Faculty Student Summer Research Program
Summer 2014

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

The Schupf Scholars Program

Each year the Schupf Scholars Program funds up to four students per year 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.

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, July 31, 2014

9:00 am – 9:30 am Coffee and Muffins

9:30 am – 10:30 am Oral Presentations

ROOM A

EXPLORATION OF ENVELOPES AS FOCAL SETS
Adam Winchell, 2016
Mark Huibregtse, Professor, Department of Mathematics and Computer Science

THE OPPORTUNITY PROGRAM (OP) ALUMNI PROJECT: EXPLORING THE CAREER EXPERIENCES OF FIRST GENERATION STUDENTS AND STUDENTS OF COLOR AT A PREDOMINATELY AND HISTORICALLY WHITE LIBERAL ARTS COLLEGE
Amari Boyd, 2014 and Aldin Medunjanin 2016
Sue Layden, Ph.D., Research Analyst on Enrollment,

PHOTOCHEMISTRY OF NITRATE CHEMIS

DOES GENTLY CLEARING THE NASAL CAVITY IMPACT ODOR IDENTIFICATION?
Mitchell Spring, 2015
Robert M. Hallock, Visiting Assistant Professor, Neuroscience Program

TOWARDS FACIAL RECOGNITION FOR SPEAKERS AT SKIDMORE FACULTY MEETINGS
Yang Yu, 2016
Michael Eckmann, Associate Professor, Department of Mathematics and Computer Science

A TOY MODEL FOR THE NONLINEAR OPTICAL RESPONSE OF MOLECULES WITH MODULATED CONJUGATION
Quanhang Chen, 2016
Javier Perez-Moreno, Assistant Professor, Department of Physics

EXPANDING THE GENETIC CODE WITH PYROGLUTAMATE
Miles Calzini, 2016 and Stephanie Zhen, 2016
Kelly Sheppard, Assistant Professor, Department of Chemistry

DUAL ROUTES FOR *B. HALODURANS* ASPARAGINYL-tRNA FORMATION
Nilendra Nair, 2015
Kelly Sheppard, Assistant Professor, Department of Chemistry

12:00 pm – 1:00 pm Lunch, Murray Aikins Dining Hall

1:00 pm – 2:00 pm Oral Presentations

ROOM A

SUCCINIC ACID TREATMENT DOES NOT IMPROVE INSULIN RESISTANCE OR ALTER ENERGY HOMEOSTASIS IN OBESE MICE
Daniela Escudero, 2016 and Gabriella Vero
T.H. Reynolds, Associate Professor, Department of Health and Exercise Sciences

IDENTIFYING THE CELLULAR MECHANISM FOR THE MnTBAP-INDUCED REDUCTION IN BODY WEIGHT
Saada Legesse, 2015 and Caitlin Sheridan, 2015
T.H. Reynolds, Associate Professor, Department of Health and Exercise Sciences

MITOCHONDRIA'S ROLE IN SCA1 DISEASE PROGRESSION
Austin Ferro, 2015 and Jenny Zhang, 2016
Sarita Lagalwar, Assistant Professor, Neuroscience Program

VACCINE COVERAGE AND INCOME INEQUALITY IN MIDDLE INCOME DEVELOPING COUNTRIES
Rachel Spring ‘15
Mehmet Odekon, Professor, Department of Economics

DUAL ROUTES FOR *B. SUBTILIS* ASPARAGINYL-tRNA FORMATION
Hannah Raff, 2015
Kelly Sheppard, Assistant Professor, Department of Chemistry

ROOM B

ENGINEERING A COST-EFFECTIVE MICROMANIPULATOR FOR *XENOPUS*

IMAGINATION INFLATION AND LEI ONLINE ADMINISTRATION
Jennifer Wicks, 2014
Rebecca B. Bays, Professor, Department of Psychology

STABLIZING ENZYMES FOR A MALARIA DIAGNOSTIC TEST
Meti Debela, 2016
Kimberly Frederick, Professor, Department of Chemistry

DEVELOPMENT OF A MICROFLUIDIC ASSAY FOR ANALYSIS OF D-LACTATE IN URINE: A DIAGNOSTIC TEST FOR MALARIA
Sibin Wang, 2016
Kimberley Frederick, Professor, Department of Chemistry

AMOEBA AS A MODEL SYSTEM TO STUDY METAL DEPENDENT BACTERIAL KILLING BY MACROPHAGES
Ketan Yerneni, 2017
Sylvia Franke McDevitt, Associate Professor, Department of Biology

COPPER-SILVER CROSS RESISTANCE – TESTING THE POTENTIAL OF HOMOLOG PROTEINS OF COPA FROM *ESCHERICHIA COLI*
Bryan Zepeda-Carranza, 2017
Sylvia Franke McDevitt, Associate Professor, Department of Biology

PROJECT ABSTRACTS

Project:

THE GREAT WAR IMAGE ARCHIVE, FRANCE, 1914-1918

Luke Conley, 2015
John Anzalone, Professor, Department of Foreign Languages and Literatures

We constructed a digital image archive of rare French illustrations for the study of "representations of The Great War." In conjunction with contemporary texts as well as later writing from historical, journalistic and literary sources, this imagery offers an enhancement to learning by allowing students to see, for example, the images that contemporaries of the war experienced themselves, for instance: the powerful images of violence that fed the waves of propaganda after the early days of the war; or the deep sadness inherent in images of the war's cruelty, of grief, and of loss. The pedagogical questions we faced involved the editing of material for inclusion, its arrangement in thematic clusters, and the formatting that would lead to most effective use.

Project:

POST-CONFLICT RECONSTRUCTION: WOMEN AND DEVELOPMENT IN AFGHANISTAN

Nahid Paiman, 2015
Nurcan Atalan-Helicke, Assistant Professor, Environmental Studies Program

Conflict causes inequality and exclusion and women often bear the brunt of conflict. In transition towards democracy, good governance, economic development and sustainable peace, post-conflict countries have to consider and implement inclusive development. International organizations have recognized and emphasized women’s participation in the processes of peace negotiations, and promotion of gender equality locally and nationally in the reconstruction process. Afghan women have been part of the reconstruction of Afghanistan since 2003, and gender equality has also been on the agenda of the government, international organizations and civil society organizations in the Transformation Decade (2015-2024). By examining the work of three organizations working on women and development in Afghanistan, the research explores the priorities for gender equality and the impact of the work of these organizations.

Project:

THE ECONOMY OF DESIRE
Ryan Crotty, 2015
Erica Bastress-Dukehart, Associate Professor, Department of History

The focus of this summer collaboration has been to work on a chapter of my larger manuscript, entitled *The Economy of Desire: Botany and Empire in Seventeenth-Century Europe*. This particular chapter, *The Economy of Desire,* focuses on the economic aspects and problems associated with importing plants and animals from around the world in an age when discoveries of new cultures, continents, animals, plants, and planets profoundly changed how men and women viewed and interacted with their universe. Lavishly funded scientific academies sprang up in every European country as monarchs, emperors, and natural philosophers vied to be at the forefront of these intellectual changes and nascent paradigms.

Project:

IMAGINATION INFLATION AND LEI ONLINE ADMINISTRATION
Jennifer Wicks, 2014
Rebecca B. Bays, Professor, Department of Psychology

We looked at imagination inflation, an effect in which imagining counterfactual events can lead to false beliefs in event occurrences. We tested reliability of online administration of the Life Events Inventory (LEI); results showed no significant differences in ratings for administration format, suggesting that future imagination inflation studies can decrease participant commitment from three face-to-face sessions to one. For our face-to-face study four events were used from the survey for imagery exercises. Participants were given instructions to use a first- or third-person perspective for imagining the events. Although there was no significant imagination inflation, there was a significant difference in pretest LEI ratings between first- and third-person conditions, a difference that diminished in posttest ratings. Selecting events of equally low occurrence could create stronger effects.

Project:

THE GENERATIONAL CONSTITUTION: JEFFERSON, MADISON AND THE CALL FOR PERIODIC CONSTITUTIONAL RENEWAL
Ben Polsky, 2015
Beau Breslin, Dean of the Faculty and Vice President for Academic Affairs, Professor, Department of Government

The Generational Constitution is an exercise in retrospective constitutional re-imagining. What would have happened if Jefferson had won his debate with Madison, and as a result, each generation rewrote the federal constitution? Using evidence from 1800s state constitutions and accounts of the contemporaneous political movements, we have concluded that the revision of

1825 would have tended toward the federalization and liberalization of suffrage. Figures such as Daniel Webster, Martin Van Buren and Nathan Sanford act as vehicles in our narrative of the imagined debate that might have unfolded at the constitutional convention of 1825. Our work will appear as one of five chapters, each dealing with a different year, or generation, that together present a plausible yet counterfactual version of constitutional American history.

Project:

SELECTIVELY DISTRUPTION OF THE CELL WALL OF CHAROPHYTE ALGA *Penium margaritaceum*
Berke Tinaz, 2016
David Domozych, Professor,

create clusters of words associated with topics, and to measure the number of words in a particular document associated with each topic. In this project, we used topic modeling to "read" a corpus of about 2,500 books published between 1757 and 1795. We then developed a number of visualization tools in collaboration with Empire Windrush, a local digital humanities startup. Analyzing the resulting data and visualizations, we discovered patterns that lend broad support to the view that imperial and domestic discourses were already tightly interwoven in the early phases of British colonialism in India.

Project:

CALIBRATING A NEW METHOD FOR MEASURING OCEAN CARBON FLUXES IN THE PRESENCE OF HIGH-SILICATE PHYTOPLANKTON BLOOMS

Melanie Feen, 2016
Meg Estapa, Visiting Assistant Professor, Department of Geosciences

Understanding how carbon moves throughout the ocean is crucial for prediction of the impacts of increased human-generated atmospheric carbon dioxide on the ocean. Atmospheric carbon dioxide dissolves into the ocean and is consumed by photosynthetic plankton, such as diatoms, a common vector for sinking carbon. We used a transmissometer, a type of optical sensor to measure the amount of particulate carbon sinking out of the ocean. We analyzed how layered diatoms on the transmissometer window affected the linearity of transmissometer response. We also studied the chemical composition of diatoms to determine their silica to carbon ratio. Connecting the optical properties and chemical composition of diatoms decreases uncertainty in carbon flux measurements from transmissometers deployed in the ocean, allowing better observations of the ocean carbon cycle.

Project:

THE EFFECTS OF MUSIC ON AUTOBIOGRAPHICAL MEMORY IN ALZHEIMER'S DISEASE (AD) PATIENTS AND HEALTHY OLDER ADULTS

Renee Schapiro, 2015
Denise Evert, Associate Professor, Department of Psychology and Neuroscience Program

The present study assesses the effect of familiar, emotional music on autobiographical memory for aging adults with and without Alzheimer's-type dementia (AD). Across three testing sessions participants listen to a familiar, emotional song from either a remote (1940's-50's) or medium-remote (1970's-80s) time period, or they sit in silence. Participants' moods are assessed before and after listening to the song. They then share a memory from their past, and answer autobiographical memory questions. The goal of this study is to assess the relationship between the strength of recalled memories and the type of music used. For example, we expect that participants with AD who listen to familiar, happy songs from their adulthood, will have strongest memories of happy events that occurred during that time period in their lives.

Project:

LAB ON A CD PLAYER

Julie Bryant, 2016
Kimberley Frederick, Professor, Department of Chemistry

Scientific equipment, which is expensive, delicate, and immobile, has limited its use to analyze samples in under resourced areas. Microfluidic devices have re-invented lab instruments in both size and needs. Unlike many of the instruments used in laboratories, microflidic platforms use significantly less sample and analysis can be done on site. Our lab is working to develop an inexpensive and portable Lab-on-a-CD-player. This device will be compact enough to take into the field while also having a user-friendly interface. Using an Arduino Uno controller running a motor and optical detection module, we are able to create a centrifugal microfluidic platform which can be used in many capacities- from detecting malaria to monitoring water for contaminants.

Project:

STABLIZING ENZYMES FOR A MALARIA DIAGNOSTIC TEST

Meti Debela, 2016
Kimberly Frederick, Professor, Department of Chemistry

Malaria is one of the biggest public health problems around the world and is one of the leading causes of death in many developing countries. Malaria is currently diagnosed through a blood-based test that requires expensive instruments that are scarce in many developing countries. Hence it's important to develop an inexpensive, easy, fast and non-blood based way of detecting malaria. Our assay detects the presence of D-lactate, a metabolic byproduct of the malaria parasite, in an infected person's urine; the D-lactate is measured by color change catalyzed by enzymes. In order to be able to store and ship the diagnostic tests, it is important to maintain the enzymes' ability to react. This is particularly difficult in high temperature and humid environments. As a result, we focused on increasing the stability of the enzymes by using certain sugars and drying the reagents to increase the portability of our diagnostic tests on microchips or paper strips.

Project:

cost, automated microfluidic device that will pre-concentrate and separate these contaminants. Osorb, a glass material developed by ABSMaterials, will be used to pre-concentrate the contaminants, which will then be separated and analyzed through the application of an electric potential. We have focused on optimizing a method for pre-concentrating, releasing, and separating organic dyes, which can later be applied to organic contaminants.

Project:

DEVELOPMENT OF A MICROFLUIDIC ASSAY FOR ANALYSIS OF D-LACTATE IN URINE: A DIAGNOSTIC TEST FOR MALARIA

Sibin Wang, 2016
Kimberley Frederick, Professor, Department of Chemistry

One of the main challenges in science is to apply techniques and instruments developed in labs into areas where there is limited access to proper equipment. Micro paper analytical devices (µPAD) technology holds great promise as because it is portable, easy to dispose of, and capable of producing a rapid and user-friendly result, one such example is a pregnancy test. Our goal is to investigate a µPAD for malaria. Our method will detect d-lactate, a byproduct of the metabolism of the malaria parasite, in urine. Previous studies done in our lab have developed a urine-based test through a coupled chemical reaction. Our efforts have focused more on testing the chemical reactions and measuring concentration of d-lactate on the µPADs.

Project:

SYNTHETIC STUDIES ON NEW TANDEM INTRAMOLECULAR DIELS-ALDER REACTIONS

Hannah DeGraaf, 2015
Raymond J. Giguere, Professor, Department of Chemistry

Carbon-carbon bond formation rests at the center of organic synthesis; our basic research project investigates new ways to create multiple carbon-carbon bonds. Carbon molecules found in nature (or made synthetically) often contain complex rings, such as those used in many pharmaceuticals. With focus on further development of Tandem Intramolecular Diels-Alder (TIMDA) reactions, this approach initially involves seven synthetic transformations, and the final TIMDA reaction creates four carbon-carbon bonds as well as four rings, in a single reaction. The presentation will describe methods employed to prepare, isolate, purify, and identify the organic molecules in this novel synthetic study.

Project:

DOES GENTLY CLEARING THE NASAL CAVITY IMPACT ODOR IDENTIFICATION?

Mitchell Spring, 2015
Robert M. Hallock, Visiting Assistant Professor, Neuroscience Program

Wine tasters often clear their nasal cavity before sniffing the aromas of a wine. Here, we tested whether this behavior has any effect on olfactory performance in a group of undergraduate participants. We had 25 undergraduates gently blow their noses before a standardized test of olfaction, the Sniffin' Sticks test. This test required the recognition of a battery of odors, and population data for this test is available. A t-test between the participant scores and population data revealed that clearing the nasal cavity did not alter olfactory performance, $t(24) = 0.464$, $p>0.05$. Our data strongly suggest that clearing the nasal cavity does not alter an individual's ability to identify odors.

Project:

ENGINEERING A COST-EFFECTIVE MICROMANIPULATOR FOR *XENOPUS* OOCYTE INJECTION

Heather A. Braun, 2015
Rebecca J. Howard, Assistant Professor, Department of Chemistry

Alcohol is one of the most widely used and abused drugs, though its action on brain receptor proteins remains unclear. *Xenopus* oocytes are a model system that can be injected with DNA encoding putative alcohol receptors for functional characterization. An important piece of equipment for injecting oocytes, the micromanipulator, is prohibitively expensive due to the precision it requires. To facilitate research and teaching on alcohol receptors, we sought to create our own micromanipulator using parts from a 3D printer. Starting from open-source plans available online, we developed a protocol for building a micromanipulator base, and generated a novel microinjection adaptor using free computer-aided design software. We have begun testing the function of a chimeric brain receptor to explore structural determinants of alcohol sensitivity.

Project:

EXPLORING THE EVOLUTION OF ETHANOL: DEVELOPMENT OF TEACHING TOOLS AND NEW EXPERIMENTS ON ETHYL ALCOHOL

Glenna E. Joyce, 2016
Rebecca J. Howard, Assistant Professor, Department of Chemistry

We sought to develop materials and protocols to explore properties of ethyl alcohol (ethanol) both in a first-year seminar course, and through novel experiments on brain proteins. To provide students with first-hand experience of ethanol's biochemical origins, we validated a simple fermentation and distillation process, reproducible using grocery store supplies and standard lab

glassware. We then designed exercises using spirit lamps, flavorings, and fruit flies to characterize ethanol as a fuel, solvent, and intoxicant. Our lab also recently identified an ethanol binding site in a bacterial protein similar to those found in human brain. To test the relevance of this binding site in eukaryotes, we synthesized RNA encoding a closely related protein, the GluCl pentameric ligand-gated ion channel from *Caenorhabditis elegans*, for pharmacological testing.

Project:

QUANTITATIVE MODELING OF ETHANOL BINDING IN LIGAND-GATED ION CHANNELS

Daniel E. Manson, 2015
Rebecca J. Howard, Assistant Professor, Department of Chemistry

Despite its widespread use and abuse, the molecular mechanisms behind alcohol (ethanol) action in the brain remain poorly understood. Previous research has shown that alcohols modulate ligand gated ion channels. Our lab recently showed that ethanol binds to a small pocket in the trans-membrane domain of a variant of GLIC, a prokaryotic ion channel that is structurally similar to proteins in the human brain. Using software that allows exploration and manipulation of protein structure data, we investigated the physicochemical properties of putative ethanol binding pockets in multiple ion channels. In correlation with functional data, we determined that the target pockets were more hydrophobic and, in one case, more voluminous in ethanol-sensitive versus nonsensitive GLIC variants.

Project:

Project:

ROLE OF AN EXTRACELLULAR AMINO ACID RESIDUE IN ALCOHOL MODULATION OF LIGAND-GATED ION CHANNELS

Travers M.D. Ruel, 2016
Rebecca J. Howard, Assistant Professor, Department of Chemistry

The mechanism by which alcohols affect the brain on a molecular scale is poorly understood. Alcohols have been found to modulate pentameric ligand-gated ion channels (pLGICs), proteins which mediate electrochemical signaling in brain. An extracellular amino acid residue has been implicated in alcohol modulation of human pLGICs; however, its role is unclear in the absence of structural information. We aimed to validate a role for this residue, Asp31, in GLIC, a bacterial pLGIC whose structure is known in the absence and presence of ethanol. We generated four mutations based on sequence alignments and physicochemical properties, and characterized activation and modulation of resulting mutants. Preliminary data indicate that substitutions of small or polar residues have little effect on ethanol modulation, while tyrosine may decrease alcohol sensitivity.

Project:

structure of $GABA_A$ receptors is yet to be determined, model proteins are required for structural analysis. GLIC, a bacterial pLGIC, is structurally homologous to $GABA_A$ receptors but is not potentiated by ethanol. It has been shown that mutating the F14' position of GLIC to alanine (A) resulted in alcohol potentiation, and facilitated the cocrystallization with ethanol. Here, we mutated positions adjacent to F14' to their respective amino acid residues in the human $GABA_A$ receptor. We found that the mutants showed altered modulation by pH and alcohols.

Project:

Project:

CHRONOLOGICAL AND SPATIAL DIMENSIONS OF ARCHAEOLOGICAL WORK AT THE WATER'S EDGE SITE

Priscilla Montalto, 2015
Heather Hurst, Assistant Professor, Department of Anthropology
Matthew Kroot, Visiting Assistant Professor, Department of Anthropology

The Water's Edge Site has been heavily excavated since the 1970s by many different groups, ranging from an amateur archaeologist to large firms from New York City. The Skidmore Archaeological Collection archives from the Water's Edge Site contain over 50 maps of the area. This project analyzes data from these maps using ArcGIS. Important elements from each scanned and georeferenced map were highlighted and further defined in a detailed timeline of excavation. This work will facilitate public access to the archives and has produced a single unified document chronicling the history of archaeological work done at Water's Edge.

Project:

A CHRONOLOGY OF HABITATION AT WATER'S EDGE

Kim Snow, 2015 and John Kolios, 2016
Heather Hurst, Assistant Professor, Department of Anthropology

The Water's Edge archaeological site in Saratoga Springs has served as a significant location of human occupation for thousands of years. This project uses artifact analysis to outline the chronological development of the site's cultural history and periods of habitation. Recovered pottery sherds and various projectile points (spearheads, dart points, arrowheads) play an important

indicator of mitochondrial content, respiration was similar across the tissues, indicating that increased mitochondrial content, not differences in individual mitochondrial complexes, explain dissimilarities in the respiratory rates of these tissues.

Project:

SERIAL PROCESSING OF LETTERS OR FIRST LETTER ADVANTAGE?

Haley Cirka, 2016
Rebecca Johnson, Associate Professor, Department of Psychology

Johnson, Staub, and Brown (2013) demonstrated that words presented serially from left-to-right are processed faster than words presented right-to-left. These results are either due to (1) actual left-to-right processing when reading or (2) the immediate presence of the first letter. To tease apart these two explanations, we conducted naming and lexical decision studies with an additional presentation type: the first letter was presented, followed by the remaining letters from right-to-left. While the lexical decision data showed the new condition was most similar to the left-to-right condition (suggesting that there is a first letter advantage in visual word recognition), the results from the naming study indicated that readers also utilize a left-to-right serial processing strategy in reading aloud.

Project:

A NEW ECONOMY OF JOKES: HASHTAG SOCIAL MEDIA, HASHTAG COMEDY

Rebecca Baruc, 2015
Beck Krefting, Assistant Professor, Department of American Studies

Comics have availed themselves of new technologies on the Internet for networking and promotional purposes. Social media online sites provide stand-up comics a platform to generate interest and allegiance from consumers and comics are proving themselves quite capable of harnessing these possibilities. Some of the questions we explore are: How are comics harnessing social media tools – to what effects? What are the effects of social media on stand-up comedy? How do online platforms alter the exchange and consumption of humor? In what ways (if any) are these networking tools changing the substance, style, or means of humor production? We explore the ways comics make use of these social media sites and how social media currently impacts the production, exchange and consumption of humor, as well as what this may mean for the future of stand-up comedy and humor at large.

Project:

MITOCHONDRIA'S ROLE IN SCA1 DISEASE PROGRESSION
Austin Ferro, 2015 and Jenny Zhang, 2016
Sarita Lagalwar, Assistant Pr

Project:

THE OPPORTUNITY PROGRAM (OP) ALUMNI PROJECT: EXPLORING THE CAREER EXPERIENCES OF FIRST GENERATION STUDENTS AND STUDENTS OF COLOR AT A PREDOMINATELY AND HISTORICALLY WHITE LIBERAL ARTS COLLEGE

Amari Boyd, 2014 and Aldin Medunjanin 2016
Sue Layden, Ph.D., Research Analyst on Enrollment, Retention, and Student Achievement, Office of Admissions & Financial Aid
Lei Ouyang Bryant, Ph.D., Associate Professor, Department of Music
Michael Ennis-McMillan, Ph.D., Associate Professor and Chair, Department of Anthropology
Bernardo Rios, Ph.D., Consortium for Faculty Diversity Postdoctoral Fellow, Department of Anthropology

The Opportunity Program (OP) Alumni Project is a multi-year study to understand the post-graduate experiences of OP alumni. While there is growing literature on the experiences of first-generation students and students of color in higher education, much of this has been conducted at large universities with little to no representation of historically white liberal arts colleges. Existing research focuses on the importance of the first year, campus climate, mentoring, and collaborative learning. A handful of studies examine the transition from college to work and graduate school; yet there are no existing studies that address the post-graduation and career experiences of these students. Using surveys and qualitative interviews, the study will identify factors that alumni believe promote achievement and success after college, and aim to develop alumni networks and build career connections for historically underserved students and graduates.

Project:

MEANINGS OF FOOD: CONVERSATIONS OF AMERICAN WOMEN ON FOOD BLOGS

Emily Kortright, 2015

Project:

COPPER-SILVER CROSS RESISTANCE – TESTING THE POTENTIAL OF HOMOLOG PROTEINS OF COPA FROM *ESCHERICHIA COLI*

Jody-Ann Facey, 2014
Sylvia Franke McDevitt, Assistant Professor, Department of Biology

The treatment of bacterial infections is becoming a more difficult process due to the rise in antibiotic resistance. Alternative methods of treatment are also becoming stringent as metal detoxification systems in multiple strains of bacteria are highly efficient. These systems have been shown to efflux various type of metal ions which are generally at what should be lethal doses for these organisms. *Escherichia coli*, *E. coli*, isolated from a pig farm in Australia, has been shown to contain a gene implicated in copper resistance and *Salmonella* Typhimurium has been shown to have a gene involved in silver resistance. Both the copper and silver resistance genes have been found in several species of Enterobacteriaceae, and specifically in *E. coli* shown to have increased tolerance to copper and silver with the up regulation of both genes. The goal of our project is to determine if similar systems from other bacterial species have incurred the ability to increase copper and silver resistance.

Project:

AMOEBA AS A MODEL SYSTEM TO STUDY METAL DEPENDENT BACTERIAL KILLING BY MACROPHAGES

Ketan Yerneni, 2017
Sylvia Franke McDevitt, Associate Professor, Department of Biology

Historically, humans have employed metals in the war against bacteria, due to their antimicrobial properties. Metal-resistant bacteria have become a prominent threat to our health and wellbeing. Understanding these mechanisms of resistance has become increasingly important in a time where metal is being used more widely to prevent the spread of these organisms. Our immune system engulfs bacteria and breaks them down using enzymes, reactive oxygen and even heavy metals, such as copper and zinc. We will utilize slime mold as a model system to test the capability of strains of *E. coli* to survive within these cells, mirroring the process of the immune system. This study will provide us insight into the mechanisms of bacterial metal resistance, and how we can combat it.

Project:

INVESTIGATING THE INFLUENCE OF BEHAVORIAL ATTRIBUTIONS ON BACKLASH AGAINST MALE ELEMENTARY SCHOOL EDUCATORS

Elizabeth Johnson, 2015
Corinne Moss-Racusin, Assistant Professor, Department of Psychology

This research seeks to explore whether men experience *backlash* (i.e., social and economic penalties) when violating gender stereotypes by choosing careers in elementary education, a female gender-typed occupation. Furthermore, this research will be the first to explore whether internal and external behavioral attributions impact levels of backlash. In this pilot study, we created eight novel target profiles describing the qualifications of potential elementary school teachers. Each profile was identical except for target gender and the behavioral attribution given for becoming a teacher. Participants read one of eight profiles, and then rated the target's competence and behavioral attributions. Results indicated that the manipulation was successful, in that each target was rated as equally competent and reflected the intended behavioral attribution type.

Project:

INNOVATION, INTELLECTUAL PROPERTY AND MAKERS

Ramzy Kahhale, Class of 2015
Scott Mulligan, Visiting Assistant Professor, Department of Management & Business and International Affairs Program

The Do-It-Yourself movement, which encourages open-source manufacturing and collaborative innovation, has grown substantially in recent years and holds great potential for future hardware and software development. Examples of this trend are the global rise of Makerspaces and Maker Faires, community-based centers and events that bring together "makers" (individual inventors) to share their ideas, collaborate on construction and then showcase their creations. Maker ideology emphasizes open-source licensing, online collaboration, crowd-sourced financing, and public disclosure of their ideas. This challenges traditional research & development and intellectual property (IP) regimes, which grant inventors certain exclusive rights. Our summer research explores empirically the potential confrontations between the increasingly important "maker movement" and IP, by analyzing makers' experiences with, attitudes towards, and perceptions of, the modern intellectual property system.

Project:

several molecular structures resulting from the interaction between nitrate (NO_3^-) from atmospheric nitric acid (HNO_3) and titanium oxide (TiO_2), a common component of fly ash aerosols emitted from coal-based power plants. We have found that when adsorbed onto TiO_2, nitrate exhibits many different modes of vibration that can help us understand the nitrate coordination with fly ash components. By analyzing these calculated structures and comparing them to experimental data, it is possible to determine prevalent molecular geometries and predict nitrate reactivity on fly ash.

Project:

PHOTOCHEMISTRY OF NITRATE CHEMISORBED ON DIFFERENT COMPONENTS OF MINERAL AEROSOL

Daniel Lesko, 2017
Juan Navea, Assistant Professor, Department of Chemistry

Atmospheric particulate matter is known to provide a reactive surface for the uptake atmospheric chemicals such as nitric acid. These atmospheric particles, or aerosols, contain metal oxides that vary with their source region. This wide-ranging composition has important implications in atmospheric processes, such as the reactivity of aerosols with nitric acid and their response to sun light. In fact, the studies presented here suggest that the combination of solar radiation and particular matter provides a pathway for nitric acid to react in the atmosphere and produce nitrogen oxide gases, which can have important environmental implications. In order to assess the effect of aerosols in the atmosphere, we have carried out studies of nitric acid reactivity with several components of atmospheric particular matter.

Project:

VACCINE COVERAGE AND INCOME INEQUALITY IN MIDDLE INCOME DEVELOPING COUNTRIES

Rachel Spring ‘15
Mehmet Odekon, Professor, Department of Economics

Pharmaceutical companies offer 3-tiered pricing for vaccines, with countries placed into a tier determined by per capita income. This price structure allows poorer regions to have access to vaccines that they would not be able to afford otherwise. The 3-tiered pricing structure is problematic for some people in middle-income countries because there is a small percentage of wealthy people that raise the Gross National Income per capita so the country is classified as middle-income. As a result, the country must pay a higher price for tiered-priced vaccines even though much of the population is poor and can’t afford the higher price.
This paper will aim to address the following questions: Is inequality in the distribution of income as measured by the Gini coefficient a significant determinant of vaccine coverage in middle-income developing countries? Ordinary least square regression results support our hypothesis.

Project:

A TOY MODEL FOR THE NONLINEAR OPTICAL RESPONSE OF MOLECULES WITH MODULATED CONJUGATION

of clock mutants were unchanged. Overall, Raboudioside-A reduced activity and improved sleep cycles, but these effects depended on having an intact circadian clock.

Project:

DO C(60) FULLERENE NANOPARTICLES ALTER SLEEP CYCLES IN FRUIT FLIES?

Matt Ciotti (Siena College)
Bernard Possidente, Professor, Department of Biology

Buckminsterfullerenes, or "Buckyballs" are composed of 60 carbon atoms in a "soccer ball" configuration named after Buckminster Fuller, known for using similarly shaped geodesic domes in his architectural designs. Buckyballs were discovered and synthesized in the late 20th century, they occur naturally, and represent a family of related carbon compounds called "Fullerenes". Buckyballs are potentially useful for biological applications, including cancer treatment and other emerging areas of "nanomedical" technology. The increasing use of buckyballs in nanotechnology has generated interest in their possible toxicity to people and ecosystems. There is little evidence for classical biological toxicity of fullerenes, but there are few studies of their behavioral effects. Here we test whether ingestion of C(60) causes changes in the activity level and sleep/wake cycle of fruit flies.

Project:

Project:

other in ethnography? To explore this question, we introduced research goals, developed a research design, explored several methodologies within anthropology, and analyzed visual data. Through this process, we found that visual forms of expression can serve as a "text" to convey knowledge rather than just support or embellish the themes present in written text.

Project:

EXPANDING THE GENETIC CODE WITH PYROGLUTAMATE

Miles Calzini, 2016 and Stephanie Zhen, 2016
Kelly Sheppard, Assistant Professor, Department of Chemistry

Pyroglutamate is an unnatural amino acid formed in certain protein residues linked to Alzheimer's disease. Using *E. coli* as a model organism, we tested the feasibility of expanding the genetic code by reassigning the amber stop codon to pyroglutamate in order to study its role in these proteins. To achieve this, we used a modified archaeal RNA-dependent glutamine biosynthetic pathway in which pyroglutamate is synthesized on an amber suppressor tRNA. An enhanced yellow fluorescent protein reporter was used to determine percent read-through of an amber codon when our pyroglumate system was present. Using this assay followed by mass spectrometry, we will be able to determine whether our method allows site-specific incorporation of pyroglumate in response to an amber codon.

Project:

DISCRIMINATING NATURE OF THE *B. ANTHRACIS* ASPARTYL-tRNA SYNTHETASES

Julia Erskine, 2017
Kelly Sheppard, Assistant Professor, Department of Chemistry

Protein synthesis is essential for life and requires the correct pairing of amino acids to their cognate transfer RNA (tRNA). Two routes exist to attach asparagine (Asn), to $tRNA^{Asn}$: 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 second pathway involves two steps in which a non-discriminating AspRS attaches aspartate (Asp) to $tRNA^{Asn}$. The Asp-$tRNA^{Asn}$ is then amidated to Asn by GatCAB. The causative agent for anthrax, *Bacillus anthracis*, appears to encode both routes for Asn-$tRNA^{Asn}$ formation along with multiple Asn synthetic pathways. We demonstrate one of the two *B. anthracis* AspRSs can attach Asp to $tRNA^{Asn}$ consistent with the organism synthesizing Asn on $tRNA^{Asn}$ using the indirect pathway.

Project:

DISCRIMINATING NATURE OF THE AS