Skidmore College

FACULTY STUDENT SUMMER RESEARCH PROGRAM

SUMMER 2019

FINAL PRESENTATIONS
AUGUST 1, 2019

Faculty Student Summer Research Program
Summer 2019

Index

Since 1989, Skidmore College's Faculty Student Summer Research Program has given students a singular opportunity to work one-on-one with a faculty member. For periods ranging from five to ten weeks, students work with faculty on original research in disciplines ranging from biology to management and business, including classics and geosciences. Hands-on research with a faculty member allows students to become part of the research enterprise in a way that both complements and informs regular class work. In some cases, the collaborative research forms the basis for a senior's honors thesis or can lead to published articles in a peer-reviewed academic journal. Long-term, participation can help students gain admission to graduate schools and research careers. Skidmore alumni who have continued their education in graduate school have reported that experience as researchers has given them distinct advantages as scholars. For summer 2019, there are 92 students and 43 faculty members engaged in collaborative research projects in a wide range of disciplines funded by the Faculty Student Summer Research program, external grants, the S3M Program, indirect cost funds, start-up funds, and other funding sources.

Funding Sources for Faculty Student Summer Research Programs

ALUMNI, FAMILY, AND FRIENDS

Samuel Croll ’73
Marlene Oberkotter Fowler ’61
Christy Johnson ’90
Jim Lippman and Linda Friedman Lippman ’82
Richard A. Mellon ’87
Rafael M. Nasser ’88
Margaret Williams Page ’43
Mary Langrall Pinkard ’78
Michael Rose ’90
The Riederer Family
Mr. and Mrs. Kenneth Woodcock, Parents ’96

Axelrod-Porges Scholars

Established in 2006 by Felicia Axelrod ’62 and Robert Porges to support faculty-student teams in the area of the sciences

Schupf Scholars

Established in 2008 by Sara Lubin Schupf ’62 to support summer faculty-student research with a preference given to students pursuing projects in the STEM disciplines. Schupf Scholars are selected beginning the summer after their freshman or sophomore year. Schupf Scholars may access additional funding for travel to meetings and conferences as well as for research supplies and expense during their continuing research with faculty during their academic career at Skidmore.

Weg Scholars

Established in 2010 by Carol Little Weg ’64 and Ken Weg and awarded with a preference for students pursuing projects in the sciences and social sciences.

FOUNDATIONS AND GRANTS

Arthur Vining Davis Foundation
France-Merrick Foundation
W.M. Keck Foundation
Rathmann Family Foundation
The Charles Slaughter Foundation
The American Chemical Society Petroleum Research Fund
The Federal Emergency Management Agency
The GKV Foundation
The National Aeronautics and Space Administration
The National Institutes of Health
The National Science Foundation
The Skidmore Scholars in Science and Mathematics (S3M) Program

The Schupf Scholars Program

Each year the Schupf Scholars Program funds students to participate in the Faculty Student Summer Research Program and to continue that research with their faculty mentor in the ensuing academic year. The Schupf Scholars Program focuses on science, technology, and mathematics, and pays special attention to interdisciplinary projects and to female students in fields where women are underrepresented. Each year these scholarships will provide students and a faculty partner with up to $10,000 for research beginning the summer after their freshman or sophomore year and continuing through the following academic year. Schupf Scholars will be able to use additional funding for travel to meetings and conferences as well as for research supplies and expenses during their continuing research with faculty during their academic career at Skidmore.

Trustee Sara Lee Schupf '62 established the $1.1 million scholarship fund for student research in an endeavor to inspire, cultivate, and support students' interest in science, because she sees it as an excellent avenue for exercising critical thought and shaping the progress of an idea from theory to practice. She says: this is what a Skidmore education is all about—getting involved in the process of discovery, which includes the satisfaction of success, failure, and mentorship. More broadly the Schupf Scholars Program seeks to help light an accessible pathway to science research and science career preparation. With such an early start on intensive research and continued work into their junior or senior year, Schupf Scholars will be well equipped to move on to graduate or professional school in the sciences.

2019-20
Anna Carhart, '22
Rachel Carrock, '22
Katie Rinaolo, '22
Jiayue Hong, '21
Saana Teittinen-Gordon, '22
Molly Cole, '21
Katie Yan, '22

2018-19
Acadia Connor, '21
Katherine Johnson, '20
Angelina Leonardi, '20
Claudia Mak, '20
Julia Danischweski, '20
Ella Long, '20
Jazmin Sepulveda, '20

2017-18
Beatriz Chavez, '18
Gabriella Gerlach, '19
Kyla Johnson, '20
Samantha Kenah, '19
Yutong Li, '19
Suzanne Zeff, '20

2016-2017
Claudia Bennett-Caso '19
Alexandra Cassell '19
Erin Mah '19
Erin Maloney '18
Emily O'Connor '19
Kari Rasmussen '18

2015-2016
Kelly Cantwell, '18
Jillian Greenspan, '17
Katherine Shi, '18
Deborah Kim, '18
Talia Stortini, '18
Hannah Schapiro, '17
Meggie Danielson, '17

2014-2015
Jaya Borgatta, '16
Meti Debela, '16
Glenna Joyce, '16
Jenny Zhang, '16
Stephanie Zhen, '16

2013-2014
Melanie Feen '16
Michele Fu '15
Kelly Isham '16
Angelica Newell '15
Rafaella Pontes '15

2012-2013
Jennifer Harfmann '14
Rafaella Pontes '15
Kara Rode '15
Carol Wu '14

2011-2012
Tim Brodsky '13
Andrea Conine '13
Brenda Olivo '14
Kathryn Stein '13

2010-2011
Rebecca Connelly '12
Ava Hamilton '12
Caroline Loehr '12
Taylor Moot '13

Faculty Student Summer Research Program

Schedule of Final Research Presentations

Thursday, August 1, 2019

9:00 am – 9:25 am Coffee and Muffins

9:30 am – 10:30 am Oral Presentations

ROOM A

SCHOOLED: AFRICAN FIRST-GENERATION EDUCATIONAL ATTAINMENT
Kelly Tran, 2020
Amon Emeka, Associate Professor, Sociology Department

18th -C. FRENCH SHIPPING LOGS: EARLY EVIDENCE OF BLACK RESISTANCE TO FRENCH SETTLEMENT
Nicole Wong, 2021, and Soren Barnett, 2020
Adrienne Zuerner, Associate Professor, World Languages and Literatures Department-French

A BIOCULTURAL RECONSTRUCTION OF SUBADULT MORBIDITY AND MORTALITY AT TELL ABRAQ (UNITED ARAB EMIRATES) DURING THE BRONZE AGE
Sophia Barrett, 2020, and Samantha Mackertich, 2021
Kathryn Baustian, Visiting Assistant Professor, Anthropology Department

ROOM B

COMPASSIONATE HANDS: REMEMBERING SKIDMORE COLLEGE DEPARTMENT OF NURSING
Grace Heath, 2019
Tillman Nechtman, Professor, History Department

IN OUR OWN VOICES: PERSPECTIVES AND EXPERIENCES OF TRANSGENDER AND GENDER EXPANSIVE (TGE) FORMER FOSTER YOUTH OF COLOR
Sophia Helmkamp, 2020
June Paul, Assistant Professor, Social Work Department

"VIVES SOLO:" TRANSNATIONAL FATHERHOOD AND RETURN MIGRATION FROM THE U.S. TO MEXICO
Samantha Velez, 2020
Ruth Hernandez, Lecturer, Sociology Department

ROOM C

EVALUATING PRIVACY POLICIES AND PERMISSIONS OF MOBILE HEALTH SMARTPHONE APPS
Matthew Clark, 2021, and Ha Linh Nguyen, 2022
Aarathi Prasad, Assistant Professor, Computer Science Department

MODELING THE PLAGUE IN EYAM
Katie Yan, 2022
Rachel Roe-Dale, Associate Professor, Mathematics and Statistics Department

EFFECTS OF CAPSAICIN ON BLOOD PRESSURE AT REST AND DURING EXERCISE: INFLUENCE OF RACE
Tawn Tomasi, 2022 and Brian Lora, 2021
Stephen Ives, Department of Health and Human Physiological Sciences

MONOMETHYL FUMARATE REVERSES DIET INDUCED OBESITY IN C57BL/6J MALE MICE
Noa Mills, 2021, Dakembay Hoyte, 2020, Katy Ehnstrom 2020
T.H. Reynolds, Professor, Health and Human Physiological Sciences Department

10:40 am – 11:50 am Poster Presentations #1

ROOM A

WEIGHT AND CVD RISK FACTOR CHANGES IN US MALE/FEMALE FIREFIGHTERS
Elliot Graham, 2020
Denise Smith, Tisch Distinguished Professor, First Responder Health and Safety Lab, Department of Health and Human Physiological Sciences

PURIFICATION OF THE BACILLUS SUBTILIS TRANSAMIDOSOME COMPONENTS
Natalie Cassello, 2021
Kelly Sheppard, Associate Professor, Chemistry Department

CHARACTERIZATION OF THE DUAL PATHWAYS FOR B. HALODURANS ASPARAGINYL-tRNA FORMATION
Jon Matthew Bilé, 2021
Kelly Sheppard, Associate Professor, Chemistry Department

IDENTIFYING THE ROLE OF MUSHROOM BODY NEURONS IN SNPF-INDUCED SLEEP IN DROSOPHILA MELANOGASTER
Nikoleta Chantzi, 2022

Christopher G. Vecsey, Assistant Professor, Neuroscience Program

CRACKING THE CODE: EVALUATING THE IMPACT OF RESIDENTIAL BUILDING CODES ON ENERGY EFFICIENCY AND CLIMATE
Nicol La Cumbre-Gibbs, 2020
Karen Kellogg, Associate Professor, Environmental Studies and Sciences Program

OPTOGENETIC ACTIVATION OF SIFAMIDE NEURONS DURING ADULTHOOD CAUSES SLEEP INDUCTION IN DROSOPHILA MELANOGASTER
Haoyang Huang, 2020
Christopher G. Vecsey, Assistant Professor, Neuroscience Program

ELDER SELF-NEGLECT REPORTING AND RESPONSE
Shana Kleiner, 2020
Kelly Melekis, Associate Professor, Social Work Department

ROOM B

CHILDREN ENCODE AND RETAIN WORDS LONGER WHEN INITIALLY EXPOSED TO FEWER WORDS
Lauren Ehrreich, 2020
Dr. Erica Wojcik, Assistant Professor, Psychology Department

INVESTIGATING GLUCAN PHOSPHATASE LSF2 IN STARCH METABOLISM
Molly Cole, 2021 and Jiayue Hong, 2021
Madushi Raththagala, Assistant Professor, Chemistry Department

THE SMALL AND LARGE VENTROLATERAL CLOCK NEURONS ARE NOT RESPONSIBLE FOR SLEEP PROMOTION MEDIATED BY SHORT NEUROPEPTIDE F.
Emily Perkins, 2020
Christopher G. Vecsey, Assistant Professor, Neuroscience Program

THE EFFECT OF MATING AND FOOD ON SLEEP IN THE PHORID FLY MEGASELIA SCALARIS
Sidney Gregorek, 2022, Princeton University
Christopher G. Vecsey, Assistant Professor, Neuroscience Program

CORRELATING OPTICAL CHANGES OF SILVER NANOPARTICLES TO THE THICKNESS OF THEIR SILICA SHELL
Quincy Lucin, 2021; Maleeha Farzansyed, 2022
Maryuri Roca, Teaching Professor, Chemistry Department

ROOM C

DEVELOPMENT OF 3D PRINTED TESTING DEVICE
Khaly Diagne, 2021
Kimberly Frederick, Professor, Chemistry Department

THERE'S A NAP FOR THAT: NUDGING USERS TO LET THEIR PHONES SLEEP

Aaron Slonaker, 2021
Aarathi Prasad, Assistant Professor, Computer Science Department

PARTICIPANT OFF-TASK BEHAVIOR ON AMAZON'S MECHANICAL TURK
Riley Filister, 2021
Daniel Peterson, Assistant Professor, Psychology Department

EFFECT OF LIGHT COLOR ON SLEEP PATTERNS IN DROSOPHILA MELANOGASTER
Dominic Skeele, 2022
Christopher G. Vecsey, Assistant Professor, Neuroscience Program

CREATING BRAND EQUITY FOR THE B CORPORATION
Bridget Wong, 2021
Ela Lepkowska-White, Professor, Management & Business Department

12:00 pm – 12:55 pm Lunch, Murray Aikins Dining Hall

1:00 pm – 2:10 pm Poster Presentations #2

ROOM A

DOME IS WHERE THE HEART IS
Jacob Adams, 2021 and Adam Kaszas, 2020
Kurt Smemo, Assistant Professor, Environmental Studies and Sciences Program

DIRECT ROUTE FOR BACILLI tRNAAsn ASPARAGINYLATION
Kaitlyn Maurais, 2022
Kelly Sheppard, Associate Professor, Chemistry Department

B. ANTHRACIS INDIRCT PATHWATY OF ASPARAGINYL-TRNA FORMATION
Emily Bushey, 2021, and Nicole McElhoe, 2022
Kelly Sheppard, Associate Professor, Chemistry Department

RESURRECTION OF ANCESTRAL ASPARTYL-tRNA SYNTHETASES
Arianna McDaniels, 2021
Kelly Sheppard, Associate Professor, Chemistry Department

SH3 BINDING VIA CONFORMATIONAL SELECTION
Rachel Carrock, 2022
K. Aurelia Ball, Assistant Professor, Department of Chemistry

EXAMINING THE ACTIVITY OF GLUCAN PHOSPHATASES IN POTATOES
Saana Teittinen-Gordon, 2022
Madushi Raththagala, Assistant Professor, Chemistry Department

FIGHTER'S TRAINING REALTED DEATH
Ben Wu, 2021
Denise Smith, Tisch Distinguished Professor, Health and Human Physiological Sciences Department

ROOM B

DEVELOPMENT OF A MICROFLUIDIC DEVICE FOR MEASUREMENT OF NITRATE/NITRITE IN WATER AND SOIL
Mastura Mukhamedova, 2022
Kimberley A. Frederick, Professor, Chemistry Department

DEVELOPMENT OF A MICROFLUIDIC ASSAY FOR ANALYSIS OF IODIDE IN WATER SYSTEMS
Jessica Gaetgens, 2022
Kimberley A. Frederick, Professor, Chemistry Department

THE EFFECTS OF SUBCELLULAR-DISRUPTING AGENTS AND CELL WALL BIOSYNTHESIS INHIBITORS ON ENDOMEMBRANE SYSTEM STRUCTURE AND DYNAMICS IN PENIUM
Wenqin He, 2021
David Domozych, Professor, Biology Department

A PERSON SHAPED HOLE
Emily Egan, 2020
Sarah Sweeney, Associate Professor, Art Department

CHILDREN WANT TO LEARN FROM, BUT DO NOT TRUST SMART DEVICES
Samantha Hutchinson, 2020, and Kyla Shen, 2019
Aarathi Prasad, Assistant Professor, Computer Science Department
Erica Wojcik, Assistant Professor, Psychology Department

ARKA12 PROLINE ISOMERIZATION
Jonathan Stabile, 2021
K. Aurelia Ball, Assistant Professor, Chemistry Department

ROOM C

PHOTOCHEMISTRY IN THE OCEAN-ATMOSPHERE INTERFACE: ALTERNATIVE PATHWAY FOR HONO FORMATION
Heather Ricker, 2022; Angelina Leonardi, 2020
Juan G. Navea, Associate Professor, Chemistry Department

EXPERIMENTAL AND THEORETICAL STUDY OF A MODELED SYSTEM FOR MARINE PHOTOSENSITIZER
Onita Alija, 2021; Grace Freeman-Gallant, 2021
Juan G. Navea, Associate Professor, Chemistry Department

IS A MODI LIKE A CAR? INTEGRATION OF NOVEL WORDS INTO TODDLERS' SEMANTIC NETWORKS
Sarah Jones, 2020, and Julia Venditti, 2019 (SUNY Oneonta)
Erica Wojcik, Assistant Professor, Psychology Department

EFFECT OF SALT ON THE ARKA-SH3 COMPLEX
Anna Carhart, Colin Mcclure, Kristina Foley, Ben Lantz, Elliot J Stollar*
K. Aurelia Ball, Assistant Professor, Chemistry Department

EXAMINING THE CATALASE ACTIVITY OF LOW MOLECULAR WEIGHT, BIOMIMETIC MANGANESE(II) COMPOUNDS
Katheryn Rinaolo, 2022
Steven Frey, Associate Professor, Chemistry Department

CHARACTERIZATION AND REACTIVITY STUDIES OF LOW MOLECULAR WEIGHT MANGANESE COMPOUNDS THAT MIMIC SUPEROXIDE DISMUTASE ENZYMES: THE EFFECT OF QUINOLINE VS PYRIDINE SUBSTITUENTS
Jasper Ballot, 2020
Steven Frey, Associate Professor, Chemistry Department

Project:

EFFECT OF SALT ON THE ARKA-SH3 COMPLEX

Anna Carhart, Colin Mcclure, Kristina Foley, Ben Lantz, Elliot J Stollar*
K. Aurelia Ball, Assistant Professor, Chemistry Department

SH3 domains are common interaction domains in the human body which foster cellular communication through protein-protein interactions. SH3 domains often bind to intrinsically disordered proteins (IDPs). IDPs are proteins that are more flexible. The mechanism of these interactions is difficult to study experimentally, so Molecular Dynamics (MD) simulations were used to support experimental data and analyze the interactions between AbpSH3, an SH3 domain found in yeast, and the disordered peptide, ArkA. ArkA contains several positively charged residues and AbpSH3 has a net negative charge. This enables electrostatics to stabilize the ArkA-SH3 complex, but salt disrupts electrostatic interactions. We performed MD simulations with and without salt. We found that salt creates a more unstable complex because it interferes with protein-protein interactions.

*Eastern New Mexico University

Project:

SH3 BINDING VIA CONFORMATIONAL SELECTION

Rachel Carrock, 2022
K. Aurelia Ball, Assistant Professor, Chemistry Department

Intrinsically disordered proteins (IDPs) are flexible peptides involved in cell communication. IDPs bind in multiple steps, and characterizing their binding pathway is difficult to do with experiments alone. To understand how these peptides bind, we characterized the interaction between the IDP, ArkA, and a SH3 binding domain using Molecular Dynamics simulations. We are interested in determining whether SH3 binds via an induced fit mechanism where the interaction forces a conformation change, a conformational selection mechanism where only a specific conformation of ArkA that is already in the correct conformation binds, or both. We found that in our simulations ArkA is sometimes folded but not fully bound, hinting at conformational selection as the mechanism.

Project:

ARKA12 PROLINE ISOMERIZATION

Jonathan Stabile, 2021
K. Aurelia Ball, Assistant Professor, Chemistry Department

Proteins typically fold into a single tertiary structure, but approximately thirty percent of proteins are intrinsically disordered proteins (IDPs). IDPs occupy two or more conformational states that are separated by low free energy barriers. IDPs' lack of uniform structure makes it difficult to determine how they bind to other proteins. Prolines, an amino acid, make it more challenging to examine IDPs. Unlike other amino acids, prolines can rotate around the peptide bond allowing

them to occupy both the *cis* and *trans* conformations. We are investigating how proline isomerization affects the binding pathway of IDP, ArkA12, with an SH3 domain using Molecular Dynamics (MD) simulations.

Project:

A BIOCULTURAL RECONSTRUCTION OF SUBADULT MORBIDITY AND MORTALITY AT TELL ABRAQ (UNITED ARAB EMIRATES) DURING THE BRONZE AGE

Sophia Barrett, 2020, and Samantha Mackertich, 2021
Kathryn Baustian, Visiting Assistant Professor, Anthropology Department

A stone burial tomb at the Bronze Age site of Tell Abraq (United Arab Emirates) was used for 200 years (2200BC-2000BC) and contained the intermixed remains of over 400 people. This research investigates high mortality and morbidity rates of children in the community through pathological and developmental analysis of the arm bones (humerus and radius). Analysis resulted in a minimum of 108 children ranging from fetal to adolescent ages and found consistent age representations as previous research using leg bones. Evidence of pathology was found among 5.6% of right humeri, 23% percent of left humeri, and 12.3 % of radii. Our results suggest that cultural practices such as consanguineous marriage and child brides may have factored into subadult mortality and morbidity.

Project:

THE EFFECTS OF SUBCELLULAR-DISRUPTING AGENTS AND CELL WALL BIOSYNTHESIS INHIBITORS ON ENDOMEMBRANE SYSTEM STRUCTURE AND DYNAMICS IN *PENIUM*

SKIDMORE COLLEGE
Wenqin He, 2021
David Domozych, Professor, Biology Department

Penium margaritaceum is an effective unicellular model to study the cell wall dynamics in plants. As important, cell wall studies will provide information of life processes that were critical to the invasion of land. Cell wall development in *Penium* consists of two major parts: a) biosynthesis, packaging and transport of wall precursors through the endomembrane system and to the cell surface and b) the extracellular organization of wall precursors into the functioning cell wall. In this study, specific subcellular disrupting agents and cell wall biosynthesis inhibitors were applied to cultures of *Penium* and effects were monitored using immunocytochemistry, confocal laser scanning microscopy and field emission scanning electron microscopy. This study represents a novel examination of single cell interrogation to elucidate specific cell wall processing events.

Project:

SCHOOLED: AFRICAN FIRST GENERATION EDUCATIONAL ATTAINMENT

Kelly Tran, 2020
Amon Emeka, Associate Professor, Sociology Department

Following the passage of the Hart-Cellar Act of 1964, substantial waves of voluntary African immigration emerged, composed of highly-skilled and educated professionals. The stories of the

first-generation are crucial to understanding and predicting the trajectories of the second-generation. Specifically, we evaluate the levels of educational attainment of each group by year and by gender. In our research, we analyze the four largest African immigration cohorts: Nigerians, Ethiopians, Egyptians and South Africans. We utilize public-use U.S. Census and American Community Survey samples from 1990 to 2015. Through analysis of this immigration cohort's educational attainment, we can say with confidence how much better or worse certain groups of the second generation are expected to do.

Project:

DEVELOPMENT OF 3D PRINTED TESTING DEVICE
Khaly Diagne, 2021
Kimberly Frederick, Professor, Chemistry Department

3D printing has made it possible to produce complex devices rapidly and with multiple types of functionality. This is exciting for the production of microfluidic testing devices that need to perform multiple functions. As one example, we are developing a 3D printed testing device for farmers and environmental specialist to measure localized nutrients soil content. The 3D printed chip should be able to filter out soil particles, using a filament that has porous characteristics, to isolate the nutrients and water. The nutrient content of the soil will be measured by the intensity of a color changing reaction. An open-source software program, Image J, will be used to measure the intensity of the color of the reaction.

Project:

DEVELOPMENT OF A MICROFLUIDIC ASSAY FOR ANALYSIS OF IODIDE IN WATER SYSTEMS
Jessica Gaetgens, 2022
Kimberley A. Frederick, Professor, Chemistry Department

Flowback water is a major byproduct of oil and gas drilling and is undrinkable because of contamination from radioactive species, trace organic species and high concentrations of ions. While not itself toxic, iodide is a good "tracer" ion that when detected at high concentrations is indicative of contamination from flowback water. The goal of this project is to develop an inexpensive paper-based test to detect iodide by reacting starch and sulfuric acid with contaminated water through UV light to create a colorimetric reaction. Iodide is detectable in ranges from 12-90 ppm. The paper chips are pretreated with the starch solution and left to age. After aging, the chips are rehydrated and the color is measured. The goal is for the chips to work successfully after 30 days and be able to detect extremely small quantities of iodide (as low as 0.1 ppm).

Project:

DEVELOPMENT OF A MICROFLUIDIC DEVICE FOR MEASUREMENT OF NITRATE/NITRITE IN WATER AND SOIL
Mastura Mukhamedova, 2022
Kimberley A. Frederick, Professor, Chemistry Department

Overapplication of fertilizers can result in run off into local waterways which then results in algal blooms and large scale dead spots where no aquatic life can survive. If farmers can have access to rapid and inexpensive technology in order to test nutrient levels in their soil, they can avoid overapplication and the resulting water contamination. The goal of this project is to develop a device to detect the level of nitrite/nitrate in water and soil. A low-cost microfluidic paper "chip" was used to analyze nitrite/nitrate on soil and in water based on colorimetric detection using the Griess reagent. For water, the sample was placed on top of the device while a more complicated lateral flow device was employed for soil testing. Results on both types of samples will be presented.

Project:

CHARACTERIZATION AND REACTIVITY STUDIES OF LOW MOLECULAR WEIGHT MANGANESE COMPOUNDS THAT MIMIC SUPEROXIDE DISMUTASE ENZYMES: THE EFFECT OF QUINOLINE VS PYRIDINE SUBSTITUENTS

Jasper Ballot, 2020
Steven Frey, Associate Professor, Chemistry Department

Superoxide dismutases (SODs) are a class of enzymes that catalyze the disproportionation of harmful superoxide radicals (O_2^-). The immune system produces an abundance of O_2^- in response to various diseases or reperfusion injuries (e.g., heart attacks or stroke), overwhelming existing SODs. Low molecular weight, biomimetic compounds are therefore sought as potential pharmaceuticals. With that in mind, we have recently synthesized two new Mn(II) compounds with quinoline-containing ligands. We have studied these compounds extensively this summer, characterizing them using X-ray crystallography, electrochemistry, and mass spectroscopy, and have also examined their SOD activity using the Fridovich assay. These compounds were found to have enhanced SOD activity in comparison to Mn(II) compounds with pyridine-containing ligands that we have studied previously in our laboratory.

Project:

EXAMINING THE CATALASE ACTIVITY OF LOW MOLECULAR WEIGHT, BIOMIMETIC, MANGANESE(II) COMPOUNDS

Katheryn Rinaolo, 2022
Steven Frey, Associate Professor, Chemistry Department

Catalase is an important enzyme present in most species that catalyzes the decomposition of hydrogen peroxide to water and oxygen. By eliminating hydrogen peroxide, catalase protects cells from this toxic, reactive oxygen species (ROS). We have optimized a volumetric method to assess that catalase activity of biomimetic manganese(II) compounds by measuring the volume of oxygen produced over time during their reactions with hydrogen peroxide. Using this technique, we determined the catalytic rate constant for the decomposition of hydrogen peroxide by a mononuclear manganese(II) compound produced in our lab. Additionally, we synthesized a new, dinuclear manganese(II) complex that more closely resembles the active sites of manganese catalases. Preliminary results with this compound demonstrate that it has much higher catalase activity than its mononuclear counterpart.

Project:

"VIVES SOLO:" TRANSNATIONAL FATHERHOOD AND RETURN MIGRATION FROM THE U.S. TO MEXICO

Samantha Velez, 2020
Ruth Hernandez, Lecturer, Sociology Department

In the last decade, two significant shifts in migration patterns from Mexico to the U.S. have emerged. The first is that Mexican migration to the U.S. has declined substantially. The second is the rise of return migration from the U.S. to Mexico. One survey reported that 61% of return migrants cited family reunification as the main reason for their return. To better understand the role of the family in return migration decisions, we ask: 1) Why do migrants decide to return from the U.S. to Mexico? 2) How do gender roles and norms factor into this decision? Based on qualitative interviews with transnational fathers, our findings explore how gender norms and roles factor into economic and emotional adjustments during return migration.

Project:

EFFECTS OF CAPSAICIN ON BLOOD PRESSURE AT REST AND DURING EXERCISE: INFLUENCE OF RACE

Tawn Tomasi, 2022, and Brian Lora, 2021
Stephen J. Ives, Associate Professor, Human Health and Physiological Sciences Department

Previous translational work in our lab, explored the impact of capsaicin, the spicy ingredient in peppers, on cardiovascular health, but hadn't addressed possible racial differences. Therefore, we sought to determine the effects of capsaicin on cardiovascular health in young healthy black and white males. In a single blind crossover design, 26 healthy young males underwent evaluation of resting and exercise blood pressure health after taking placebo (fiber) or capsaicin (spicy pepper) capsules in a counterbalanced manner. Black males systolic BP were on average 7 mmHg higher at rest, and was reduced by 1mmHg with capsaicin whereas white male BP increased by 9 mmHg. During exercise capsaicin reduced the exercise pressor response in black males by 33%, whereas white males changed by less than 1%.

Project:

KEEP CLAM AND CARRY ON: MISPERCEPTIONS OF TRANSPOSED-LETTER NEIGHBORS

Merrick Fahrenwald, 2020; Megan Wootten, 2020
Rebecca Johnson, Professor, Psychology Department

Previous research has provided evidence that readers experience processing difficulty when reading words that have a transposed letter (TL) neighbor (e.g., TRAIL has the TL neighbor TRIAL). Here, we provide direct evidence that this interference is driven by explicit misidentifications of the word for its TL neighbor. Readers read sentences aloud that contained either a word with a TL neighbor (e.g., ANGEL) or a matched control word (e.g., ALIEN) while their eye-movements were being recorded. The fixation duration data confirmed processing difficulty of words with a TL neighbor, particularly in late measures of processing. Furthermore, readers explicitly misidentified many more of the transposed-letter words than control words, and most often for their TL neighbor.

Project:

CRACKING THE CODE: EVALUATING THE IMPACT OF RESIDENTIAL BUILDING CODES ON ENERGY EFFICIENCY AND CLIMATE

Nicol La Cumbre-Gibbs, 2020
Karen Kellogg, Associate Professor, Environmental Studies and Sciences Program

Buildings consume 41% of energy used in the United States and are responsible for 40% of the nation's greenhouse gas emissions. Every three years, the International Energy Conservation Code proposes new energy-related building codes, and states vote on whether to adopt them. We investigated the relationship between building code adoption and per capita energy consumption between 2015-2017 for 48 states. While factors such as personal income, heating and cooling days, and energy price explain a large percentage of the variation in residential electricity and natural gas consumption (71.2% and 70.8% respectively), building code adoption explains another 6.5% and 3.4%. If 18 of the most rapidly developing states had made even modest improvements in building code stringency, approximately 73,908,452 MTCE greenhouse gases could have been avoided.

Project:

SCA1 DISEASE PROMOTES ROS GENERATION AND MAY BE ALLEVIATED BY SUCCINIC ACID TREATMENT

Dane Ford-Roshon, 2020
Sarita Lagalwar, Associate Professor, Neuroscience Program

Defects in mitochondrial respiration elevate reactive oxygen species (ROS) levels in Alzheimer's and Parkinson's diseases, likely contributing to neuronal cell death. Our lab has published evidence of mitochondrial respiration defects in a mouse model of Spinocerebellar Ataxia Type 1 (SCA1) that contribute to neurodegeneration and can be mitigated by succinic acid (SA) treatment. Using a cellular SCA1 model, we investigated whether SCA1 cells would display increased ROS and if SA could rescue ROS production. We found that SCA1 cells did indeed produce more ROS than healthy control cells. Furthermore, SA protected SCA1 cells by decreasing ROS. Our findings suggest that SA in combination with mitochondrial antioxidants may augment the therapeutic potential of SA treatment in SCA1 and further elucidate the role of ROS in SCA1 pathology.

Project:

DECREASED MITOCHONDRIAL ATP PRODUCTION IN HUMAN CELLULAR MODELS OF SCA1 DISEASE

Lindsay Shinn, 2020
Sara Lagalwar, Associate Professor, Neuroscience Program

Mitochondrial dysfunction contributes to the progression of neurodegenerative diseases including Alzheimer's and Parkinson's. Spinocerebellar ataxia type 1 (SCA1) is an autosomal dominant neurodegenerative disease initiated by a mutation in the ATXN1 gene. Recent work in our lab has found that the mitochondrial electron transport chain, which produces cellular energy in the form of adenosine triphosphate (ATP), is disrupted in the presence of mutant ATXN1. Furthermore, we found that treatment of SCA1 mice models with succinic acid (SA) mitigated the mitochondrial

deficits and the neurodegeneration. To further understand the implications of this, we now aimed to measure ATP production in SCA1 cell models. We found that ATP is indeed decreased in SCA1 cells compared to control cells and SA treatment does not affect ATP production in control cells. More results will be included in the poster presentation.

Project:

CREATING BRAND EQUITY FOR THE B CORPORATION

Bridget Wong, 2021
Ela Lepkowska-White, Professor, Management and Business Department

As consumer attention builds on areas such as supply chains, workers' wellbeing, company transparency, and environmental footprints, companies can no longer focus on profit alone. Consumer preferences are increasingly influenced by the question "what is the *full* impact of business?" One response to this change was the emergence of the B Corporation Certification process in which businesses are scored on their responsibility towards workers, the environment, the community, and sound business governance. Although B Corps have now existed for more than a decade, many consumers are still unaware of the B Corp label. This project explores how B Corps market the B Corp label on social media.

Project:

WHY ARE ANTIMICROBIALS BECOMING LESS EFFECTIVE AGAINST MICROBES?

Baomou Feng, 2021
Sylvia Franke McDevitt, Associate Professor, Biology Department

Copper and silver have antimicrobial properties; however, bacteria have developed resistance against these metals. In this study, we tested four different strains of *Escherichia coli* that contain plasmids harboring copper/silvers resistance genes. These resistance plasmids were transferred in *E. coli* GR161 via conjugation and the resulting transconjugants were tested under aerobic and anaerobic condition in the presence of copper and silver stress. This experiment allowed us to determine the Minimum Inhibitory Concertation (MICs) for copper and silver. The result show that the presence of resistance plasmids from *Cronobacter sakazakii* and *Klebsiella pneumoniae* in GR161 increases copper resistance under aerobic condition compared to GR161 parental strain or GR161 harboring a resistance plasmid from *Enterobacter cloacae*. However, under anerobic condition, the opposite effect was observed.

Project:

ELDER SELF-NEGLECT REPORTING AND RESPONSE

Shana Kleiner, 2020
Kelly Melekis, Associate Professor, Social Work Department

In the U.S., self-neglect is the most commonly reported form of elder abuse and neglect. While self-neglect typically falls under the purview of a state's adult protective service (APS) system, there are several states where this is not codified and/or practiced. This study examined the state of existing laws, policies and programs that address elder self-neglect in the U.S. in an effort to better understand how self-neglect reporting and response is handled, particularly in states where

APS does not have oversight. While the inclusion of self-neglect into the broad category of elder abuse and neglect is often perceived as vital for service provision, findings indicate it may exacerbate the challenges inherent in defining and conceptualizing both the term and its response.

Project:

IMPACTS OF PAID PARENTAL LEAVE ON STEM GENDER GAP

Kerry O'Brien, 2020
Corinne Moss-Racusin, Associate Professor, Psychology Department

Although prior research has identified some causes of the STEM gender gap, the current research is the first to investigate whether access to paid parental leave could encourage women to be more engaged in STEM fields. Participants (N = 300) will read one of two articles conveying that paid parental leave is either likely or unlikely in STEM workplaces in the near future. Participants will then complete a brainstorming task designed to make this reality more salient, followed by scales measuring their anticipated engagement in STEM. We predict that there will be a significant gender gap benefiting men in the no leave condition, which will be minimized in the leave condition. These results would reveal a promising new method to lessen the STEM gender gap.

Project:

EXPERIMENTAL AND THEORETICAL STUDY OF A MODELED SYSTEM FOR MARINE PHOTOSENSITIZER

Onita Alija, 2021; Grace Freeman-Gallant, 2021
Juan G. Navea, Associate Professor, Chemistry Department

Sea spray aerosols (SSA) released from the marine boundary layer (MBL) contain marine chromophoric dissolved organic substances (m-CDOM), resembling humic acids. These humic-like substances are well-studied photosensitizers of atmospheric trace gases, opening alternative mechanisms for chemical reactions within sea spray aerosols. Studies seeking to establish a "molecular recipe" to replicate the optical and photochemical properties of m-CDOM have used small molecules, such as pyruvic acid, to simulate m-CDOM. Here we propose an additional photosensitizer, 4-benzoylbenzoic acid (4-BBA), to introduce the effects of aromaticity and low solubility. The pH dependent speciation and optical activity of 4-BBA was studied experimentally and theoretically. Photoexcitation of 4-BBA within the solar spectra initiate atmospherically relevant reactions resulting in a SSA mass transfer.

Project:

PHOTOCHEMISTRY IN THE OCEAN-ATMOSPHERE INTERFACE: ALTERNATIVE PATHWAY FOR HONO FORMATION

Heather Ricker, 2022; Angelina Leonardi, 2020
Juan G. Navea, Associate Professor, Chemistry Department

Solar radiation quickly degrades atmospheric nitrous acid (HONO) to form nitrogen monoxide (NO) and hydroxyl radical (OH). Yet, recent field studies have recently found daytime HONO in the marine boundary layer. This suggests that, while light can destroy HONO, there must be a path for its light-induced formation as well. Here, we present the role of marine-chromophoric dissolved organic matter (m-CDOM) as photosensitizer of NO_2, a common atmospheric trace gas, leading

to HONO formation in the presence of sunlight. We show that terrestrial humic substances, a proxy of m-CDOM, can photosensitize NO_2 and form HONO and NO_x. Finally, we worked on the extraction of m-CDOM from the marine boundary layer in a wave-channel experiment that will allow testing this HONO formation pathway using marine photosensitizers.

Project:

COMPASSIONATE HANDS: REMEMBERING SKIDMORE COLLEGE DEPARTMENT OF NURSING

Grace Heath, 2019
Tillman Nechtman, Professor, History Department

This project exists to carry on the work that was done by Professor Tillman Nechtman's Public History Class. The goal of the class was to design and create an exhibit and presentation about Skidmore College's Nursing Department. While the exhibit and presentation were finished during the semester it was important that the work be continued by a student throughout the summer. My role this summer was to firstly present the classes' work to the nursing alumni who returned for reunion weekend in June. In order to save all the work done on this project I created a webpage to showcase the information and act as an archive. Along with creating this webpage I continued to carry out interviews with many nursing alumni in order to document and archive their stories.

Project:

USING THE BARYONIC TULLY-FISHER RELATION FOR GALAXIES TO MEASURE INFALL INTO COSMOLOGICAL FILAMENTS

Ramirez Raymi, 2021; Trevor Viscardi, 2020; Adam Warner, 2022
Evan Halstead, Senior Teaching Professor, Physics Department
Mary Crone Odekon, Professor, Physics Department

Cosmological simulations predict the existence of large filaments dominated by dark matter. These filaments should gravitationally attract nearby galaxies, creating an infall pattern. We test this prediction by mapping the positions and velocities of galaxies near the Perseus-Pisces Supercluster filament. We analyze radio data from the Arecibo Telescope in Puerto Rico and optical data from the Sloan Digital Sky Survey, and use the "Baryonic Tully-Fisher Relation" (a relationship between a galaxy's rotation speed and its mass in gas and stars) to determine positions and velocities. While this study is ongoing, a particular result from this summer is that we need to exclude data from galaxies that are oriented nearly face-on, since we cannot adequately measure their rotation speeds.

Project:

IN OUR OWN VOICES: PERSPECTIVES AND EXPERIENCES OF TRANSGENDER AND GENDER EXPANSIVE (TGE) FORMER FOSTER YOUTH OF COLOR

Sophia Helmkamp, 2020
June Paul, Assistant Professor, Social Work Department

Former foster youth often suffer from poor life outcomes resulting from their involvement in foster care. Although all youth who exit foster care may have difficulties, these issues are likely to be exacerbated for transgender/gender expansive (TGE) youth of color due to race/gender-based

stigma/victimization. Despite these concerns, research focused on this population is scarce. We explore the experiences of 5 TGE former foster youth of color to understand how they are faring post exit. Data was gathered through semi-structured interviews and analyzed using case study analyses. Participants reported frequent race/gender-based struggles related to safety, identity, housing, and health care, as well difficulties navigating social/legal systems. Results suggest that these youth face distinct challenges and highlight the importance of identifying/addressing biases in child welfare.

Project:

PARTICIPANT OFF-TASK BEHAVIOR ON AMAZON'S MECHANICAL TURK

Riley Filister, 2021
Daniel Peterson, Assistant Professor, Psychology Department

Mechanical Turk (MTurk) is a platform run by Amazon that connects those looking to have online tasks completed with those willing to complete them. MTurk has become popular with research psychologists due to the inexpensive access to a large, diverse participant pool. Unlike the traditional laboratory where participants complete tasks under the watchful eye of an experimenter, MTurk participants complete research studies on their own time with no explicit oversight. Consequently, little is known about how participants spend their time during the course of the research study. The present study used TaskMaster, an open source program to monitor participants' on- and off-task activity during their study participation. Results show participants were more likely to be off task during a self-paced task than experimenter-paced task. Looking specifically at the experimenter-paced task, time off task predicted task performance.

Project:

NESTING BEHAVIOR IN TRANSGENIC ALZHEIMER'S MICE

Neha Amatya, 2020
Bernard Possidente, Professor, Department of Biology

Nesting behavior of transgenic mice carrying Alzheimer's mutations and controls was measured at 19 weeks of age and every seven weeks for the next four assays. Mice were divided between bright and dim photoperiods to determine if light treatment improved the Alzheimer's mouse behavior. Nesting in Alzheimer's mice deteriorated rapidly compared to controls. By eight months, they almost stopped building nests. Alzheimer's mice built significantly smaller nests in the dim light than the controls. In the bright light, the controls built a significantly bigger nests starting at the third assay. Light treatment had no significant effect on nesting behavior for Alzheimer's mice but significantly affected the control's nesting behavior. Our results suggest that "bright light treatment" is not an effective therapy for Alzheimer's Disease.

Project:

ASPERTAME INTERATION WITH CIRCADIAN RHYTHM ACTIVITY OF DROSOPHILIA MELANOGASTER

KeAnna Nelson, 2022
Bernard Possidente, Professor, Biology Department

Does aspartame influence the circadian rhythm in Drosophila Melanogaster- fruit flies? Aspartame, an artificial sweetener commonly found in beverages and foods, may have unknown effects on the circadian rhythm, a roughly 24-hour physiological cycle in living beings. Fruit flies were given the equivalence of three cans of diet Coke worth of aspartame in order to assess developmental effects that aspartame may have on their offspring. Activity levels and rest activity levels of the immediate offspring were then measured using activity monitors. The results will demonstrate if there are any correlations between aspartame and activity levels in fruit flies in relation to aspartame and gender.

Project:

GENETIC ANALYSIS OF EFFECTS OF LEAD ON THE REST-ACTIVITY CYCLE OF *DROSOPHILA*

Chenhao (Scott) Shangguan, 2020
Bernard Possidente, Professor, Biology Department

I am researching effects of the heavy metal lead(Pb) on the rest-activity cycle of fruit flies at the genetic level. This project models developmental lead exposure in humans. The SAS statistical program was used to process the genetic effects and correlations. The correlation of the rest-activity changes with genetic effects was analyzed and will be presented.

Project:

EVALUATING PRIVACY POLICIES AND PERMISSIONS OF MOBILE HEALTH SMARTPHONE APPS

Matthew Clark, 2021; Ha Linh Nguyen, 2022
Aarathi Prasad, Assistant Professor, Computer Science Department

Despite the benefits towards users, mobile health (mHealth) apps risk data security because users reveal their private and sensitive information. We sampled 100 top apps and 100 mHealth apps to analyze the permissions the apps request and the availability and content of their privacy policies, focusing on data storage, usage and deletion. We found that top apps invoke more of Android's "dangerous permissions" than mHealth apps. mHealth apps are less likely to have a privacy policy, despite handling more personal information. Of the apps that have privacy policies, mHealth apps are as likely as top apps to disclose data collected, and deny users the ability to delete their data. Thus, we believe mHealth apps must become more transparent with their use of data.

Project:

THERE'S A NAP FOR THAT: NUDGING USERS TO LET THEIR PHONES SLEEP

Aaron Slonaker, 2021
Aarathi Prasad, Assistant Professor, Computer Science Department

As a response to negative backlash about smartphone addiction, Apple and Google released ScreenTime and Digital Wellbeing respectively to help smartphone users make informed decisions about their phone usage. These features allow smartphone users to allot a specific amount of time usage per app, and show a warning and temporarily block the users from returning to the app when that time is up. However, our previous study on ScreenTime revealed that the warning affects users negatively. Users reported experiencing anxiety, stress, and disappointment when alerted that they exceeded their daily time limits. This summer, I have been working on improving time limit warnings to reduce user anxiety and instead help the user change their behavior through nudging and mindfulness techniques

Project:

INVESTIGATING GLUCAN PHOSPHATASE LSF2 IN STARCH METABOLISM

Molly Cole, 2021; Jiayue Hong, 2021
Madushi Raththagala, Assistant Professor, Chemistry Department

Starch is the main energy reserve in plants and photosynthetic algae, and the concerted activity of glucan phosphatases, Starch EXcess4 (SEX4) and Like Sex Four2 (LSF2), is essential for efficient starch metabolism. Much of work of understanding the reversible starch phosphorylation pathway has been done on the model organism *Arabidopsis thaliana*. To investigate dephosphorylation kinetics and substrate binding of glucan phosphatases from agriculturally relevant crops, we cloned and overexpressed *Zea mays* (corn), Oryza sativa (rice) and *Arabidopsis thaliana* SEX4 and LSF2 in *E.Coli* cells and purified proteins using Ni-NTA affinity chromatography and size exclusion chromatography. Initial kinetic experiments were done using generic p-nitro phenyl phosphate (pNPP) assay and glucan specific malachite green assay. Future investigations of kinetic, binding and structural studies of rice and corn glucan phosphatases may lead ways to harness and modify industrially important starch.

Project:

INVESTIGATING THE ACTIVITY OF GLUCAN PHOSPHATASES IN POTATOES

Saana Teittinen-Gordon, 2022
Madushi Raththagala, Assistant Professor, Chemistry Department

Starch is a key component in many aspects of daily life and increasing demand has led to competition for starch among food, biofuels, and industrial manufacturers. Reversible starch phosphorylation by dikinases and glucan phosphatases is an essential step in plant starch metabolism and a key modulator that allows us to harness starch more efficiently. The overall goal of our research is to utilize glucan phosphatases and dikinases from potatoes to improve agricultural starch production and degradation *in vitro.* We aim to overexpress *Solonum tuberosome* (potato) Starch Excess4 (SEX4) and Like SEX Four 2 (LSF2) proteins in *E.Coli* and purify them to homogeneity using nickel affinity chromatography and size exclusion

chromatography. Successful purification of SEX4 and LSF2 will allow us to obtain structural and functional details of glucan dephosphorylation.

Project:

MONOMETHYL FUMARATE REVERSES DIET INDUCED OBESITY IN C57BL/6J MALE MICE

Noa Mills, 2021, Dakembay Hoyte, 2020, Katy Ehnstrom, 2020
T.H. Reynolds, Professor, Health and Human Physiological Sciences Department

The prevalence of obesity has increased substantially over the past three decades resulting in a major public health problem. Currently, there are very few effective treatments for obesity. The purpose of this study was to examine the effects of monomethyl fumarate (MMF) treatment on diet-induced obesity in male C57BL/6J mice. It was hypothesized that MMF treatment would reverse the effects of a high fat diet (HFD) on body composition and insulin action. Mice were fed a HFD for six months. During the last month of the HFD mice were treated with MMF or vehicle. MMF treatment significantly reduced body weight and body fat when compared to vehicle treated mice. Despite the decrease in adiposity, MMF treatment did not improve insulin action.

Project:

CORRELATING OPTICAL CHANGES OF SILVER NANOPARTICLES TO THE THICKNESS OF THEIR SILICA SHELL

Quincy Lucin, 2021; Maleeha Farzansyed, 2022
Maryuri Roca, Teaching Professor, Chemistry Department

The vibrant colors of silver nanoparticles make them desirable for applications like artwork. However, the color of nanoparticle solutions changes unpredictably when put in film. We synthesized yellow, red, and blue silver nanoparticle solutions, varied experimental parameters of silica coating, and studied how the thickness of the shell affected the color of the polyvinyl alcohol (PVA) film. Using a Plackett-Burman experimental design, we identified the amount of Tertraethyl ethoxysilane (TEOS) as the most influential parameter affecting the thickness of the silica shell. We also compared the relationship between the silica thickness and the change in color of the solutions. Being able to manipulate of the color of nanoparticles in films allows us to tailor these materials to specific needs.

Project:

MODELING THE PLAGUE IN EYAM

Katie Yan, 2022
Rachel Roe-Dale, Associate Professor, Mathematics and Statistics Department

In the 17th century, the plague was making its way across much of Europe, and the Great Plague had killed 25% of the population in London. The plague traveled from London to Eyam, in a bale of cloth. During the Eyam Epidemic 76% of all residents died from the plague, leaving only 83 surviving villagers. In my talk I discuss why the Eyam plague is such a compelling case study for mathematical disease models. The first model I present is a simple, compartmental S-I-R model. I then consider more complex systems of differential equations and their numerical solutions.

Additionally, I present results obtained with an agent-based model using the software NetLogo to help answer my research question, "was the quarantine In Eyam effective?"

Project:

CHARACTERIZATION OF THE DUAL PATHWAYS FOR *B. HALODURANS* ASPARAGINYL-tRNA FORMATION

Jon Matthew Bilé, 2021
Kelly Sheppard, Associate Professor, Chemistry Department

Protein synthesis requires the attachment of an amino acid to its cognate transfer RNA (tRNA). Two distinct pathways for attaching asparagine (Asn) to $tRNA^{Asn}$ are known: the direct pathway, in which Asn is directly attached to $tRNA^{Asn}$ by AsnRS; and the indirect pathway, in which Asn is attached to tRNA by non-discriminating AspRS and GatCAB. *Bacillus halodurans* uses both routes for the formation of the Asn-$tRNA^{Asn}$ complex. To better understand why *B. halodurans* possesses both pathways, we are purifying its AsnRS and AspRS in order to test and compare their activities under different chemical conditions such as reactive oxygen species and pH. This research will provide insight into how *B. halodurans* has adapted to survive in different environments.

Project:

B. ANTHRACIS INDIRCT PATHWATY OF ASPARAGINYL-TRNA FORMATION

Emily Bushey, 2021, and Nicole McElhoe, 2022
Kelly Sheppard, Associate Professor, Chemistry Department

Two distinct routes for attaching asparagine (Asn) to its cognate transfer RNA ($tRNA^{Asn}$), an essential step in protein synthesis, are known in *Bacillus anthracis*. In the direct route, asparaginyl-tRNA synthetase directly ligates Asn to tRNA. In the indirect pathway a non-discriminating-AspRS attaches aspartate to $tRNA^{Asn}$ which GatCAB then amidates. In this path asparagine is synthesized on the tRNA using a complex between a non-discriminating aspartyl-tRNA synthease, $tRNA^{Asn}$, and GatCAB, the transamidosome. We are purifying the components of the transamidosome in order to characterize the indirect pathway under various conditions to understand the role of the indirect route in this human pathogen and why it acquired an archaeal aspartyl-tRNA synthetase for this purpose.

Project:

PURIFICATION OF THE *BACILLUS SUBTILIS* TRANSAMIDOSOME COMPONENTS

Natalie Cassello, 2021
Kelly Sheppard, Associate Professor, Chemistry Department

There are two distinct routes for attaching asparagine (Asn) to its cognate transfer RNA ($tRNA^{Asn)}$, an essential step in protein synthesis, in the bacterium *Bacillus subtilis*. The one-step asparaginyl-tRNA synthetase directly attaches asparagine to its corresponding tRNA. In the indirect pathway, a non-discriminating aspartyl-tRNA synthetase (ND-AspRS) initially attaches aspartate to $tRNA^{Asn}$. This aspartate is modified to asparagine by the aminotransferase GatCAB. This two-step pathway synthesizes asparagine using the transamidosome: a complex between the ND-AspRS, $tRNA^{Asn}$, and GatCAB. I am working to purify the components of the transamidosome to

characterize the *B. subtilis* indirect pathway to better understand its role in the life cycle of *B. subtilis*, an organism being considered as a probiotic treatment for intestinal disorders.

Project:

DIRECT ROUTE FOR BACILLI tRNA^{Asn} ASPARAGINYLATION

Kaitlyn Maurais, 2022
Kelly Sheppard, Associate Professor, Chemistry Department

Protein synthesis is essential for life and requires the correct pairing of amino acids to their cognate transfer tRNA (aminoacylation). To date, only two routes exist to attach asparagine (Asn), to it cognate tRNA^{Asn}: the direct and indirect pathways. The direct path uses asparaginyl-tRNA synthetase to attach Asn to tRNA^{Asn} when Asn is present. Asn is synthesized by asparagine synthetase A. The causative agent for anthrax, *Bacillus anthracis*, appears to encode both routes for Asn-tRNA^{Asn} formation. The same is true in *Bacillus subtilis*. We would like to understand why these Bacilli codes for both routes, and if one pathway is preferred over the other under varying conditions. This summer we have focused on the direct pathway. We report on the purification of the two asparaginyl-tRNA synthetases and tRNA^{Asn} involved in the direct pathway.

Project:

RESURRECTION OF ANCESTRAL ASPARTYL-tRNA SYNTHETASES

Arianna McDaniels, 2021
Kelly Sheppard, Associate Professor, Chemistry Department

Protein synthesis is essential for life and requires the correct pairing of amino acids to their cognate transfer tRNA by aminoacyl-tRNA synthetases. Many prokaryotes lack an AsnRS to directly attach Asn to tRNA^{Asn}. Instead these organisms use a non-discriminating AspRS to attach Asp to tRNA^{Asn} and GatCAB to amidate the Asp to Asn. Organisms with an AsnRS often have a discriminating AspRS (D-AspRS) that only attach Asp to tRNA^{Asp}. How that specificity evolved from a bacterial ND-AspRS is unknown. To address, we phylogenetically modeled the last common ancestor of D-AspRS and an ND-AspRS. We report on the overproduction, and purification of the ancestral enzymes to study how specificity evolved. The work will provide insight into the evolution of life and tools for synthetic biology.

Project:

DOME IS WHERE THE HEART IS

Jacob Adams, 2021; Adam Kaszas, 2020
Kurt Smemo, Assistant Professor, Environmental Studies and Sciences Program

Island ecosystems have been extensively studied for understanding plant and animal community dynamics (seed dispersal limitations). Rarely are islands, especially small islands, used as model systems for studying spatial and environmental factors controlling ecosystem properties and processes. On Dome Island, a protected 5 ha island in Lake George, we studied patterns of soil microbial community activity, nutrient availability, and soil organic matter content across natural environmental gradients. Using GPS, we mapped the entire island to 20 by 20 m grid cells and used aggregate soil sampling at the grid cell level of the ecosystem properties described above.

Using geostatistics to model variation in space, we created high-resolution maps of ecosystem properties.

Project:

WEIGHT AND CVD RISK FACTOR CHANGES IN US MALE/FEMALE FIREFIGHTERS

Elliot Graham, 2020
Denise Smith, Tisch Distinguished Professor, First Responder Health and Safety Lab, Health and Human Physiological Sciences Department

Obesity and cardiovascular disease (CVD) have become major concerns in US firefighters. However, no studies have examined the differences in weight and CVD risk factor change over time between male and female firefighters. The aim of this study was to compare changes in body weight and CVD risk factors between male (n=606) and female firefighters (n=69) over 5 years. Women had more favorable baseline CVD and obesity measurements, but men and women increased in BW, BMI, TC and LDL. Weight and CVD management programs should be strategically established in firehouses across the US.

Project:

FIGHTER'S TRAINING REALTED DEATH

Ben Wu, 2021
Denise Smith, Tisch Distinguished Professor, Health and Human Physiological Sciences Department

Since 1977, 325 firefighters have died while training. Training is a vital part of firefighters' preparation and conditioning for job performance, but training related deaths are tragic and seemingly unnecessary. To address this issue, investigators reviewed the NIOSH fatality reports from 1998 to 2018. were identified. Of all training related deaths (n=98) 22% occurred during live-fire training, 33% during firefighting skills training, and 45% during physical fitness training. Cardiac events were the cause of death in 45%, 72%, and 86% of the specific training modalities respectively. Based on the results, we encourage training academies and departments to emphasize the importance of medical and fitness examinations before training.

Project:

A PERSON SHAPED HOLE

Emily Egan, 2020
Sarah Sweeney, Associate Professor, Art Department

After listening to stories shared from the families of missing people, Professor Sarah Sweeney began wondering what their loss might look like if it were made visible. Could someone create a portrait of a body that was not there? This long term project works with families of missing people through The Center of Hope to explore these questions through large-scale photographic diptychs and augmented reality (AR) sculptures. This summer, student Emily Egan began researching how augmented reality could be used to communicate the complicated relationships between presence, absence, and space that this project requires. Using Unity, a video game engine, Emily

experimented with building an AR app that reveals a multidimensional layer to Professor Sweeney's photographs.

Project:

IDENTIFYING THE ROLE OF MUSHROOM BODY NEURONS IN SNPF-INDUCED SLEEP IN *DROSOPHILA MELANOGASTER*

Nikoleta Chantzi, 2022
Christopher G. Vecsey, Assistant Professor, Neuroscience Program

Sleep is a well conserved biological process. In *Drosophila*, short neuropeptide F (sNPF) is found to have sleep promoting effects. Our project aimed to identify neurons responsible for sNPF-induced sleep, primarily focusing on the mushroom bodies. Flies in which all sNPF neurons except those in the mushroom bodies were activated did not show a sleep induction. Unexpectedly, neither did flies in which all sNPF neurons were activated. We concluded that the transgene responsible for the sleep promoting effect was either absent or not properly expressed in the control line and possibly in the experimental one. Thus, our results cannot be considered viable. In the future we will repeat the sleep experiment, after verifying that all fly lines are fully functional.

Project:

THE EFFECT OF MATING AND FOOD ON SLEEP IN THE PHORID FLY *MEGASELIA SCALARIS*

Sidney Gregorek, 2022, Princeton University
Christopher G. Vecsey, Assistant Professor, Neuroscience Program

Sleep has long been investigated in the model organism *Drosophila* melanogaster, but little is known about sleep in the Phorid fly *Megaselia scalaris*. In this study, we used *Drosophila* Activity Monitors to characterize the sleep patterns of the Phorid fly and draw comparisons to that of *Drosophila*, also looking at whether Phorid flies show the same reduction in sleep seen in *Drosophila* females after mating. Additionally, we raised the Phorid flies on different types of food to determine which was easier to use in the lab and the effect of food on sleep. Generally, Phorid flies slept for less total time and in a more fragmented pattern than *Drosophila*. However, they were similar to *Drosophila* in how the females showed reduced total sleep after mating.

Project:

OPTOGENETIC ACTIVATION OF SIFAMIDE NEURONS DURING ADULTHOOD CAUSES SLEEP INDUCTION IN *DROSOPHILA MELANOGASTER*

Haoyang Huang, 2020
Christopher G. Vecsey, Assistant Professor, Neuroscience Program

SIFamide (SIFa) is a genetically conserved neuropeptide in arthropods, and it regulates diverse behaviors, which include sexual behaviors, feeding behaviors, sleep, and rest:activity rhythms. In *Drosophila,* SIFa is sleep promoting, and ablation of SIFa neurons was shown to decrease total sleep. Herein, we built a fly line with both SIFa-Gal4 and UAS-Chrimson transgenes, and then utilized an optogenetic approach to activate SIFa neurons with red light. The current study showed that activation of SIFa neurons when flies were active significantly decreased flies' behavioral activity, suggesting that activation of SIFa neurons promotes sleep. Moreover, knockdown of SIFa

expression level using SIFaRNAi diminished the sleep-promoting effect induced by the activation of SIFa neurons, suggesting a key role for SIFa itself.

Project:

THE SMALL AND LARGE VENTROLATERAL CLOCK NEURONS ARE NOT RESPONSIBLE FOR SLEEP PROMOTION MEDIATED BY SHORT NEUROPEPTIDE F.

Emily Perkins, 2020
Christopher G. Vecsey, Assistant Professor, Neuroscience

Short neuropeptide F (SNPF) is a sleep promoting neuropeptide widely expressed in *Drosophila melanogaster.* Because it is so widely expressed, the specific populations responsible for this effect have not been identified. The pigment dispersing factor (PDF)-releasing small and large ventrolateral clock neurons (sLNvs, lLNvs) are one possible target as other papers have posited that the sLNvs may release SNPF to inhibit the wake-promoting lLNvs. We used transgenic fly lines to activate SNPF neurons in response to light but blocked activation in the sLNvs and lLNvs to determine if these specific populations were responsible for the sleep promoting effect. These flies fell asleep in response to the light stimulation, indicating that another population of neurons is likely responsible for the sleep promoting effect.

Project:

EFFECT OF LIGHT COLOR ON SLEEP PATTERNS IN *DROSOPHILA MELANOGASTER*

Dominic Skeele, 2022
Christopher G. Vecsey, Assistant Professor, Neuroscience Program

Exposure to blue light prior to sleep is widespread in humans due to the prevalence of handheld electronics. In recent years, the potentially negative effects of blue light on sleep have been called into question. However, the underlying molecular mechanisms for these effects remain unknown. This study aimed to determine the relationship between light color, sleep, and circadian rhythms using the model organism *Drosophila melanogaster*. This study concluded that blue light exposure increases nighttime sleep latency, or the time it takes to fall asleep. Genetic mutants lacking an inherent circadian rhythm were especially susceptible to the effects of blue light. In contrast, red light exposure decreased sleep during the day, but had no effect on nighttime sleep.

Project:

CHARACTERIZING WORKPLACE MENTAL HEALTH STIGMA

Isabelle E. Siegel, 2021
Leigh Wilton, Assistant Professor, Psychology Department

People with mental health issues experience stigma in everyday life. The current research presents the first experimental test investigating the presence and nature of stigmatizing beliefs and behaviors enacted against people with anxiety or depression (the most prevalent psychological disorders). Participants will evaluate a person presenting with depression, an anxiety disorder, or a control in a workplace setting (Study 1) or for hiring purposes (Study 2), and then evaluate the person on a number of key dimensions (e.g., competence, sensitivity, hireability, mentorship potential). We predict that individuals presenting with a psychological disorder will be judged

more harshly and rated less favorably than controls. Results may have major implications for workplace policy and practices and may inform anti-stigma campaigns.

Project:

CHILDREN ENCODE AND RETAIN WORDS LONGER WHEN INITIALLY EXPOSED TO FEWER WORDS

Lauren Ehrreich, 2020
Erica Wojcik, Assistant Professor, Psychology Department

Research suggests that the number of objects labeled at learning significantly affects encoding. However, we don't know whether the amount of words being taught affects long-term retention. 62 children aged 3-6 years were exposed to 4 novel objects, and given a label for either 2 or 4 objects. Participants' learning was tested both immediately and one week later. Data were analyzed with a binomial mixed-effects model with Phase (Encoding vs. Retention) and Condition (2 vs. 4) as fixed effects. Participants performed significantly better in the Encoding phase than in the Retention phase ($p=0.026$). Participants performed above chance in the Retention phase in the 2-label condition, but not in the 4-label condition, suggesting that the number of words a child is taught affects retention.

Project:

IS A MODI LIKE A CAR? INTEGRATION OF NOVEL WORDS INTO TODDLERS' SEMANTIC NETWORKS

Sarah Jones, 2020; Julia Venditti, 2019 (SUNY Oneonta)
Erica Wojcik, Assistant Professor, Psychology Department

Previous research shows that adult word knowledge is organized into a network of connected words and concepts (e.g. McClelland & Rogers, 2003). There is evidence that toddlers organize their word knowledge into semantic networks as well (Willits, Wojcik, Seidenberg, & Saffran 2013). However, it is unknown whether toddlers integrate new words immediately into their networks when they are first learning them. We are investigating this question with a semantic priming procedure. Participants aged 24 - 26 months old are taught 4 novel words (*modi, coro, bosa, tulver*) paired with 4 novel images (two unfamiliar animals and two unfamiliar vehicles). We then test whether the novel words are associated with known semantically related words. We are also investigating whether children's overall vocabulary structure moderates this semantic integration.

Project:

CHILDREN WANT TO LEARN FROM, BUT DO NOT TRUST SMART DEVICES

Samantha Hutchinson, 2020; Kyla Shen, 2019
Aarathi Prasad, Assistant Professor, Computer Science Department
Erica Wojcik (Sponsor), Assistant Professor, Psychology Department

We investigated how children learn from smart speakers. We presented 30 5- to 6-year-olds with unfamiliar animals and had them ask either a human or the Amazon Echo where the animal was from. We then asked the participant which agent they trusted. We used a binomial mixed-effects to analyze the data. Children were significantly more likely to request information from the Echo

(z = -3.160, p = 0.002), and technology experience (parent report) did not significantly explain request choice, (z = 1.234, p = 0.217). However, children were equally as likely to trust the Echo as the human (z = -1.479, p = 0.139). These findings suggest that although children want to interact with smart devices, they may not trust this source of information.

Project:

18th-C. FRENCH SHIPPING LOGS: EARLY EVIDENCE OF BLACK RESISTANCE TO FRENCH SETTLEMENT

Nicole Wong, 2021; Soren Barnett, 2020
Adrienne Zuerner, Associate Professor, World Languages and Literatures Department-French

Shipping logs from the early years of the French transatlantic slave trade enact the first constructions of race as we understand these today. These logs, however, also unwittingly document some of the earliest instances of resistance to enslavement and thus reveal the agency of Blacks and other indigenous peoples. Examining the precise vocabulary of race found in slave shipping logs allows scholars to identify the conceptual frameworks that coded Blacks as sub-human, and at the same time, such study illuminates key episodes of Black resistance omitted from official French history. This archival research, informed by postcolonial theory, delves into early conceptions of race and resistance overlooked by modern-day French society, showing that French society has never been the "colorblind" society that it claims to be, and that resistance has existed for as long as racism has.