Skidmore College

FACULTY STUDENT SUMMER RESEARCH PROGRAM

SUMMER 2017

FINAL PRESENTATIONS
AUGUST 3, 2017

Faculty Student Summer Research Program
Summer 2017

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 2017, there are 74 students working with 32 faculty members on 53 summer-long research projects in a wide range of disciplines.

Funding Sources for Faculty Student Summer Research Programs

ALUMNI, FAMILY, AND FRIENDS

Harman Cain Family ‘12
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
Don and Jean Richards
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 expenses 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

Mellon Foundation (NY6)
W.M. Keck Foundation
Rathmann Family Foundation
The Petrlik Family Foundation
American Chemical Society, Petroleum Research Foundation
Center for Aerosol Impacts on Climate and the Environment
Psychology Department
S3M Transitional Program
The National Science Foundation
National Institutes of Health, National Institute on Aging
U.S. Department of Homeland Security, FEMA

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.

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

2009-2010
Korena Burgio '11
Evan Caster '11
Megan Gaugler '12
James Turner '11

2008-2009
Catherine Baranowski '11
Maria DiSanto-Rose '11
Michael Letko '11
Paul Russell '11

Faculty Student Summer Research Program

Schedule of Final Research Presentations

Thursday, August 3, 2017

9:00 am – 9:25 am Coffee and Muffins

9:30 am – 10:30 am Poster Presentations #1

ROOM A

OBESITY AND INSULIN RESISTENCE IN MICE
Luke Calzini, 2018; Ally Dalton, 2019
T.H. Reynolds, Professor, Health and Exercise Sciences Department

BACKLASH AGAINST MEN WHO DEPRIORITIZE WORK
Alexandra Dennis, 2018
Corinne Moss-Racusin, Assistant Professor, Psychology Department

NON-THERMAL PLASMA FOR THE HETEROGENEOUS CHEMISTRY OF CHEMISORBED VOLATILE COMPOUNDS WITH FREE-RADICALS
Claudia Bennett-Caso, 2019; Chris Ostaszewski, 2018
Juan G. Navea, Assistant Professor, Chemistry Department

PARASITIC WASP EXPOSURE AND SLEEP IN DROSOPHILA MELANOGASTER
Jamie Stonemetz, 2019
Christopher G Vecsey, Assistant Professor, Neuroscience Program

ANALYZING SOCIAL CIRCADIAN ACTIVITY RHYTHMS IN GROUPS OF 100 *DROSOPHILA MELANOGASTER*
Sophia Moritz, 2018; Hannah Knoll, 2018; Brittany Newsome, 2019; Sarah Wilensky, 2018; Ryan Toma, 2018; Justin Jones, 2016; Abby Bryant, 2014; and Arianna Laszlo, 2014.
Bernie Possidente, Professor, Biology Department
Lucy Spardy, Assistant Professor, Math Department

ROOM B

CHARACTERIZING ATXN1 AGGREGATION AND AGGREGATE PROPAGATION IN SPINOCEREBELLAR ATAXIA TYPE 1
Jeff Okoro, 2018; Haoyang Huang, 2020
Sara Lagalwar, Assistant Professor, Neuroscience Program

EXPANDING THE GENETIC CODE WITH PYROGLUTAMATE
Hongwei Yu, 2019; Hannah Forman, 2019
Kelly Sheppard, Associate Professor, Chemistry Department

CHARACTERIZATION OF THE DUAL PATHWAYS FOR *B. HALODURANS* ASPARAGINYL-tRNA FORMATION
Caitlin Schroeder, 2018
Kelly Sheppard, Associate Professor,
Chemistry Department

***B. ANTHRACIS* INDIRCT PATHWATY OF ASPARAGINYL-TRNA FORMATION**
Elissa Williams, 2019; Yutong Li, 2019
Kelly Sheppard, Associate Professor, Chemistry Department

DRUG INTERACTINOS BETWEEN LITHIUM AND CAFFEINE: A MODEL FOR BIPOLAR DISORDER
Sarah Wilensky, 2018; Hannah Knaul, 2018; Brittany Newsome, 2019; Sophia Moritz, 2018
Bernard Possidente, Professor, Biology Department

VOICES: VOICING OUR INDIVIDUAL AND COLLECTIVE EXPERIENCE
Sophie Staton, 2018
Kelly Melekis, Assistant Professor, Social Work Department

ROOM C

DEVELOPMENT OF OPEN-SOURCE HARDWARE FOR USE WITH MICROFLUIDIC TESTING TECHNOLOGY
Beatriz Chavez, 2018; Tenzin Gyaltsen, 2019
Kimberley A. Frederick, Professor, Chemistry Department

DAYTIME AND NIGHTTIME ATMOSPHERIC PROCESSING OF US FLY ASH
Yao Xiao, 2019; Deborah Kim, 2018
Juan G. Navea, Assistant Professor, Chemistry Department

FRAMEWORK FOR MARKETING WITH SOCIAL MEDIA: THE CASE OF SMALL RESTAURANTS
William Berg, 2018
Elzbieta Lepkowska-White, Professor, Management & Business Department and International Affairs Program

THE STUDY OF ZOOPLANKTON TRAP BIAS AND PLASTIC CONTENT IN THE UPPER OCEAN: A SEDIMENT TRAP INTERCOMPARISON
Lucy Walker, 2019
Meg Estapa, Assistant Professor, Geosciences Department

LANGMUIR TURBULENCE IN THE COASTAL OCEAN
Matthew Cocke, 2019; Samantha Kenah, 2019
Greg Gerbi, Associate Professor, Physics and Geosciences Department

10:40 am – 11:50 am Oral Presentations

ROOM A

THE DEPOT THEATRE - 40 YEARS OF PROFESSIONAL THEATRE IN THE ADIRONDACKS - A DIGITAL ARCHIVE
Geoffrey Greene, 2018
David Howson, Teaching Professor & Arthur Zankel Executive Director, Arts Administration

DYNAMICS OF ARMENIAN GENOCIDE DENIAL: AN EXPERIMENTAL APPROACH
Benjamin Rudman, 2018
Feryaz Ocakli, Assistant Professor, Political Science Department and International Affairs Program

CHARTING THE UNCANNY VALLEY
Laura Noejovich, 2018; George Chakalos, 2018
Flip Phillips, Professor, Psychology Department and Neuroscience Program

REHYDRATING EFFICACY OF MAPLE WATER AFTER EXERCISE-INDUCED DEHYDRATION
Alexs Matias, 2018; Monique Dudar, 2020; Josip Kauzlaric, 2020
Stephen J. Ives, Assistant Professor, Health and Exercise Sciences Department

ROOM B

CLASSICAL MYTHOLOGY COURSES IN NORTH AMERICAN COLLEGES
Emily Gunter, 2019
Dan Curley, Associate Professor, Classics Department

MINING CODE IN SEARCH OF REASON
Giorgos Petkakis, 2018
David Read, Lecturer, Computer Science Department

IDENTIFYING THE HAITIAN SECOND GENERATION
Ana Sosa, 2018
Amon Emeka, Associate Professor, Sociology Department

TO BE OR NOT TO BE: ETHNIC IDENTITY FOR SECOND GENERATION WEST INDIANS
Ruby Thompson, 2018
Amon Emeka, Associate Professor, Sociology Department

ROOM C

PILOTING A REGIONAL NETWORK FOR YOUTH RADIO PARTICIPATION
Adam Simon, 2019

Adam Tinkle, Visiting Assistant Professor, Media & Film Studies and the John B. Moore Documentary Studies Collaborative (MDOCS)

DESIGN AND DEVELOPMENT OF A NOVEL ANTIBIOTIC: A GATCAB INHIBITOR
Veronica Mierzejewski, 2019
Kelly Sheppard, Associate Professor, Chemistry Department

EFFECTS OF CONFORMATIONAL CHANGES AND FLEXIBILITY FROM ARKA BINDING TO ABP1-SH3 DOMAIN
Kristina Foley, 2018
K. Aurelia Ball, Assistant Professor, Chemistry Department

PART OF THE WHOLE: HOW STRUCTURAL CHANGES AFFECT DYNAMICS IN THE HIV-1 VIF COMPLEX
Elise Tierney, 2018; Lieza Chan, 2018
K. Aurelia Ball, Assistant Professor, Chemistry Department

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

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

ROOM A

WORD BLAST! AN EXAMINATION OF YOUNG CHILDREN'S SEMANTIC DEVELOPMENT
Ramon Diah, 2018; Zoe Chodak, 2019
Erica Wojcik, Assistant Professor, Psychology Department

DIRECT PATHWAY FOR *BACILLUS ANTHRACIS* tRNA ASPARAGINYLATION
Jose Giron, 2020
Kelly Sheppard, Associate Professor, Chemistry Department

DIRECT ROUTE FOR *B. SUBTILIS* ASPARAGINYL-tRNA FORMATION
Rebecca Wales, 2018
Kelly Sheppard, Associate Professor, Chemistry Department

DEVELOPMENT OF A PAPER MICROFLUIDIC TEST FOR D-LACTATE: A DIAGNOSTIC TEST FOR MALARIA
Roxanna Martinez, 2019; Kyla Johnson, 2020
Kimberley Frederick, Professor, Chemistry Department

SYNTHETIC INVESTIGATION INTO A CLASS OF HIGHLY SUBSTITUTED CYCLOHEXENE COMPOUNDS
Brian Wollocko, 2018
Kara Cetto Bales, Senior Instructor, Chemistry Department

DEVELOPMENT OF MICROFLUIDIC DEVICES FOR THE DETECTION OF IODIDE IN SURFACE WATER
Suzanne Zeff, 2020
Kimberley A. Frederick, Professor, Chemistry Department

ROOM B

NON-SPECIFIC EFFECTS OF OPTOGENETIC TRANSGENE EXPRESSION IN WAKE PROMOTING NEURONS OF *DROSOPHILA MELANOGASTER*
Ryan Toma, 2018
Christopher Vecsey, Assistant Professor, Neuroscience Program

DOES SPINOCEREBALLAR ATAXIA TYPE 1 IN MICE ALTER CIRCADIAN CLOCK FUNCTION?
Sarah Wilensky, 2018; Brittany Newsome, 2019; Hannah Knaul, 2018; Ricardo Merlin, 2020; Christianel Gil, 2020
Bernard Possidente, Professor, Biology Department
Sarita Lagalwar, Assistant Professor, Neuroscience Program

SIMPLEX OPTIMIZATION OF COLOR INTENSITY OF SILVER NANOPARTICLE FILMS
Jessica Ranesizafiniaina Ndrianasy, 2020
Maryuri Roca, Teaching Professor, Chemistry Department

CONFORMATIONAL CHANGES OF ARKA12
Robyn Stix, 2018
K. Aurelia Ball, Assistant Professor, Chemistry Department

ROLE OF SEGMENTS 1 AND 2 IN THE ARKA12 STRUCUTRAL ENSEMBLE
Gabriella Gerlach, 2019
K. Aurelia Ball, Assistant Professor, Chemistry Department

ROOM C

DAYTIME CHEMISTRY OF SEA SPRAY AEROSOL: ALTERNATIVE PATHWAY OF HONO FORMATION
Kathleen J. Maas, 2020; Deborah Kim, 2018
Juan G. Navea, Assistant Professor, Chemistry Department

EFFECT OF CULLIN-5 PROTEIN ON CONFORMATIONAL FLEXIBILITY OF HIV-1 COMPLEX
Sampriti Thapa, 2018
K. Aurelia Ball, Assistant Professor, Chemistry Department

INTERACTIVE EFFECTS OF LITHIUM AND ALCOHOL ON FRUIT FLY CIRCADIAN ACTIVITY RHYTHMS: TESTING A MODEL FOR DRUG INTERACTIONS IN BIPOLAR DISORDER
Hannah Knaul, 2018; Brittany Newsome, 2019; Sarah Wilensky, 2018; Sophia Moritz, 2018; Christianel Gil, 2010; Ricardo Merlin, 2020
Bernard Possidente, Professor, Biology Department

DOWNSTREAM CONSEQUENCES OF SELF-DISTANCING
Wallis Slater, 2018
Daniel Peterson, Assistant Professor, Psychology Department

DEVELOPMENT OF A PAPER MICROFLUIDIC TEST FOR D-LACTATE: A DIAGNOSTIC TEST FOR MALARIA
Roxanna Martinez, 2019; Kyla Johnson, 2020
Kimberley Frederick, Professor, Chemistry Department

PROJECT ABSTRACTS

Project:

SYNTHETIC INVESTIGATION INTO A CLASS OF HIGHLY SUBSTITUTED CYCLOHEXENE COMPOUNDS

Brian Wollocko, 2018
Kara Cetto Bales, Senior Instructor, Chemistry Department

Highly substituted cyclohexene compounds have a variety of applications ranging from pharmaceuticals to cosmetics and preservatives. Considering their range of functions, research into inexpensive and innovative synthesis methods for such compounds is of interest. Our group investigates the formation of highly substituted cyclohexene compounds using Lewis acid catalyzed Diels-Alder chemistry. We have recently synthesized one such compound which shows promise as an effective fungicide. This research investigates a similar class of highly-substituted cyclohexene compounds with the aim of increasing solubility while maintaining fungicidal properties.

Project:

EFFECTS OF CONFORMATIONAL CHANGES AND FLEXIBILITY FROM ARKA BINDING TO ABP1-SH3 DOMAIN

Kristina Foley, 2018
K. Aurelia Ball, Associate Professor, Chemistry Department

SH3 domains are common protein interaction domains found across all forms of life, including over 400 domains in humans. These domains bind to intrinsically disordered proteins (IDPs), proteins that do not fold into a stable secondary structure. One SH3 domain in yeast, Abp1SH3, has a binding site for the ArkA IDP, but little is known about the binding process. Molecular dynamics simulations were used to model Abp1SH3, the Abp1SH3-ArkA complex, and a hybrid linking Abp1 and ArkA. ArkA binds to Surface I and Surface II of the SH3 domain in a hypothesized two-step method. There are conformational differences between the wildtype and hybrid bound structures including differences in dihedral angles and backbone fluctuations, suggesting the linker may have an entropic effect on the complex.

Project:

ROLE OF SEGMENTS 1 AND 2 IN THE ARKA12 STRUCUTRAL ENSEMBLE

Gabriella Gerlach, 2019
K. Aurelia Ball, Assistant Professor, Chemistry Department

SH3 domains are protein interaction domains found across all forms of life and involved in both signal transduction and cytoskeleton regulation. They bind to intrinsically disordered proteins (IDPs), which are challenging to model using only experimental techniques. Thus, little is known about these binding mechanisms. One SH3 domain found in yeast, Abp1SH3, has a binding site

for ArkA, an IDP. Replica exchange molecular dynamics simulations with were used to model ArkA, and segments one and two of ArkA. It was found that while the entire ArkA peptide samples at least 6 conformations, segment 1 only samples one, where nearly all residues are in the conformation polyproline II. These conformations will be used to run simulations of ArkA binding to the Abp1SH3 domain.

Project:

CONFORMATIONAL CHANGES OF ARKA12

Robyn Stix, 2018
K. Aurelia Ball, Assistant Professor, Chemistry Department

SH3 domains are common protein interaction domains that are found across all forms of life and bind flexible intrinsically disordered proteins (IDPs). IDPs are difficult to model using only experimental methods. Molecular dynamics (MD) simulations mimicking experimental conditions were used to model the ArkA IDP which binds to the SH3 domain found in yeast, Abp1SH3. ArkA IDPs are believed to bind to SH3 domains in a multi-step binding process. Conformational analysis was applied to the ArkA IDP to gain a better understanding of conformations that may promote this binding. ArkA was found to sample a higher population of polyproline II helices compared to experimental data, which is likely due to restriction of the omega bond of proline to the trans conformation in the MD simulations.

Project:

PART OF THE WHOLE: HOW STRUCTURAL CHANGES AFFECT DYNAMICS IN THE HIV-1 VIF COMPLEX

Elise Tierney, 2018; Lieza Chan, 2018
K. Aurelia Ball, Associate Professor, Chemistry Department

Intrinsically disordered proteins (IDPs) are not thought to influence the conformation of folded proteins because, inherently, IDPs lack a fixed secondary structure. The IDP HIV-1 Vif, gains structure in complex with EloC, EloB, CBF-β, and Cul5 (VCBC-Cul5). Vif uses the complex to degrade the antiviral APOBEC enzyme. The VCBC-Cul5 complex crystal structure contains a truncated C-terminus EloB tail; however, NMR data has shown that with the full-length EloB tail, there was improvement to the NMR signal. We use Molecular Dynamics (MD) simulations to study how the EloB tail and Cul5 binding partner affect the conformations and dynamics of the VCBC complex. Using these computer simulations we have uncovered potentially functional alternate conformations of this viral protein complex.

Project:

EFFECT OF CULLIN-5 PROTEIN ON CONFORMATIONAL FLEXIBILITY OF HIV-1 COMPLEX

Sampriti Thapa, 2018
K. Aurelia Ball, Assistant Professor, Chemistry Department

HIV-Vif protein is an intrinsically disordered protein (IDP) that gains stability when bound to Elongin-B (EloB), Elongin-C (EloC), CBF-β, and Cullin-5 (Cul5), forming the VCBC-Cul5 Complex. Cul5 is a scaffold protein that is directly involved in the ubiquitination and degradation of antiviral proteins. While the crystal structure of the VCBC-Cul5 Complex has been solved, the role of conformational flexibility of the complex without Cul5 is not known. To investigate the role of Cul5 on the conformations sampled, molecular dynamics (MD) simulations were run on VCBC. Using principle component and dihedral angle analysis, it was determined that VCBC is more flexible without Cul5 bound and the alternate states sampled by the VCBC complex may be important for function.

Project:

THE MILITARY AND POLITICAL IMPLICATIONS OF GENETIC WEAPONS

Brian Roberge, 2018
Yelena Biberman-Ocakli, Assistant Professor, Political Science Department

Our research project investigates the developments in the fields of genetics and synthetic biology. It draws on government records, cutting-edge multidisciplinary journals, classic works, and interviews with experts in the field. We begin by providing a comprehensive examination of the history of biological warfare, genetics, and biological engineering. We then analyze how the emerging technologies could influence the way state and nonstate actors will carry out organized violence in the near future. We find that genetic weapons will most likely be used for individual or small-group assassinations or long-term coercion. Their use will also have significant political implications for the alignment of social groupings and biological privacy. Our project concludes by offering policy recommendations for tackling the problem of genetic warfare.

Project:

CLASSICAL MYTHOLOGY COURSES IN NORTH AMERICAN COLLEGES

Emily Gunter, 2019
Dan Curley, Associate Professor, Classics Department

The Our Mythical Education Project, funded by the European Commission (EC), is an ongoing investigation of the reception of classical antiquity; in particular, the project is concerned with children's and young adults' culture in response to regional and global challenges. We have been tasked with surveying classical mythology courses in North American colleges (US, Canada, Mexico). Our survey traces the presence and use of classical myths in college-level curricula —

their scope, functions, and outcomes. Syllabi for these courses are being collected and assembled into a database to track teaching materials, myths taught, methods of instruction, instruments for assessing student learning, enrollments, and other factors. Our data will be published in chapter form for an edited volume sponsored by the Project's organizers.

Project:

IDENTIFYING THE HAITIAN SECOND GENERATION

Ana Sosa, 2018
Amon Emeka, Associate Professor, Sociology Department

We set out to find if there is substantial selective ethnic attrition among second generation Haitians in the U.S. Ethnic attrition is a way of integrating into the host society by forfeiting one's ethnic identity. Measuring ethnic attrition is important because it may lead to a misrepresentation of the group's achievement in the U.S. We measure the extent to which parents' and respondents' characteristics bear on identify in the Haitian second generation. We use Census data to track identificational changes from 1990 to 2014. Our results suggest that family structure, socioeconomic status, and parents' and respondents' characteristics have a significant effect on Haitian identity.

Project:

TO BE OR NOT TO BE: ETHNIC IDENTITY FOR SECOND GENERATION WEST INDIANS

Ruby Thompson, 2018
Amon Emeka, Associate Professor, Sociology Department

Ethnic attrition refers to the process through which immigrants stop identifying with the nationalities and ethnicities of their predecessors. Our central research questions are: 1) is there evidence of ethnic attrition among second generation West Indians, and 2) to what extent is it selective? Using 1990 to 2014 Census Data, we identified a cohort of West Indian second generation children in order to track how they identify across two decades. If West Indians are no longer identifying as such we cannot track their progress in the United States, which may give an unduly positive outlook on the group's success in the U.S. Our preliminary findings demonstrate that less than half of West Indians identify primarily as West Indian, and suggest that family structure, parents' characteristics, and respondents' characteristics are significant predictors of ethnicity.

Project:

SINKING PARTICLE FLUX IN THE UPPER OCEAN

Laura Heinlein, 2019
Meg Estapa, Assistant Professor, Geosciences Department

Particles sinking from the surface ocean to the deep ocean are an important component of the biological carbon pump. This mechanism allows the ocean to sequester atmospheric CO_2 into deep sediments. One technique used to measure sinking particles in the upper ocean is sediment traps which collect passively settling particles. The aim of this study was a trap intercomparison to better understand the biases of trap designs frequently used in oceanographic studies. Samples were analyzed for mass flux and biogenic silica flux. Biogenic silica is formed by certain types of plankton in the upper ocean, and increases the rate of sinking of organic matter by making particles denser. The biogenic silica-to-mass flux ratio gives insight into the significance of silica ballasting in the upper ocean.

Project:

THE STUDY OF ZOOPLANKTON TRAP BIAS AND PLASTIC CONTENT IN THE UPPER OCEAN: A SEDIMENT TRAP INTERCOMPARISON

Lucy Walker, 2019
Meg Estapa, Assistant Professor, Geosciences Department

Oceanographers employ a variety of methods to measure particle flux, an important part of the carbon cycle. Sediment traps are the most common and have the longest historical data set. There are several trap designs, including Neutrally Buoyant Sediment Traps, Surface Tethered Traps, and Pelagra Traps. This study focused on evaluating which trap design was most effective at collecting sinking particles with as little bias as possible. The bias that was measured was the collection of 'swimmers', or zooplankton that enter the traps by actively swimming into them, as opposed to passively sinking. This study also investigated plastic fiber content in undeployed process blank traps compared to deployed traps. It was found that Pelagra traps collected fewer 'swimmers' and had less plastic in the blanks.

Excluded

Utilizing jars of polyacrylamide, these traps collect passively sinking particles that are headed downwards into deeper regions of the ocean.

Particle flux in the upper ocean is an integral part of the biogeochemical ocean system, and is an important component of larger-scale processes, like the ocean carbon sink.

Project:

DEVELOPMENT OF A PAPER MICROFLUIDIC TEST FOR D-LACTATE: A DIAGNOSTIC TEST FOR MALARIA

Roxanna Martinez, 2019; Kyla Johnson, 2020
Kimberley Frederick, Professor, Chemistry Department

Malaria is currently detected trough a blood based test which requires expensive modern equipment. This poses problems to developing areas where proper equipment is not present and conditions are unsanitary. Micro paper based analytical devices are portable, easy to dispose of, and are user friendly. Our method uses a coupled enzyme assay to detect D-lactate, a byproduct of the malaria parasite, in urine. We have continued to work on stabilizing our reagents on paper to prolong shelf life and preparing a control set of chips to use alongside the patient's test in order to determine the concentration of D-lactate.

Project:

DEVELOPMENT OF OPEN-SOURCE HARDWARE FOR USE WITH MICROFLUIDIC TESTING TECHNOLOGY

Beatriz Chavez, 2018; Tenzin Gyaltsen, 2019
Kimberley A. Frederick, Professor, Chemistry Department

Chemical testing methods are getting more portable, and efficient, therefore, it is important that technology supporting these methods also becomes affordable. Our lab has developed testing methods on microfluidic paper chips which are inexpensive and easy to use. Our tests produce a color change which needs to be quantified for analysis. This study involves comparison of cell-phone cameras and open source hardware such as a Raspberry Pi-based camera. While cell-phone cameras are ubiquitous, they need to be interfaced with a computer for analysis. The Raspberry Pi-based system automates the analysis but the camera unit itself is not as high quality. We will present our results for both a urine-based diagnostic for malaria and a test to detect surface water contamination from oil and gas drilling.

Project:

DEVELOPMENT OF MICROFLUIDIC DEVICES FOR THE DETECTION OF IODIDE IN SURFACE WATER

Suzanne Zeff, 2020
Kimberley A. Frederick, Professor, Chemistry Department

Hydraulic fracturing, or hydrofracking, is used to access natural gases and oil. Hydrofracking produces millions of gallons of flowback water, contaminated with the chemical additives of the fracking. This flowback water can contaminate nearby surface water. The goal of this project is to create inexpensive, easy to use devises for the detection of iodide, one of the pollutants found in

produced water. An assay was created using microfluidic paper chips which measure the colorimetric reaction between iodide and methylene blue; measured by absorption. We were able to extend previous work by establishing the long-term stability. Additionally, we pursued alternative assays that could detect lower concentrations for earlier detection of contamination.

Project:

LANGMUIR TURBULENCE IN THE COASTAL OCEAN

Matthew Cocke, 2019; Samantha Kenah, 2019
Greg Gerbi, Associate Professor, Physics and Geosciences Departments

Vertical turbulent mixing plays a key role in cross-shelf exchange and circulation in the coastal ocean. While different mechanisms affect vertical mixing, our focus was on Langmuir turbulence. Langmuir circulation consists of parallel rotating cells typically oriented downwind and driven by wind and surface gravity waves. We used data from an acoustic Doppler current profiler offshore of Martha's Vineyard during 2014 and 2015, as well as meteorological data gathered in the area. We focused on times when forcing by wind, waves, and surface heat flux were favorable for Langmuir turbulence. We then analyzed the ocean response to see the effect of near-bed friction on the development of Langmuir cells. Preliminary results suggest that strong tidal currents prevent the formation of Langmuir turbulence.

Project:

CONTRASTING THE EFFECTS OF ECONOMIC VALUATION OF USE VALUE AND NON-USE VALUE ON ENVIRONMENTALLY RELEVANT BEHAVIOR

Damian S. Hammond, 2019
Sandra H. Goff, Ph.D., Assistant Professor, Economics Department

This work extends the literature on the study of pro-environmental behavior and the use of ecosystem services valuation (ESV) to promote conservation. Prior work demonstrates that exposure to ESV information can decrease donations to environmental organizations through self-interest activation (Goff et al. 2017). We assert that the type of value (use or non-use) used to characterize the benefits of the resource may also affect behavior. We assess self-reported engagement in a set of environmentally-relevant behaviors as a function of both the type of benefit reported and the presence of ESV information. Using United States National Parks as the context for our study, we find evidence to suggest that there are interaction effects between the use of ESV information and the type of benefits reported.

Project:

THE DEPOT THEATRE - 40 YEARS OF PROFESSIONAL THEATRE IN THE ADIRONDACKS - A DIGITAL ARCHIVE

Geoffrey Greene, 2018
David Howson, Teaching Professor & Arthur Zankel Executive Director of Arts Administration

The Depot Theatre is a small professional, non-profit theater located in Westport, NY. Local residents founded the theatre in 1979 as a means to save the Westport Train Depot (circa 1876) from demolition. In 2018, the Depot Theatre will be celebrating its 40th anniversary season and plans to have an exhibition of its history. This summer's archive project includes sorting and digitizing 40 years' worth of old photos, playbills and documents. Research included documenting the discovery of historical stories and themes revealed by the archives. Some emerging themes include: the effect of technological changes on theatre operations and the importance of audience development. The project culminates in the delivery of an organized and fully-digitized archive for the organization to use in the future.

Project:

REHYDRATING EFFICACY OF MAPLE WATER AFTER EXERCISE-INDUCED DEHYDRATION

Alexs Matias, 2018; Monique Dudar, 2020; Josip Kauzlaric, 2020
Stephen J. Ives, Assistant Professor, Health and Exercise Sciences Department

Exercise in the heat results in profound dehydration, deleterious to physiology and performance. While increasing in popularity, no study has explored the rehydrating efficacy of maple water (MW). Twenty-six young healthy volunteers (n=13 males) participated in a single-blind, counterbalanced, crossover design study of the potential impact of MW on hydration, thirst, fatigue, and heart rate variability (HRV) after exercise-induced dehydration of ~2%. After attaining post-exercise measures, participants consumed 1L of MW or maple-flavored water and then monitored at 0.5,1, and 2hrs post-exercise. No significant differences in hydration, fatigue, or HRV were observed, though thirst remained higher with MW. Some of the markers of rehydration occurred in a sex-specific manner. In conclusion, MW does not appear to enhance rehydration, although sex differences in rehydration may exist.

Project:

CHARACTERIZING ATXN1 AGGREGATION AND AGGREGATE PROPAGATION IN SPINOCEREBELLAR ATAXIA TYPE 1

Jeff Okoro, 2018; Haoyang Huang, 2020
Sara Lagalwar, Assistant Professor, Neuroscience Program

Spinocerebellar Ataxia Type 1 (SCA1) is an autosomal dominant and progressively fatal neurodegenerative disease caused by expanded CAG repeats in the mutant ATXN1 gene. Mutant ATXN1 monomers misfold and aggregate in the cell nucleus. Previous work from our lab and others show that mutant ATXN1 aggregates may spread from the nucleus to the cytoplasm, and later propagate horizontally from cell-to-cell via tunneling nanotubes. Cell-to-cell propagation is the putative mechanism of disease progression in the cerebellum of SCA1 mice. To further understand the processes of ATXN1 aggregation and propagation, we designed experiments to test if ATXN1 aggregates are 1) toxic, 2) oligomeric, 3) transfer vertically, and 4) facilitate aggregation of aggregation-resistant ATXN1. The results of our work are relevant to the propagation of oligomeric, aggregation-prone proteins in SCA1, Alzheimer's, Parkinson's and Huntington's disease.

Project:

FRAMEWORK FOR MARKETING WITH SOCIAL MEDIA: THE CASE OF SMALL RESTAURANTS

William Berg, 2018
Elzbieta Lepkowska-White, Professor, Management & Business Department and International Affairs Program

Social Media is becoming increasingly important for restaurants, which are constantly competing to forge the strongest ties with their consumers. However, many restaurants, especially small ones, struggle to find voice and personal identity through social media, whether due to lack of personnel, time, financial backing, or expertise. This research explores strategic approaches to social media in small restaurants using content analysis of their social media and thematic analysis of fourteen interviews conducted with them. We developed a framework for social media management and applied it in the context of small restaurants to explore tactics they utilize. Findings point to successful strategies and tactics that can be utilized by restaurants and present a theoretical model for social media management that could be applied to other types of businesses.

Project:

CLONING OF *pcoRS* (CHROMOSOMAL GENE CLUSTER) FROM *E. cloacae* FOR EXPRESSION IN *E. coli* GR161(pECL_A)

Sthorm Pyrame, 2018
Sylvia McDevitt, Associate Professor, Biology Department

While copper is an essential trace element, at high concentrations copper can be toxic to all cells, including bacteria. *Enterobacter cloacae* possesses two 20-gene copper resistance gene clusters,

one of which is encoded on a plasmid (pECL_A) which can be transferred to other bacteria. After the transfer of pECL_A into *E. coli*, no increase in copper resistance has been observed. This is presumably due to the presence of a transposon within one of the regulatory genes. The aim of this work was to clone the functional regulatory genes (*pcoRS*) contained within the 20-gene chromosomal gene cluster of *E. cloacae* for expression in *E. coli* GR161(pECL_A) and observe the effect on the bacterium's ability to handle copper stress. The gene cluster *pcoRS* has been successfully cloned into pACYC177, and we are now working to transform it into *E. coli* GR161(pECL_A) to confer copper resistance.

Project:

COPPER RESISTANCE AS SURVIVAL STRATEGY OF BACTERIAL PATHOGENS

Xavier Cambi, 2020
Sylvia F. McDevitt, Associate Professor, Biology Department

Dictyostelium discoideum is an amoeba that is a natural predator of bacteria. In order for *D. discoideum* to consume bacteria it utilizes digestive enzymes and heavy metals, e.g. copper and zinc, to kill bacteria after engulfing them. Using *Escherichia coli* as model system we are looking into the effectiveness of a plasmid (pMG101) bound copper resistance system to protect bacteria from being killed by *D. discoideum*. *E. coli* GR161 and *E. coli* GR161(pMG101) were fed to *D. discoideum* and the number of bacteria surviving within the amoeba cells was determined.

Project:

VOICES: VOICING OUR INDIVIDUAL AND COLLECTIVE EXPERIENCES

Sophie Staton, 2018
Kelly Melekis, Assistant Professor, Social Work Department

Using the participatory action research method photovoice, this project explored the experience of homelessness in New York, including difficulties, coping mechanisms, and actions for addressing homelessness. Over the course of 6 weeks, participants in Saratoga Springs and New York City used visual images and narratives to share the story of their everyday reality and construct strategies for change. Data consisted of images, corresponding narratives and group dialogue. Descriptive coding and thematic analysis were conducted using NVivo 11. Preliminary findings highlight themes related to 1) the 'identity' and stigma of being homeless, 2) the double jeopardy of being old/disabled and homeless, and 3) the role of providers/caseworkers. Findings suggest implications for research and practice.

Project:

BACKLASH AGAINST MEN WHO DEPRIORITIZE WORK

Alexandra Dennis, 2018
Corinne Moss-Racusin, Assistant Professor, Psychology Department

This research examines the impact of leaving work to engage in childcare or self-care on perceptions of employees. Participants (N = 480) read one of six vignettes indicating that a male or female employee left work for childcare or self-care, or did not leave work. Participants then evaluate the employee on both positive characteristics (competence, likeability, work commitment and deservingness of rewards) and negative characteristics (deservingness of penalties and risk posed to the work environment). Because gender stereotypes emphasize the importance of men's paid labor, men who leave work for either reason are expected to be rated lower on positive characteristics and higher on negative characteristics than employees in other conditions, revealing backlash against men who deprioritize work for even a short time.

Project:

ATMOSPHERIC PARTICLE AGING: DAYTIME CHEMISTRY IN THE OCEAN/ATMOSPHERE INTERFACE

Sarah Gowan, 2019
Juan G. Navea, Assistant Professor, Chemistry Department

To date, little attention has been given to the photochemistry of the sea surface microlayer (SML) and sea spray aerosol (SSA), leading to large uncertainties in the roles of both systems as they pertain to climate, biogeochemical cycles, and the chemical balance of the atmosphere. Recent studies have found that the SML is enriched with light absorbing organic material, including humic-like substances (HULIS). Upon interaction with solar radiation, photoexcited HULIS can transfer energy to neighboring volatile organic compounds (VOCs), affecting its interaction with SSA. In this project, we investigate the daytime changes in particle mass when humic acid, a proxy of HULIS, interacts with common biogenic VOCs such as isoprene and α-pinene

Project:

NON-THERMAL PLASMA FOR THE HETEROGENEOUS CHEMISTRY OF CHEMISORBED VOLATILE COMPOUNDS WITH FREE-RADICALS

Claudia Bennett-Caso, 2019; Chris Ostaszewski, 2018
Juan G. Navea, Assistant Professor, Chemistry Department

In this work we present a state-of-the-art system to study the heterogeneous reactions between adsorbed hydrocarbons and free radicals generated via non-thermal plasma. The system allows for the exposure of a well-characterized oxygen plasma plume on a hydrocarbon-coated alumina powder. Two pairs of windows in the chamber allows in-situ two-dimensional spectroscopy: UV-Vis and IR. The oxidation of chemisorbed hydrocarbon on the alumina powder via non-thermal

plasma was investigated in-situ in order to determine the conditions for an effective oxidation. Our results show a novel and effective method for the free-radical reaction with adsorbed volatile or semi-volatile compounds. Quantum mechanically calculated vibrational frequencies of the adsorbed oxidized products suggest the first oxidation of cyclohexane is the limiting step.

Project:

DAYTIME CHEMISTRY OF SEA SPRAY AEROSOL: ALTERNATIVE PATHWAY OF HONO FORMATION

Kathleen J. Maas, 2020; Deborah Kim, 2018
Juan G. Navea, Assistant Professor, Chemistry Department

Sea spray aerosols (SSA) are particles of varying size and composition released from bubble bursting on the ocean's surface, or marine boundary layer (MBL). SSA are known to contain complex organic chromophores known as humic-like substances (HULIS), which are naturally emitted from the MBL and/or formed though SSA atmospheric processing. HULIS are known photosensitizers that can open alternative photochemical pathways within SSA. In this study, we investigate the photosensitization of NO_2 and NO_3^- to produce HONO, an important source of hydroxyl radicals in the troposphere, and nitrogen oxides.

Project:

DAYTIME AND NIGHTTIME ATMOSPHERIC PROCESSING OF US FLY ASH

Yao Xiao, 2019; Deborah Kim, 2018
Juan G. Navea, Assistant Professor, Chemistry

Fly ash, a byproduct of coal firing, is an aerosol rich in iron oxides. Under acidic conditions, it can leach iron, an essential nutrient for living organisms in the ocean. In this study, we compare the iron mobility from fly ash in nitric acid to that in hydrochloric acid. In the presence of nitrates, we hypothesize that surface phenomena, combined with redox reactions from leached iron, will reduce nitrates into nitrites. In this project, the yield and rate of iron and nitrite leached from US fly ash has been investigated under both pH 1 conditions in both daytime and nighttime conditions.

Project:

DYNAMICS OF ARMENIAN GENOCIDE DENIAL: AN EXPERIMENTAL APPROACH

Benjamin Rudman, 2018
Feryaz Ocakli, Assistant Professor, Political Science Department and International Affairs Program

We devised a survey experiment that measures Turkish attitudes towards the Armenian Genocide and tests the impact of a number of approaches to challenging the denialist position. Existing research suggests that when respondents are confronted with facts that challenge their beliefs, they retreat from the conversation and harden their opinions. However, when they are first given a

suggestion that affirms their identities, and then asked the controversial questions, they become more open to engagement. Using this insight, we designed a self-affirmation manipulation. We also tested a prime using collective pride to soften the positions of those holding denialist positions. Our goal is to get a better understanding of what leads to genocide denial, and identify interventions that could help minimize such attitudes.

Project:

DOWNSTREAM CONSEQUENCES OF SELF-DISTANCING

Wallis Slater, 2018
Daniel Peterson, Assistant Professor, Psychology Department

Individuals routinely experience negative, upsetting events. A body of research has demonstrated that slight shifts in perspective when thinking about a distressing event, from a self-immersed to a self-distanced perspective, are associated with decreased negative affect. Furthermore, research has demonstrated that self-distancing can have delayed benefits, such that individuals who engage in the self-distancing at time 1 also display lower levels of distress at time 2. However, these delayed benefits are seen when individuals reprocess the same event at both times. While this is an interesting finding, it is unlikely that individuals routinely experience the same negative events over and over again. Therefore, an important question has yet to be explored: how does self-distancing at time 1 influence the subsequent processing of *other* negative events at time 2?

Project:

CHARTING THE UNCANNY VALLEY

Laura Noejovich, 2018; George Chakalos, 2018
Flip Phillips, Professor, Psychology Department and Neuroscience Program

As simulations of our physical world approach reality, their appearance creates feelings of unnaturalness. In robotics, the relationship between human likeness and perceived plausibility experiences a 'dip' as appearances approach realism - the "Uncanny Valley". Traditional animation avoids the pitfall into this chasm by exaggerating movement of real objects beyond what is physically accurate. A series of simulations of bouncing balls were created using deformable exaggeration. Subjects evaluated each animation as to its plausibility. For generic balls, exaggerated bounces were regarded as significantly more plausible than those that were physically accurate, regardless of their modeled elasticity. When subjects are shown the type of ball being simulated, they subjectively modify their plausibility ratings accordingly. Thus, exaggeration acts as a bridge across the uncanny valley.

Project:

ANALYZING SOCIAL CIRCADIAN ACTIVITY RHYTHMS IN GROUPS OF 100 *DROSOPHILA MELANOGASTER*

Sophia Moritz, 2018; Hannah Knoll, 2018; Brittany Newsome, 2019; Sarah Wilensky, 2018; Ryan Toma, 2018; Justin Jones, 2016; Abby Bryant, 2014; and Arianna Laszlo, 2014.
Bernie Possidente, Professor, Biology Department
Lucy Spardy, Assistant Professor, Math Department

Drosophila Melanogaster, otherwise known as the fruit fly, is a model organism for the study of genetics, development, and even circadian rhythms. Fruit flies are generally more active during the day with sporadic periods of sleep during the day and night. Over the course of three years, Skidmore students have recorded the patterns of activity and sleep for groups of 100 flies of several strains of *Drosophila;* these include Wild-Type Canton-S, and the circadian clock mutants *period and timeless*. While investigating these patterns, a phenomenon of sporadic "spikes" of hyperactivity was observed during the day. I developed numerical criteria for defining these activity peaks and analyzed patterns in their occurrence with respect to genotype and sex of the groups.

Project:

INTERACTIVE EFFECTS OF LITHIUM AND ALCOHOL ON FRUIT FLY CIRCADIAN ACTIVITY RHYTHMS: TESTING A MODEL FOR DRUG INTERACTIONS IN BIPOLAR DISORDER

Hannah Knaul, 2018; Brittany Newsome, 2019; Sarah Wilensky, 2018; Sophia Moritz, 2018; Christianel Gil, 2010; Ricardo Merlin, 2020
Bernard Possidente, Professor, Biology

Alcohol Use Disorder is common in the bipolar community. With most bipolar patients being prescribed lithium-based medications, it is important to examine how alcohol and lithium interact. Bipolar disorder, which is cyclical, has been modeled as a circadian clock disorder. Previous studies demonstrate that lithium lengthens circadian clock period while alcohol shortens it, suggesting that they may have opposing effects. If that is the case, alcohol use may decrease the efficacy of lithium in treating bipolar disorder. We assayed circadian locomotor activity of Canton-S Wild-Type fruit flies given a control medium, lithium chloride, ethanol, or the combination of lithium chloride and ethanol. The research is still in progress; therefore, our final results will be presented at the Summer Research Symposium.

Project:

DRUG INTERACTINOS BETWEEN LITHIUM AND CAFFEINE: A MODEL FOR BIPOLAR DISORDER

Sarah Wilensky, 2018; Hannah Knaul, 2018; Brittany Newsome, 2019; Sophia Moritz, 2018
Bernard Possidente, Professor, Biology Department

Although coffee is widely considered to be an innocuous or even beneficial drink, it can have dangerous effects on bipolar disorder patients. Bipolar disorder is a mental illness characterized by alternating episodes of mania and depression. Bipolar patients who consume caffeine through coffee are 2.4 times more likely to commit suicide than if they had abstained from coffee, and the risk increases on a dose-dependent manner. We used fruit flies (Drosophila melanogaster) to determine whether caffeine interacts with lithium, which is commonly prescribed for bipolar disorder, to alter locomotor activity and circadian clock function. Flies were treated with control medium, lithium chloride, caffeine, or both lithium and caffeine. Research is still in progress and final results will be presented at the Summer Research Symposium.

Project:

DOES SPINOCEREBALLAR ATAXIA TYPE 1 IN MICE ALTER CIRCADIAN CLOCK FUNCTION?

Sarah Wilensky, 2018; Brittany Newsome, 2019; Hannah Knaul, 2018; Ricardo Merlin, 2020; Christianel Gil, 2020.
Bernard Possidente, Professor, Biology Department
Sarita Lagalwar, Assistant Professor, Neuroscience Program

Spinocerebellar ataxia type 1 (Sca1) is a neurodegenerative disease of the cerebellum causing unsteady gait and progressive loss of muscle control. We compared circadian wheel-running activity rhythms of Sca1 transgenic mice to unaffected controls for seven days in a standard photoperiod and six days in constant darkness. As expected, Sca1 mice were much less active, but they showed no significant differences in the time of peak activity or circadian clock period. Mutants showed control-like activity levels immediately after placement in running wheels, but abruptly decreased their activity after about one day. Future studies will determine whether succinic acid treatment has any normalizing effect on Sca1 circadian activity patterns, and will monitor both running wheel behavior and spontaneous motion outside the wheel.

Project:

MINING CODE IN SEARCH OF REASON

Giorgos Petkakis, 2018
David Read, Lecturer, Computer Science Department

The Web Ontology Language (OWL) is a semantic specification which defines formal logical constructs allowing web sites to find information and connect facts from computers on the Internet. Every day, companies like Google use OWL-based software to seamlessly combine maps, events, locations, venues, weather conditions, and more. Broader use of OWL is constrained by the lack of a freely available computer program implementing the complete specification. Our project's goal was to enhance Apache Jena, a free, albeit non-comprehensive, software library for OWL. As our work began we found that Jena's design allows for powerful extensibility at the cost of significant complexity, requiring additional effort to understand. This presentation focuses on our work with OWL, Jena, and concepts involved with implementing computer software which supports reasoning.

Project:

OBESITY AND INSULIN RESISTENCE IN MICE

Luke Calzini, 2018; Ally Dalton, 2019
T.H. Reynolds, Professor, Health and Exercise Sciences Department

Researchers estimate that ~30% of the global population is obese. Literature suggests that age plays a role in the development of obesity and insulin resistance, particularly in females. This study examined the effect of age and sex on obesity and insulin resistance in C57Bl/6J mice. Additionally, the role of the tissue factor protease-activated-receptor-2 (TF-PAR2) signaling pathway was investigated, as recent research has discovered a link between this pathway and obesity. Our study demonstrates that aged male mice are significantly more obese and insulin resistant than their younger cohort. Furthermore, we discovered that female mice do not develop obesity with advancing age. Finally, the TF-PAR2 signaling pathway doesn't appear to influence the development of obesity and insulin resistance.

Project:

SIMPLEX OPTIMIZATION OF COLOR INTENSITY OF SILVER NANOPARTICLE FILMS

Jessica Ranesizafiniaina Ndrianasy, 2020
Maryuri Roca, Teaching Professor, Chemistry Department

Silver nanoparticle films of various colors were prepared as a step forward in the field of nanotechnology. To prepare these films, silver was reduced using sodium borohydride and ascorbic acid, and the resulting nanoparticles were embedded in polymer. The color of the film depends on the

proportion of the reagents. In order to obtain the most intense colored film, we used a simplex optimization of the concentration and volume of the agents used to reduce silver. UV-visible spectroscopy, centrifugation, and Transmission Electron Microscopy (TEM) were used to characterize the nanomaterials. Using a simplex optimization allowed an efficient and controlled preparation of films of various shades in the color spectrum at the intended intensity.

Project:

DESIGN AND DEVELOPMENT OF A NOVEL ANTIBIOTIC: A GATCAB INHIBITOR

Veronica Mierzejewski, 2019
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 the direct pathway, Asn is attached to $tRNA^{Asn}$; in the indirect pathway, Asn is synthesized on the tRNA using a non-discriminating aspartyl-tRNA synthetase and our enzyme of interest, GatCAB. The inhibition of GatCAB would disrupt translation and kill pathogens that depend solely on the indirect pathway, such as *Helicobacter pylori* and *Staphylococcus aureus*. We are purifying *B. subtilis* GatCAB to perform future inhibition experiments while also conducting *in silico* molecular docking studies using *Autodock 4* to test the efficacy of potential inhibitors. The work lays the foundation for the potential development of novel antibiotics.

Project:

***B. ANTHRACIS* INDIRCT PATHWATY OF ASPARAGINYL-TRNA FORMATION**

Elissa Williams, 2019; Yutong Li, 2019
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:

EXPANDING THE GENETIC CODE WITH PYROGLUTAMATE

Hongwei Yu, 2019; Hannah Forman, 2019
Kelly Sheppard, Associate Professor, Chemistry Department

Non-canonical pyroglutamate incorporation during protein synthesis will aid the study of medical conditions like Alzheimer's disease. To better understand pyroglutamate's role in protein structure and function, an *E. coli* model system was developed to directly incorporate pyroglutamate into proteins. Key to this process is the use of a modified archaeal RNA-dependent glutamine biosynthetic pathway in which pyroglutamate is synthesized on an amber suppressor tRNA. Enhanced yellow fluorescent protein was used as a reporter system to determine levels of read-through, and therefore incorporation, of pyroglutamate in response to an amber codon. In order to determine presence of eYFP, fluorimetey was used. As yield was poor, we are developing a new pyroglutamate system using mesophilic enzymes. Success of this system will be confirmed by mass spectrometry.

Project:

DIRECT PATHWAY FOR *BACILLUS ANTHRACIS* tRNA ASPARAGINYLATION

Jose Giron, 2020
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 the indirect pathways. The direct path uses asparaginyl-tRNA synthetase to attach Asn to $tRNA^{Asn}$ when free Asn is present. The Asn is synthesized by asparagine synthetase A. The second pathway involves synthesizing Asn on the tRNA itself. The causative agent for anthrax, *Bacillus anthracis*, appears to encode both routes for Asn-$tRNA^{Asn}$ formation. We would like to understand why *B. anthracis* codes for both routes. This summer we have focused on the direct pathway. We report the successful purification of the asparagine synthetase A and asparaginyl-tRNA synthetase along with both variants of the *B. anthracis* $tRNA^{Asn}$ in order to characterize the pathway under different physiologically relevant conditions.

Project:

DIRECT ROUTE FOR *B. SUBTILIS* ASPARAGINYL-tRNA FORMATION

Rebecca Wales, 2018
Kelly Sheppard, Associate Professor, Chemistry Department

B. subtilis uses two distinct pathways to attach asparagine to $tRNA^{Asn}$. Asparaginyl-$tRNA^{Asn}$ formation is essential for protein synthesis, but why the organism encodes for both asparaginyl-$tRNA^{Asn}$ routes is unknown. In the direct route, asparagine is first synthesized by an asparagine synthetase. Asparagine is then attached to $tRNA^{Asn}$ by asparaginyl-tRNA synthetase. For the

indirect path, asparagine is synthesized on the tRNA. Characterization of the two routes will provide insight into bacterial life cycles. Accordingly, we have purified the *B. subtilis* asparaginyl-tRNA synthetase and asparagine synthetase to characterize the direct pathway. Also, we are attempting to knockout the direct pathway in *B. subtilis* to better understand its physiological role. The work will provide insight into how bacteria adapt metabolism to survive under different environmental conditions.

Project:

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

Caitlin Schroeder, 2018
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 environmental conditions.

Project:

ENVIRONMENTAL AND PLANT COMMUNITY CONTROLS ON ECOSYSTEM PROCESSES IN THE ADIRONDACK MOUNTAINS OF NEW YORK STATE

Daniel Casarella, 2018; Jennifer Cristiano, 2018
Kurt Smemo, Assistant Professor, Environmental Studies and Sciences Program

Forest trees possess specific traits that regulate many fundamental ecosystem processes, including decomposition and carbon storage. Previous studies have focused on mycorrhizal association of dominate trees, which usually associate with one fungi: Arbuscular Mycorrhizal (AM) or Ectomycorrhizal (ECM). However, environmental and abiotic factors related to climate, soil, and land-use are also considered variables that control ecosystem dynamics. This study aims to examine the effect of mycorrhizal tree types and environmental controls across natural gradients. Understanding the influence of these traits can provide the means to predict consequences of environmental change and altered biodiversity. Our results showed that specific species distribution patterns are apparent across short distances and result in correlating patterns of carbon and nutrient cycling.

Project:

MONITORING THE EUTROPHICATION OF LAKE LONELY AND TRIBUTARIES THROUGH SEASONAL NUTRIENT CYCLES

Devon McLane, 2019
Kurt Smemo, Assistant Professor, Environmental Studies and Sciences Program

Growing seasonal nutrient cycle data from the Lake Lonely tributaries (Spring Run, Bog Meadow Brook, and Bear Swamp) provides an understanding to the current health of Lake Lonely and the cultural eutrophication process currently affecting the lake. Ion chromatography and various colorimetric techniques are used to determine the total nitrogen, total phosphorus, and chloride concentrations of each tributary and the lake. Analyzing past and current data provides observations of these levels changing over time and the effects of human impact.

Project:

ANALYZING OSCILLATOR DYNAMICS FOR GROUP BEHAVIOR IN *DROSOPHILA MELANOGASTER*

Alexandra Cassell, 2019; Alexander Smith, 2018
Lucy Spardy, Assistant Professor, Mathematics Department

The wild-type *Drosophila melanogaster*, the common fruit fly, has an intrinsic 24-hour circadian rhythm with peaks of activity near dawn and dusk. Bernard Possidente's biology research has demonstrated that in large groups, fruit flies exhibit similar patterns of activity around dawn and dusk but has also shown a presence of random activity spikes during the light period. Our goal is to develop a mathematical model to explain and predict the population dynamics. We use the phase and Van der Pol oscillators to represent a morning and an evening oscillator as two components of the circadian rhythm. We entrain the morning to dawn and the evening to dusk and couple them to other flies. Future research will address the inclusion of the random daytime activity.

Project:

PILOTING A REGIONAL NETWORK FOR YOUTH RADIO PARTICIPATION

Adam Simon, 2019
Adam Tinkle, Visiting Assistant Professor, Media & Film Studies Program and the John B. Moore Documentary Studies Collaborative (MDOCS)

Youth radio programs exist across the country and world, but no such program exists in the Capital Region. Through eight weeks of workshops, live broadcasts, and special radio events, we investigated how we might best invite, encourage, and teach youth participants (aged 4 to 20) to creatively self-express through radio. We observed how their participation yielded personal, social, and creative outcomes seldom found in school or other traditional extracurricular activities.

In addition to our qualitative study of youth interactions with radio, we also asked: How might we design a program that meaningfully engages with the larger community in which Skidmore exists; What would a regional network of youth radio look like? In our experiments, forging community partnerships and decentralizing our broadcasting infrastructure laid groundwork for potential future expansion of this project.

Project:

THE CLOUD PROJECT
Emily Moreton, 2018
Sarah Sweeney, Associate Professor, Art Department

“The Cloud Project” is a collaborative digital art project consisting of a series of image pairs. The first is drawn from a participant’s mental image of a cloud. The second image is a digitally constructed photograph, informed by the hand-drawn cloud sketch. These digitally created clouds are confabulations, memories derived from imagination. Each image presents a false documentation, the photographic evidence of a memory that never actually existed.

As a collaborative project, "The Cloud Project" also became a trial-and-error study to obtain usable drawings and to attract participants. The final methodology involved the combination of precise language and engaging visual identity to effectively communicate project goals, maintain professionalism, and appeal to possible contributors.

Project:

PARASITIC WASP EXPOSURE AND SLEEP IN DROSOPHILA MELANOGASTER
Jamie Stonemetz, 2019
Christopher G Vecsey, Assistant Professor, Neuroscience Program

Parasitic wasps, such as *Leptopilina heterotoma*, affect large portions of natural populations of *Drosophila*. This has led to *Drosophila* developing both behavioral and cellular responses to infection. Among these, is a reduced expression of NPF, a neuropeptide known to have a role in sleep and activity levels as well as many other behaviors. In light of this, our study examines the effect of wasp exposure on sleep by exposing *Drosophila* to both male and female wasps and monitoring their sleep and circadian rhythms following that exposure. Preliminary findings had indicated that exposure to wasps led to an increase in sleep in female *Drosophila*. Ultimately, however, no connection between wasp exposure and sleep was found.

Project:

NON-SPECIFIC EFFECTS OF OPTOGENETIC TRANSGENE EXPRESSION IN WAKE PROMOTING NEURONS OF *DROSOPHILA MELANOGASTER*

Ryan Toma, 2018
Christopher Vecsey, Assistant Professor, Neuroscience Program

Pigment dispersing factor **(**PDF) neurons in the fruit fly, *Drosophila*, have important roles in circadian rhythm synchronization and wake promotion. Herein we created a transgenic fly which expresses a light activated ion channel (Chrimson) in PDF neurons. Based on previous preliminary findings, we hypothesized that the activation of PDF neurons by activating Chrimson would result in a desynchronization and shortening of circadian rhythms. To corroborate past findings, we ran a control experiment with no light stimulation to assess the circadian rhythms of flies without Chrimson activation. To our surprise, we observed dramatically impaired rhythmicity in transgenic flies, with an associated rhythm shortening. Our results indicate that the expression of Chrimson into PDF neurons has detrimental effects on circadian rhythmicity irregardless of direct Chrimson activation.

Project:

WORD BLAST! AN EXAMINATION OF YOUNG CHILDREN'S SEMANTIC DEVELOPMENT

Ramon Diah, 2018; Zoe Chodak, 2019
Erica Wojcik, Assistant Professor, Psychology Department

Our summer research investigated how the structure of young children's word knowledge changes from age three to seven and whether genders differences exist. Adults link together words from the same category (e.g., morning-night). We hypothesized that this organization develops slowly over childhood. Participants (32 children aged 3-8 and 21 adults) played a game in which they heard a list of words and responded with the first word that came to mind. There was only significant main effect of age: there were more category-match responses for adults than for children $F(2, 47) = 14.13$, $p < 0.001$, and the data suggest that this changes across early childhood. We plan to continue to collect data and create a public database of child associations for other researchers to explore.