedical Sciences

Specialization: Genetics and Genomics

Donor: LaVerne and Blaine Briggs

Ryan's research project aims to understand the underlying molecular mechanisms of the neurodegenerative disease Amyotrophic Lateral Sclerosis (ALS). Trained as an RNA biologist, Ryan is seeking to identify how mutations within a particular class of proteins, called RNA-binding proteins (RBPs), contribute to disease susceptibility later in life. His research revolves around using a combination of induced pluripotent stem cell (iPSC) technologies and bioinformatic approaches to determine causative pathways contributing to neuron degeneration.

NICOLE PATRICIA MLYNARYK

University of California San Diego

School of Medicine

Concentration: Neurosciences

Specialization: Systems Neuroscience

Donor: Kathryn Crippen Hattox Fund

When faced with a decision, we often compare the value of each option and then choose the one that seems most rewarding. Keeping track of value information is very important, but how the brain actually does this remains unclear. To study this, Nicole records the activity of thousands of neurons in a mouse's brain while the animal performs a decision-making task. Using circuit tracing techniques, she can identify the specific neural pathways that encode value, and observe how they communicate with other brain areas to guide our choices.

COLMAN ARTHUR MOORE

University of California San Diego

Jacobs School of Engineering

Concentration: NanoEngineering

Specialization: Molecular Imaging

Donor: ARCS Foundation - San Diego Chapter

Colman studies the intersection of nanoengineering and biomedical imaging to develop new diagnostic strategies using photoacoustic imaging. He is primarily focused on applications in oral diseases such as periodontitis (gum disease), which affects nearly half of the adult U.S. population. Photoacoustic imaging is similar to ultrasound but uses optical rather than acoustic excitation to generate signal. This facilitates deeper imaging and higher contrast. The current goal of Colman's work is to build a molecular imaging platform using novel photoacoustic contrast agents to diagnose periodontitis in its earliest stages.

JESSICA YI-JUN NG

University of California San Diego

Scripps Institution of Oceanography

Concentration: Geochemistry

Specialization: Noble gas paleoclimatology

Donor: Carlos and Sharon Arbelaez

Jessica's research project is in the Andean Highlands of Chile and Argentina, where lithium mining for electric vehicle batteries and other renewable energy technologies is stressing extremely limited water resources. She measures gases dissolved in the groundwater—water that rained or snowed thousands of years ago and accumulated in closed basins—to understand how the level of groundwater has changed over time, with the goal of quantifying the impact of recent lithium mining.

VICTOR WINGTAI OR

University of California San Diego

Division of Physical Sciences

Concentration: Chemistry

Specialization: Atmospheric and Environmental Chemistry

Donor: Ellen Browning Scripps Foundation

Humans spend most of their time indoors and there has been an emerging interest in studying the fundamental chemistry influencing the quality of indoor air to which occupants are exposed. Significant effort in indoor chemistry research has been directed towards understanding emissions and their chemical evolution within indoor spaces. Surfaces and their influence on indoor air quality have begun to receive more attention, as surfaces are important for the depositional loss of particulate matter and gases and also serve as reaction sites that can facilitate alternative reactions.

JASON ALEXANDER PLATT

University of California San Diego

Division of Physical Sciences

Concentration: Biophysics

Specialization: Neuroscience/Artificial Intelligence

Donor: Legler Benbough Foundation

Jason is exploring the boundaries between physics, neuroscience and computer science in order to build more biologically-realistic neural networks. He is taking as his model system the insect—specifically the locust—olfactory pathway, a network which has evolved to identify chemical constituents in odors rapidly and accurately, and for which there is enough known biologically to use as a basis for machine learning. Biologically based artificial intelligence programs hold the promise of being able to learn much faster than current systems, while being robust to noise and adversarial attacks.

HOMA RAHNAMOUN

University of California San Diego

Division of Biological Sciences

Concentration: Biological Sciences

Specialization: Cancer Biology and Gene Regulation

Donor: ARCS Foundation - San Diego Chapter / Helga Moore

Only about 2% of the human genome encodes for proteins that carry out functions in a cell. While it has been well-established that some of the noncoding DNA is used as template to generate functional RNA molecules that support different cellular processes, large numbers of noncoding RNAs are still thought to lack function. In a recent study, Homa and her colleagues revealed that several thousand noncoding enhancer RNAs (eRNAs) are produced in colon cancer cells following chronic immune signaling, and the primary focus of her research is understanding how these RNAs regulate oncogenic gene networks.

DIMITRIOUS ADRIAN SCHREIBER

University of California San Diego

Jacobs School of Engineering

Concentration: Electrical and Computer Engineering

Specialization: Medical Robotics

Donor: ARCS Foundation – San Diego Chapter

Dimitri Schreiber's research is focused on the design and control of Magnetic Resonance Imaging (MRI) guided needle-placement robots and their evaluation in a clinical setting. MRI environments are challenging to work inside due to their high magnetic fields and confined working area. Dimitri has developed a highly dexterous CT-compatible biopsy robot which can be modified for use within an MRI scanner with different joint actuators. Currently, he is preparing for clinical tests of his CT-compatible needle-guidance robot and developing novel hydraulic actuators to work within an MRI scanner.

BENJAMIN SHIH

University of California San Diego

Jacobs School of Engineering

Concentration: Mechanical and Aerospace Engineering

Specialization: Robotics (Soft Robotics)

Donor: ARCS Foundation – San Diego Chapter

Ben studies soft robotics, which is where robots are made from flexible and compliant materials like silicones and rubbers rather than traditionally rigid components such as metals. Their inherently squishy exteriors make them safe for contact with humans or fragile objects and provide them with robustness to uncertainty in their environments and interactions. Ben is developing informative touch for soft robots by embedding dense, high-resolution sensors into their skins and interpreting the tactile information using machine learning. This research enables robots working alongside us in the future to understand actions that are intuitive for humans but difficult for robots to interpret, such as a pat on the back or a handshake.

MATTHEW DAVID STONE

University of California San Diego / San Diego State University

School of Medicine

Concentration: Public Health - Health Behavior

Specialization: Tobacco Regulatory Science

Donor: Kenneth and Marjorie Blanchard

Matthew's research uses choice-based preference tasks, sensor technology and ecologically driven data to investigate the impact that graphic warning labels affixed to cigarette packaging have on consumer health perceptions, thoughts of quitting, and behavioral outcomes among daily smokers. His research also focuses on identifying product characteristics of e-cigarettes that can be altered in order to protect youth and mitigate the harms of vaping. Combined, this high-impact research aids in reducing the global health burden of tobacco-related morbidity and mortality.

ANTHONY QUOC VU

University of California San Diego

School of Medicine

Concentration: Biomedical Sciences

Specialization: Genetics and Genomics

Donor: Hervey Family Non-Endowment Fund

Anthony's research focuses on understanding how stress granules may contribute to neurodegenerative diseases. Stress granules are transient clumps of protein and RNA that form inside the cell when exposed to environmental stresses. These assemblies protect their molecules from damage and help the cell survive. Importantly, abnormal formation and clearance of stress granules may impact cell survival and are implicated in the pathogenesis of neurodegeneration. Through experimental methods, his goals are to identify components that contribute to stress granule biology and to determine how misregulation of key genes may contribute to disease progression.

ALEXANDER JEFFREY WHITEHEAD

University of California San Diego

Jacobs School of Engineering

Concentration: Bioengineering

Specialization: Regenerative Medicine and Tissue Engineering

Donor: ARCS Foundation – San Diego Chapter

Alex studies how the immune system regulates how the heart heals after a heart attack. He also studies how certain animals can regenerate their hearts, and if we can use similar processes to heal human hearts. He uses large datasets to decipher how protein composition of the heart changes with age and in instances of disease. By combing data-driven approaches and molecular biology techniques, he hopes to identify drug targets to improve outcomes of heart attack patients.

ANDREW YING

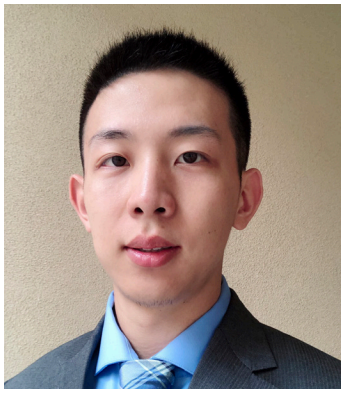
University of California San Diego

Division of Physical Sciences

Concentration: Statistics

Specialization: Causal Inference

Donor: Reuben H. Fleet Foundation Fund



Causal inference, as a long standing problem in statistics, computer science, epidemiology, and the social sciences, has drawn much attention in recent years due to the explosion of data magnitude and complexity. Andrew's research projects focus on understanding the causal mechanism of certain actions, treatments and others with complex data like time-to-event data. Andrew's current work aims to understand causal effect of etanercept on birth defects for diseased pregnant women.

JIARONG ZHOU

University of California San Diego

Jacobs School of Engineering

Concentration: NanoEngineering

Specialization: Vaccine Development

Donor: ARCS Foundation, Inc. – San Diego Chapter

Jiarong's research focuses on leveraging tiny particles for the development of vaccines against both infectious diseases and cancer. Vaccines are the safest and most effective means of fighting against infections. By introducing the foreign substances into the immune system in a safe manner, our immune cells can be taught to fight against the pathogens and cancerous cells. Jiarong is currently utilizing cell membrane-coated nanoparticles to create personalized vaccine formulations for individual patients.

University of San Diego

BYRON BATZ

University of San Diego

Hahn School of Nursing and Health Science

Concentration: Nursing

Specialization: Home Based Palliative Care

Donor: Beyster Family Foundation Fund IV

Byron's research project is focused on the palliative care process and end of life preparation. He is seeking how hospitalized patients requiring increased symptom management can have an efficient and smoother transition into either inpatient or home-based palliative care services. In addition, he is researching why most individuals in the United States are not prepared with end of life arrangements or long-term care. His nursing experience as a palliative care nurse, patient educator, case manager, and research nurse has shown him that end of life unpreparedness is causing increased inefficiency in the use of medical resources and time, and unnecessary stress, pain, and suffering to patients and their family members.

NICOLE TAMARA MARTINEZ

University of San Diego

Hahn School of Nursing and Health Science

Concentration: Nursing

Specialization: Emergency Medicine

Donor: Beyster Family Foundation IV

Nicole's study will describe relationships among social demographics (age, gender, established PCP, race/ethnicity, education level), physical examination findings (i.e. HR> 90 bpm, temperature > 37.7 C), treatment modality (i.e. incision and drainage, oral medication, or parenteral medication), patient disposition (i.e. hospital admission or Emergency Department discharge at initial presentation), and reason for return visit to the ED among patients with non-purulent and purulent skin and soft tissue infections who presented for treatment in a high-volume rural ED. Furthermore, her work will identify factors that increase the odds of hospital admission at initial presentation for patients with skin and soft tissue infections, such as cellulitis and abscesses.

ALLISON KATHLEEN PERKINS

University of San Diego

Hahn School of Nursing and Health Science

Concentration: Nursing

Specialization: Delirium

Donor: Beyster Family Foundation IV

This research study focuses on identifying if there are specific risk factors for developing delirium within the Veteran population. Delirium affects 25% of all elderly adults hospitalized in the US and can have long-term consequences. This study will help identify Veterans at risk for delirium upon hospital admission. If at-risk Veterans can be identified before delirium occurs, then preventive interventions can be implemented to decrease the chance of developing delirium.

BROOKE HALEY RAKES

University of San Diego

Hahn School of Nursing and Health Science

Concentration: Nursing

Specialization: Neonatal Nursing

Donor: Reuben H. Fleet Foundation Fund

Hypoxic-ischemic encephalopathy (HIE) occurs when there is a lack of oxygenated blood flow to the neonate's brain leading to brain injury. HIE is a significant cause of mortality, morbidity, and long-term disability. Timely recognition of infants with HIE is critical. The standard of care is to initiate treatment within six hours of life to prevent further brain injury. Brooke's proposed research will examine retrospective data extracted from the electronic health records (EHR) of HIE infants receiving therapy, to identify if there is a relationship among the hour of life treatment was initiated and the short-term outcomes.