



Summer Scholars Program

Summer 2017



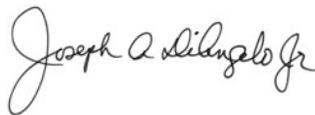
Live greater.

Welcome to the 18th Annual Summer Scholars Dinner at Saint Joseph's University. This year, 86 students and 52 faculty mentors, representing 22 departments and programs participated in the Summer Scholars Program. We are excited to have families, donors, administrators and staff join us in tonight's celebration. This signature program would not be as extremely successful without your support.

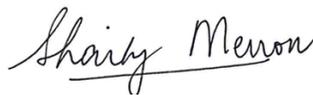
We especially like to thank the Faculty Mentors who give of their time and energy to work closely with students engaged in creative scholarly work and independent research across the University. Our Summer Scholars are grateful for the opportunity you have provided and recognize the difference it makes in their Saint Joseph's experience.

Thank you for taking the time to join us tonight as we celebrate the accomplishments of our impressive student scholars. We would also like to thank everyone whose support continues to make scholarly activity at Saint Joseph's University a priority.

Sincerely,



Joseph DiAngelo, MBA, Ed.D.
Dean, Haub School of Business



Shaily Menon, Ph.D.
Dean, College of Arts & Sciences



Jeanne F. Brady, Ph.D.
Provost/VP for Academic Affairs

Table of Contents

<u>Section</u>	<u>Page</u>
Introduction	i
Table of Contents	ii-v
Supporters of Student Research at SJU	vi
Deron R. Albright, Department of Music, Theatre and Film	1
Thomas C. Smith	2
Paul J. Angiolillo, Department of Physics	3
Alison Sweeney, Department of Astronomy, University of Pennsylvania	3
Jamilyn Mooteb	4
Catalina Arango, Department of Biology	5
Francis Mele	6
Leona Ryder	7
Jonathan Weinstein.....	6,7
Lisa A. Baglione, Department of Political Science	8
Peter Ferris.....	9
Ernest Baskin, Department of Food Marketing	10
Jessica Olszyk.....	11
Thomas Vecchio	12
Elizabeth A. Becker, Department of Psychology	13
Julia Forbes.....	14
Julie Ford	15,16
Alexander Gill	16
Claire Sweeney	14
Tetyana Berezovski, Department of Mathematics	17
Lauren Hall.....	18
Anthony J. Berret, Department of English	19
George Fenton	20
Shantanu Bhatt, Department of Biology	21
Brian Critelli	22
Marisa Egan	23
Sarah Muche	24

Thomas J. Brennan, S.J., Department of English	25
Jacob Norberg.....	26
Keith R. Brown, Department of Sociology	27
Colette Hanlon.....	28
James F. Caccamo, Department of Theology and Religious Studies	29
Erin Breen.....	30
Julian Zuzarte	31
Peter A. Clark, S.J., Institute of Clinical Bioethics and Departments of Theology & Religious Studies & Health Administration	32
Andrew Myers	33
Clare E. Conry-Murray, Department of Psychology	34
Amelia Martinie.....	35
Megan McKechnie.....	36
Robert T. Coyne, Department of English	37
Emma Seely.....	38
Laura M. Crispin, Department of Economics	39
Alexander Velazquez.....	40
Neil T. Desnoyers, Department of Decision and System Sciences	41
Rabia Ansari	42
Anne M. Fetherston, Department of Interdisciplinary Health Services	43
Nicholas O’Malley.....	44
Janine M. Firmender, Department of Teacher Education	45
Elaine Estes.....	46
Mark A Forman, Department of Chemistry	47
Isabella Armento.....	48
Franco Baccari.....	48
Elise Brutschea	49
Linda Bui	49
Amanda Tallon	49
Richard A. Fusco, Department of English	50
David Garton	51

Peter M. Graham, Department of Chemistry	52
Brandon Jiannotti.....	53
Madelyn MacDonald	54
Steven Oldenburg	55
Eileen D. Grogan, Department of Biology	56
Aswathi Jacob.....	57
Piotr Habdas, Department of Physics	58
Miranda Mazzio.....	59
Rui Zhang	60
Emily K. Hage, Department of Art	61
Daniel Hughes	62
Steven R. Hammer, Department of Communication Studies	63
Michael Farrell	64
Christina King Smith, Department of Biology	65
Elizabeth Del Rio.....	66
Joseph G. Quinlan.....	67
Meghan Quinlan	68
Shawn M. Krahrmer, Department of Theology and Religious Studies	69
Nathaniela Bourdeau	70
Joseph M. Larkin, Department of Accounting	71
Nathan Vrabel.....	72
Julia Y. Lee-Soety, Department of Biology	73
Corinne Merlino	74
Edwin Li, Department of Biology	75
Ksandros Cani.....	76
Roberto Herrera	77
Ryan Schuck	78
J. M. Lyons, Department of Communication Studies	79
Anne Clark.....	80
Nico Tamborello.....	81
Scott P. McRobert, Department of Biology	82
Julia Cautela	83
Haley Patrick	83

Jason H. Mezey, Department of English	84
Jennifer Nessel.....	85
Matthew D. Nelson, Department of Biology	86
Natalie Barrett.....	87
Amelia Brown.....	88
Kristen Buscemi	89
Alana Cianciulli.....	90
Aloysius Ochasi, Department of Theology and Religious Studies and the Institute of Clinical Bioethics	91
Kevin Cooney	92
Eric Patton, Department of Management	93
Jacob Diehl	94
Kersti Tarien Powell, Department of English	95
Victoria Tralies	96
Brendan T. Sammon, Department of Theology and Religious Studies	97
Rebecca Judge	98
Becki S. Scola, Department of Political Science	99
Kiana Porter.....	100
Hannah Salamon.....	101
Reecha B. Sharma, Department of Interdisciplinary Health Services	102
Amanda Hoag	103
Rachel Ledbetter.....	103
George P. Sillup, Department of Pharmaceutical & Healthcare Marketing	104
Stephen J. Porth, Department of Management	105
Olivia Capperella.....	106
Kayla Herbert	107
Tyler Pham	108
Alexander J. Skolnick, Department of Psychology	109
Maria Biancaniello.....	110
Brent A. Smith, Department of Marketing	111
Kevin Shank	112
Jean M. Smolen, Department of Chemistry	113
Nathalia Benavides	114
Kathryn Hyduchak.....	114

Karen M. Snetselaar, Department of Biology	115
Megan Burke	116
Connor Long.....	117
Martin Ryan.....	117
Suzanne Sorkin, Department of Music, Theatre and Film	118
Austin Sbarra	119
Jennifer Spinner, Department of English	120
Kasie Bourque	121
A.J. Stagliano, Department of Accounting	122
Margaret McGuire	123
Jennifer C. Tudor, Department of Biology	124
Lilianna DeFalcis.....	125
Lakshmi Narayanam.....	126
Angelo d’Antonio-Bertagnolli.....	126
C. Ken Weidner, Department of Management	127
Karleigh Lopez	128

Supporters of Student Research at Saint Joseph's University

The students, faculty and staff wish to express their gratitude to the following individuals and companies whose generous gifts and grants have supported student research and scholarly activities at Saint Joseph's University

Ms. Carolyn Green Bernacki, '05
Mr. Jonathan Bernacki, '03
Dr. Anne Marie Borneman, '08
Dr. John P. Borneman, '80
Clayman Family Foundation
Mr. Bradford L. Clayman
Ms. Julia R. Collins, '15
Ms. Carla E. Conaty
Mr. Robert B. Conaty, '66
Ms. Ellen DiSanti
Mr. Francis J. DiSanti, '79
Ms. Linda M. Dutcher
Mr. Kenneth E. Dutcher, '79
Ms. Mary C. Feeney
Ms. Colleen Krull Frankenfield, '90
Mr. Joseph A. Frankenfield
Ms. M. Frances Harkness
Mr. Michael J. Harkness, '77
Ms. Ashley J. Hills, '15
Mr. Edward P. Leonard, '79
Ms. Maureen Mirsch Leonard, '82
Dr. Maria P. MacWilliams, '81
Ms. Gia M. Montemuro, '13
Dr. Nicholas Nicolaides, '87
Ms. Susan M. Nicolaides
Mr. David T. O'Gurek, '04
Ms. Maureen Fitzpatrick Tortella
Dr. Bartholomew J. Tortella
Dr. David M. Wojciechowski, '98
Ms. Mara Young
Mr. Kenneth C. Young, '72

American Society for Microbiology-Undergraduate Research Fellowship Program
GeoKids LINKS Undergraduate Fellowship
Allen and Dolores Gustafson Distinguished Research Fellows Program
HHMI Undergraduate Science Education Grant
Institute of Clinical Bioethics
The John P. McNulty Scholars Program for Excellence in Science and Math
Mercy Health System
National Institute of General Medical Sciences at the NIH
National Science Foundation
The Office of the Dean, CA&S
The Office of the Dean, HSB
The Office of the Provost
Redemption Project
Sigma Xi



Deron Albright
Department of Music, Theatre & Film
Saint Joseph's University

M.F.A. Temple University

Research Interests: Narrative Filmmaking

As a filmmaker, I believe in the transformative power of art. Working in the cinematic arts, where both subject and audience are an essential part of the equation, my central concern has always been the appropriate use of that power. I also have great faith in the power of narrative and the centrality of its position in the collaborative art of cinema. Thus my work often revolves around the question, “What story am I to tell?” – not only as a question of content, but one of construction and form. And because cinematic artists must answer to the demands of both medium and audience, the question of both what to say and how to say it is a constant struggle, because I believe the “how” is often as much about the *process* as it is about the form itself.

Although my own work has been extremely varied in approach – working across documentary, installation, agit-prop, historical drama, lyric animation, and genre narrative – my thematic concerns are unified by a quest for (re)presenting the authenticity of the human experience and the commonality of the human condition across boundaries of race, class, and nation. Furthermore, my love and practice of cinema and media arts has always revolved around my belief in its unique ability to combine the artistic, emotional, intellectual and political; while at the same time demanding a tremendous discipline of craft, technological proficiency, and the responsibility to audience.

While my earlier films often pushed the boundaries of form, I have since turned to more conventional work, attempting to create films that made a deep and genuine connection with audience. But in doing so, I am still intent on exploring the interface of form and story and meaning, and even as my films fall between the cracks of programmer and commercial categories, I have been able to find an enthusiastic and receptive audience.

My work with Tom built upon the experience of developing my *Molineaux* feature film script into an hour-long dramatic television series which I had the opportunity to pitch to development executives from BBC America, Sony Pictures International, and others last fall as part of IFP's Independent Film Week.

The Adventures of Writing and Producing an Episodic Series

Thomas Smith, '18

Faculty Mentor: Deron Albright
Department of Music, Theatre and Film

Supported by the SJU Summer Scholars Program



In any episodic series you might watch on television or stream online, you may notice in the opening theme what I believe to be the most important credit of the series: “Created by”. This credit goes to what is called the Showrunner. This person has put a great amount of effort and creativity into getting his or her series off the ground.

For my project, I have explored the process of creating a series of my own. I had been dwelling on an idea for a television show for quite some time, and I decided I wanted to take the opportunity to accomplish just that. My series is called “The Adventures of Murdock & Sons”. It is a comedic series about a group of friends who gather every week to play a fantasy board game and take on their heroic, monster-slaying personas. The series visualizes two different worlds: the real world of these players, and the fantasy world in which their game takes place. Each episode finds creative ways to bring these worlds together, oftentimes teaching the players some valuable lessons.

So now that I had the concept for my show, I needed to develop it into something that can fully explain my vision. Through my studies as a Film student and through research into the process of creating a series, I learned that the best way to do this is to create what is called a Show Bible. This is a complex document that lays out all the important details of the series. It contains a one-page pitch, detailed descriptions of major and minor characters, their arcs throughout the show, the special features that differentiate this show from others, iconic locations frequently visited, a breakdown of all the first season’s planned episodes, etc. I spent a great amount of time creating a Show Bible of my own, which has helped my vision of the series become more fully developed and prepared me to begin writing episodes.

Writing the pilot script proved to be the most difficult part of the process. This very first episode must tell a compelling story while also accomplishing one very important task: selling your show to an audience. The pilot episode has to show off everything that your series is. It should communicate to the audience every reason they should keep watching. Introducing this all in a 22-page script, while still also trying to make it a complete episode proved to be a highly stressful endeavor. But through research of television writing and close analysis of other pilot scripts, I found ways to properly structure the story I wanted to tell.

Beyond this first script, I want to have more material to show off for when I try to pitch this series in the future. I have made detailed outlines for future episodes, hired an artist to put together a storyboard for the pilot, and have begun preparations to film an abridged version of the pilot episode. All the work I have put into this series should be more than enough for me to bring to a studio executive and try to get it approved. The ultimate goal of all this work is for me to continue on with this series as its Showrunner. Hopefully one day I may be able to turn on the TV, see the opening theme of a series I have worked on, and read the words “Created by Tom Smith”.



Paul J. Angiolillo
Department of Physics
Saint Joseph's University

Ph.D. The University of Pennsylvania

Research Interests: Organic Conductors and Semiconductors, Materials Physics

The 21st century, in all probability, will witness a revolution in the electronics industry. Since the end of World War II, doped silicon has been the material, which virtually every electronic device is predicated. The “size” of transistors has shrunk from centimeters in 1948 to approximately 50 nm in 2012. This decreasing trend in the size of the fundamental features of electronic devices based on silicon technology cannot be sustained due to a number of quantum phenomena, which dominate the physics at nanometer length scales. The past 20 years has seen the establishment of a new area of discovery research and promising technology - that of nanoscale molecular electronics that exploit π -conjugated organic materials. Much of this development has been spurred by attempts to mimic or model the highly efficient electron and energy transfer processes typified in green plants and photosynthetic organisms.

This lab has historically used electron paramagnetic resonance (EPR) spectroscopy to probe both charged states (polarons) and neutral excited triplet states in a unique class of organic semiconducting materials. Recently, however, the lab has been utilizing EPR spectroscopy to study radiation-induced radicals in biogenic calcite from several species of extinct cephalopods. These radical systems have been found to be useful in dating the fossilized material. These spin systems may be used to further glean a more fundamental understanding of the dynamics (rotation and vibration) of polyatomic ions in crystal lattice sites.

In past years, the lab has been also looking at the fundamental physics of friction. Despite the common nature of friction, it remains largely unexplained especially the transition from static to kinetic friction and the evolution of stick-slip motion. It appears that the dynamics of systems exhibiting stick-slip frictional motion span many length scales, from the movement of nanometer-scale surfaces to the movement of the Earth's tectonic plates. We have developed a mesoscopic model system employing the commonplace hook-and-loop (Velcro) fastening system. When placed in shear, Velcro exhibits many of the hallmarks of stick-slip motion seen in other systems and, moreover, is accompanied by acoustic bursts that are related to the slip events. We have also explored how the Velcro model system behaves with respect to the classical Amontons-Coulomb laws and have discovered stark contrasts with the accepted classical laws.



Alison Sweeney
Department of Astronomy
University of Pennsylvania

Molecular evolution of self-assembling protein photonic structures in molluscs and optical characterization of the sophisticated roles they play in camouflage and photosynthetic symbiosis; cellular and biochemical mechanisms of dynamic camouflage; characterization of the open ocean light environment in which animals have evolved sophisticated camouflage; spectral changes during twilight and their effects on visual ecology.

Exploring the Giant Clam's Symbiosis by Looking at the Organization of Cells Within the Mantle Tissue

Jamilyn Mooteb, '19

Faculty Mentors: Paul J. Angiolillo, Department of Physics and Alison Sweeney, Department of Astronomy, University of Pennsylvania



Supported by the SJU Summer Scholars Program and the John P. McNulty Scholars Program

Giant clams of the *Tridacna* and *Hippopus* genus are interesting specimens of the sea with brightly-colored patterns of blue, green, yellow, and purple on their mantles. These clams are also known commonly by their huge size and their unique symbiotic relationship with the dinoflagellates, *Symbiodinium*. Some *Symbiodinium* clades are found in the giant clam's mantle and provide photosynthetic byproducts to the clam. In return, the host giant clam provides a stable habitat. Through Dr. Sweeney's research, we learned that iridescent cells called iridocytes form a pillar-like structure with *Symbiodinium* allowing sunlight to redistributing the light downward onto the *Symbiodinium* across a large surface area for deeper photosynthesis within the mantle tissue. While providing some protection, the iridocytes' main purpose is to scatter light for efficient use of solar energy. We are now interested in how the formation of the iridocytes and *Symbiodinium* within the mantle contributes to the giant clam's color across different genus of *Tridacna* and *Hippopus*.

We wanted clear images of a clam's mantle tissue showing the arrangement of the iridocytes and *Symbiodinium* of different species of giant clams. To accomplish this endeavor, we established histological techniques to embed the mantle tissues of the giant clam. Embedding describes a process of which a tissue sample is deeply penetrated with chemicals designed to maintain the architecture of the sample. Thus, multiple clam mantle tissue samples were dissected and embedded for study.

The additional task of manually color standardizing images of clams collected from Palau was also accomplished. The color analysis of clams is to investigate the effects of the environment on the iridocyte density in clams. A program that color correct images based on a known set of red-green-blue (RGB) values matched to a color pallet within the pictures was used. The clams were manually masked in the picture for future analysis of color patterns between species and sites.



Catalina Arango
Department of Biology
Saint Joseph's University

Ph.D. University of Massachusetts

Research Interests: Environmental
Microbiology and Bacterial Gene
Regulation

Bacteria are my passion. I am fascinated by the sophisticated mechanisms that bacteria use to control their gene expression in response to environmental conditions, and most of my research is directed towards understanding these mechanisms. For example, some bacteria are able to “choose” the most energetically favorable carbon source when there is more than one available in the environment and use it first. This behavior, called catabolite repression, is the result of an intricate interaction of proteins and other molecules, where some sense the presence of the preferred carbon source and others communicate the signal to specific genes that are turned on or off. Although the players (proteins and such) are similar in different bacteria, the role they play may be very different! I use the bacterium *Sinorhizobium meliloti* as a model organism to study catabolite repression. My students and I are trying to understand how catabolite repression works in *S. meliloti* by studying a specific group of genes, the *mela-agp* operon, which are necessary for the utilization of certain sugars. Specifically, this summer my group is investigating the binding of a transcriptional regulator, called AgpT, on the DNA region that controls expression of the *mela-agp* genes. We hope that by learning more about how catabolite repression affects these genes, we can gain understanding of how it controls other genes.

Does Enzyme IIA^{Ntr} Have a Role in Regulating Alfalfa Symbiosis in *Sinorhizobium Meliloti*

Frank Mele, '18

Jonathan Weinstein, '18

Faculty Mentor: Catalina Arango

Department of Biology

Supported by the SJU Summer Scholars Program



Sinorhizobium meliloti is a gram-negative bacterium that is known to form symbiotic relationships with various legumes via root nodules. Nodules are small organs developed by legumes that house nitrogen fixing bacteria. *Sinorhizobium* receives succinate and other dicarboxylic acids from the plant when in nodules and, when living freely in soil, the bacterium exhibits succinate mediated catabolite repression. This means that the bacteria will catabolize all present succinate first when it is presented in combination with another carbon source such as raffinose or lactose. The Phosphotransferase system is a group of proteins that transfers a phosphate in response to succinate, which causes catabolite repression, controlling gene expression. Enzyme IIA^{Ntr} is part of the PTS, and is under investigation for its potential role in succinoglycan synthesis, nodule formation, and storage of carbon in the form of polyhydroxybutyrate (PHB) is being explored. To establish the role of EIIA^{Ntr} in regulating these processes, mutants that lack the enzyme, or carry a version of the enzyme with a nonphosphorylatable residue, were evaluated for the synthesis of succinoglycan, for PHB synthesis and for their ability to infect and establish nitrogen-fixing nodules in alfalfa plants.

Investigating AraC-type Regulation of the *mela-agp* Operon in *Sinorhizobium meliloti*

Leona Ryder, '18

Jonathan Weinstein, '18

Faculty Mentor: Catalina Arango

Department of Biology



Supported by the John P. McNulty Scholars Program and the SJU Summer Scholars Program

Sinorhizobium meliloti is a gram-negative bacterium that exhibits succinate-mediated catabolite repression (SMCR). Utilization of raffinose is controlled by SMCR. The *mela-agp* operon encodes proteins necessary for the transport and breakdown of raffinose and other α -galactosidases. The protein AgpT is an AraC-type regulator that controls expression of the *mela-agp* operon and is crucial to its transcription. The *agpT* gene is located approximately 400 bp upstream from the start codon of *mela-agp* and is transcribed in the opposite direction. The intergenic region between the *agpT* and *mela-agp* has been shown to contain all necessary sequences for the proper regulation of transcription of the genes; however, the specific regulatory sequences have not been identified.

In an effort to characterize the architecture of SMCR-controlled promoters, we have used random and directed mutagenesis and Electrophoretic Mobility Shift Assays (EMSA) to confirm direct binding of AgpT to the *mela-agp* intergenic region and identify its binding sites. Results of the assays performed indicate more than one binding site and suggest dimerization of AgpT molecules, which is a common attribute of AraC type regulators such as AgpT.



Lisa A. Baglione

Department of Political Science
Saint Joseph's University

Ph.D. Cornell University

Research Interests: Russian Politics,
Particularly Federalism and the Nature
of Authoritarianism There; Russian
Foreign Policy; Global Politics

Politicians and scholars today debate the extent to which Russia's recent behavior in Ukraine and other parts of Eastern Europe are aggressive or are the result of Western post-Cold War efforts to marginalize and humiliate that former superpower. Those who perceive Russia's annexation of Crimea and support for separatists in eastern Ukraine as justified generally blame the United States and others for having provoked Russia by expanding NATO and the European Union to Russia's borders and for not considering Russia's legitimate security and prestige concerns. While this argument is popular among Russia academics and leaders as well as some scholars in the West, what is interesting is that neither set of critics of Western policy emphasize the roles that Russia itself and its East European neighbors (excluding Ukraine) have played in bringing European security to its most dangerous state in thirty-five years. In other words, where those who want to excuse Russia seek to blame the West for not being sufficiently considerate, others could also look at the ways in which Russia has ignored the legitimate security concerns and historical fears of its neighbors, such as Poland, the Czech Republic, and Hungary (not to mention Ukraine), and how those states have sought to protect themselves from Russia.

This research, then, investigates a central problem in global politics, that of the security dilemma, where the desire and actions taken for one side's security are perceived as bellicose by another, thereby provoking consequent actions from that other to enhance its position. In the end, that response makes all sides worse off than at the outset. Thus the *security dilemma*: states can find it impossible to take steps on their own to enhance their safety; those actions undermine their position by making another insecure enough to undertake new measures that make the situation more dangerous for all.

My mentee, Peter Ferris, is using this summer as an opportunity to develop a better understanding of Russia's contemporary relationship with its Western neighbors, as well as its historical (at least for the past seventy-five years) foreign policy goals. He is also using this time to develop a nuanced understanding of the scholarship on Russian foreign policy and is using this time as the foundation for an academic paper that examines Russia's role in provoking the current crisis, by not engaging early in confidence-building and responsibility-taking measures that might have allayed the fears of its former Warsaw Pact allies and not driven them into the Western alliances.

Reconciliation and Relations in Modern Russia

Peter Ferris, '18

Faculty Mentor: Lisa A. Baglione
Department of Political Science



Supported by the SJU Summer Scholars Program

Though Russian policy toward Europe and the United States during the Cold War period was fraught with constant tension and distance, both Boris Yeltsin and Vladimir Putin (during his first term as president) made significant efforts towards positive engagement with the Western world. Yet their interactions with the post-Soviet states have remained tumultuous. With some notable exceptions, Russia's relations with some of the former Soviet states, particularly to its west, have been defined by animosity, estrangement, and sometimes even armed conflict. Globally, tense relations with many countries (including the United States) have only grown worse thanks to Putin's "civilizational" turn in his current presidential term.

Some scholars argue that current geopolitical conflict in Eastern Europe is the West's fault for pursuing hegemonic conquest under the guise of "democracy promotion" and regime change. But many challenge this thinking by pointing out Russia's own inclinations towards hegemony in the former Soviet states. Indeed, many Western scholars believed the annexation of Crimea was purely an act of aggression. With this debate in mind, I have begun investigating potential sources of these tense relations and reasons Russia has taken little (if any) responsibility for its past actions in the post-Soviet sphere. Some questions I've attempted answering include: To what extent has Russia acknowledged that it might have created such fear that the post-Soviet states have favored Western institutions? If Russia has created this fear, what new connections has it created with these states? And how has memory politics played into these new relations?

So far, I have found multiple explanations for Russia's lack of apology and the great contempt its former allies feel. One school argues that, especially in Putin's third term, ethnicity has become more important than ever to Russians and other nationalists in Eastern Europe. This renewed sense of ethnic pride has kept Russia from acknowledging any culpability in the development of current conflicts in the region. Consequently, it has also led to more nations turning away from Russia. Others may see entangled memories as an issue. Some believe that Russia has an identity of both perpetrator (under Stalin) and victim (suffering at the hands of Bolshevik crimes during the Russian Revolution) in its relations with the post-Soviet states. When both sides are culpable, why should only one side be forced to apologize? And some believe it might not make sense for Russia to apologize at all. Since the evils of the past cannot be undone, only time can heal social and political wounds. This research will evaluate these contending perspectives by examining turning points in Russian-East European relations and teasing out the role that resentment and fear played in producing the current situation.



Ernest Baskin

Department of Food Marketing
Saint Joseph's University

Ph.D. Yale University

Research Interests: Judgment and Decision Making, Consumer Behavior, Consumer Mispredictions, Encouraging Healthy Behaviors

Ernest Baskin's research focuses on consumer judgment and decision making with an interest in environmental effects on judgment and choice using experimental methodology and survey design. He is interested in how consumers make choices and particularly how to influence those choices towards healthier options. In addition, he looks at how the environment affects the choices that consumers make both at retail point of purchase as well as in their everyday lives. His work has been published in journals such as the Journal of Consumer Research and the Journal of Marketing Research and has been extensively covered in the popular press in outlets such as the Chicago Tribune, Lifehacker, and The Atlantic as well many other national media and radio outlets including NPR.

This summer, he worked with two summer scholars on several projects. For a portion of the summer, students worked on consumer behavior research projects which they developed themselves. They ran experiments and conducted literature reviews to understand their hypotheses. In addition, they worked on classroom innovations in case teaching. They both completed case studies on timely marketing issues for publication in peer-reviewed academic journals for other faculty to use in their classroom.

Case Studies in Food Marketing

Jessica Olszyk, '19

Faculty Mentor: Ernest Baskin

Department of Food Marketing



Supported by the SJU Summer Scholars Program

Initially, we conducted a study to determine if there was a correlation between feelings of shame about oneself brought on by an arrogant ad and likelihood of purchasing a healthy food product. In our experiment, we ran four simulations of ads for products: ones that were healthy products and an arrogant message, healthy product with a humble message, unhealthy product with an arrogant message, and unhealthy with a humble message. Then, we examined how shameful the ad made the participants feel, how likely they were to purchase, and how they felt about their body image. We found no correlation between any of the variables.

We then started writing case studies. Case studies help professors and those in higher education gain understanding of an event in a quick and concise manner and are used in the classroom as lesson plans. Case studies are at the center of many lesson plans as they compile many different facts and figures on a subject in a neat and organized manner. They provide the analysis as well as future predictions. Teachers notes accompany the case study to give a clear structure.

The first case study written was about the Starbucks Unicorn Frappuccino, a limited-edition stunt food that captured media attention and produced a great deal of revenue. Stunt food is a product that combines unlikely or outrageous flavors to be novel and illicit attention. Starbucks could do just that when they launched the Unicorn Frappuccino. They analyzed and quickly capitalized on the trend of unicorn food that was dominating social media at the time. Even though the Unicorn Frappuccino led to increased revenue for Starbucks, it came with some problems. Baristas complained it was complicated to make and the volume of people ordering it was overwhelming. A café in Brooklyn is taking legal action against Starbucks, claiming Starbucks stole the idea from their Unicorn Latte. The case study examined all aspects to the Unicorn Frappuccino as well as posing questions for potential students to ponder, such as how did Starbucks implement the Unicorn Frappuccino correctly?

The second case study involved the Amazon acquisition of Whole Foods Market. This surprise purchase from Amazon resulted in world-wide speculation. Amazon in the past had very small forays into the grocery business: Amazon Fresh, a grocery ordering aspect of Amazon has had sluggish sales. The purchase of Whole Foods was Amazon's first aggressive step into the world of groceries. The world of groceries is something Amazon hopes to change as well, there is overwhelming evidence Amazon will not just simply "hold on" to Whole Foods. They will most likely delve into the grocery delivery business and utilize Whole Foods distribution centers. However, before Amazon begins to build, they must first fix what has made Whole Foods lose money for the past couple of quarters. Whole Foods will probably benefit from Amazon completely revamping their logistics systems and adding Amazon's signature efficiency and speed. This will hopefully put Whole Foods back on a profitable track. The deal may not even be upheld, as law-makers have called for anti-trust laws to break up the deal.

Crowdsourcing as a Marketing Tactic

Thomas Vecchio, '18

Faculty Mentor: Ernest Baskin
Department of Food Marketing



Supported by the SJU Summer Scholars Program

My first project revolved around research on distracted behavior. More specifically, we aimed to show that when distracted by a smartphone, people would be more likely to consume more food. Literature surrounding this subject suggests that there may have been a relationship between consumption and distraction so our first step was to conduct a survey using Qualtrics. Our first survey was aimed toward discovering distracted behavior, probability to take risks, and how sociable the participant felt while taking the survey. Ultimately our surveys surrounding our research could not deliver on the statistical facts necessary to prove this. We then changed topics slightly keeping the same basic concept except changing it toward the concept of sociability. Sociability is defined by dictionary.com as the quality of being sociable and our second survey's statistics showed that based on our condition, which was aimed to distract the participant's engagement with the survey, there was a relationship with the sociability questions we posed. This led us to perform one more survey to try and replicate the results. Unfortunately, we were unable to replicate the results on our last survey and at this point, we decided to shift to a new project.

My current project is "Crowdsourcing as a Marketing Tactic" which discusses the use of crowdsourcing in the form of a case study. Crowdsourcing is the practice of obtaining information or input into a task or project by enlisting the services of a large number of people, either paid or unpaid, typically via the Internet. In order to explain this subject in a classroom setting, the case study discusses companies like Oreo, Starbucks, and Frito-Lay. A majority of the case revolves around the #MyOreoCreation contest on social media which is currently ongoing in the summer of 2017. Through the lens of Oreo's contest, the case discusses the positives and negatives of crowdsourcing which include cost and quality. By opening their contest to social media, they allow for a large influx of ideas to be available. By posting ads regularly to their social media and responding to noteworthy ideas and concepts, Oreo maintains and builds a connection with their fans.

Lastly, the case discusses the downstream consequences of crowdsourcing, like cannibalization or public backlash. Cannibalization is the negative impact of a company's new product on the sales performance of its existing and related products. This suggests that the current lineup of cookies offered by Oreo could potentially take a hit in sales from the new flavors. In the case of public backlash, the case refers to the case of "Boaty McBoatface". Boaty McBoatface is a \$290 million polar research ship in which the UK Ministry of Science decided to crowdsource a name for it. When the contest was finished even though "Boat McBoatface" was the public's choice, they decided to discount the public's decision which caused backlash and outrage on social media.



Elizabeth Ann Becker
Department of Psychology
Saint Joseph's University

Ph.D. University of Wisconsin

Research Interests: Neural Mechanisms of Social Behavior,
Neurodevelopmental Consequences of Early Drug Exposure, Aggression,
Epigenetics

My primary interest as a behavioral neuroendocrinologist, is understanding the neural mechanisms underlying the transmission of species typical behavior from parent to offspring. In particular, I focus on non-genetic, parental contributions to the development of offspring brain and behavior (e.g. how parental care influences offspring biology). In my laboratory, we examine a range of social behaviors including aggression, monogamy, animal communication and future parental behavior.

For many species, the postnatal period, which consists primarily of feeding and thermoregulation, is a critical phase in development. In female offspring, it has been well-documented that care from mothers influences the development of maternal behavior and anxiety through epigenetic mechanisms. Although the majority of research has focused on maternal care, the early social environment is not limited to interactions with mothers alone, and may include fathers, siblings and even alloparents. In the bi-parental California mouse, for example, increased care from fathers leads to increased paternal behavior and aggression in adult male offspring. Paternal care is rare among mammals and therefore, has been largely understudied. In the Becker Lab, we work with the monogamous, territorial and highly aggressive California mouse (*Peromyscus californicus*), which is a model system for exploration of paternal investment on offspring development and the development of aggression.

We have a new area of research in the lab examining the neurodevelopmental consequences of early-life antidepressant exposure (via maternal drug use throughout the period of lactation). Our findings suggest a causal link between SSRI (a class of antidepressant) use by nursing mothers and impairment of the oxytocin system which is implicated in the development of autism spectrum disorders. Moreover, preliminary analyses of behavioral work this summer indicate impairments in social behavior, as expected. ***Summer Research Highlights.*** There were four summer scholars working in the Becker Lab this summer. Alex Gill, Claire Sweeney, Julia Forbes and Julian Ford worked tirelessly on aspects of several studies in the lab including: study design, behavioral testing, and immunohistochemistry. Working with these truly bright and dedicated students was both rewarding and a pleasure.

Consequences of Prenatal Stress and SSRI Exposure on Pairbonding in the California Mouse

Julia Forbes, '19

Claire Sweeney, '19

Faculty Mentor: Elizabeth A. Becker
Department of Psychology



Supported by the SJU Summer Scholars Program

This summer we worked on finishing the behavioral testing for Seattle Peterson's master's thesis. Seattle is a former graduate student, in Dr. Elizabeth Becker's Behavioral Neuroendocrinology lab, who graduated this past spring.

Maternal depression continues to be a relevant issue among women in the U.S. that not only affects mothers, but their offspring as well. It is a debilitating mental illness, that when left untreated, can lead to an increased risk of their offspring developing depression. Maternal depression is frequently treated with antidepressants. However, research shows SSRIs (selective serotonin reuptake inhibitors), which are the most commonly prescribed antidepressants, cross the placental and ductal epithelial barriers thus, exposing offspring to serotonin agonists during fetal development.

Developmental changes in the serotonergic system can lead to long-term changes in brain and behavior. For example, hyperserotonemia can develop, which is a reduction in oxytocin (OT) receptors, particularly in brain areas related to social interaction. Such brain areas may include the paraventricular nucleus (PVN) of the hypothalamus. Consistent with these findings, we found recently that maternal SSRI treatment reduced the number of OT-immunoreactive(ir) cells in the PVN. The primary aim of the current study was to examine whether these observed changes in OT-ir manifest into altered social behavior using the California mouse.

The California mouse is a monogamous species or a species that mates for life, which enables us to study developmental brain and behavioral changes across generations. To study the consequences of prenatal stress and SSRI exposure on the offspring development, mothers were either (1) injected with cortisol during pregnancy or (2) exposed to SSRIs shortly after parturition, (3) subject to both experimental manipulations, or (4) subject to no experimental manipulation. When the offspring reached adulthood, we evaluated the social behavior in a 3-hour preference task across three days: at Time 1 (6 hours following pairing), Time 2 (24 hours following the previous test) and Time 3 (24 hours following the previous test). We examined our focal animal's (the animal exposed to experimental manipulation) preference for either their mate or a stranger, stimulus mouse as well as their general sociability (time spent with either the partner or the stranger compared to time spent alone.) Preliminary analyses of Time 1 show an overall decrease in sociability among those exposed to both SSRIs and cortisol compared to those with SSRI exposure alone. This interaction suggests that compounding effects of prenatal stress and drug exposure during development can seriously impact offspring's behavior across the lifespan.

Analysis of Oxytocin-Immunoreactive Neuron (OT-ir) Levels in the Paraventricular Nucleus (PVN) and Supraoptic Nucleus (SON) Brain Regions of California Mice (*Peromyscus Californicus*) That Received High or Low Levels of Paternal Care

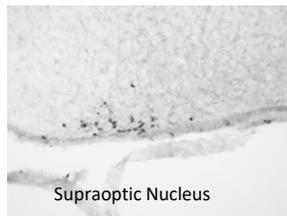
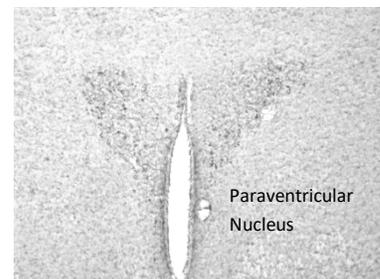
Julie Ford, '18

Faculty Mentor: Elizabeth A. Becker
Department of Psychology



Supported by the SJU Summer Scholars Program

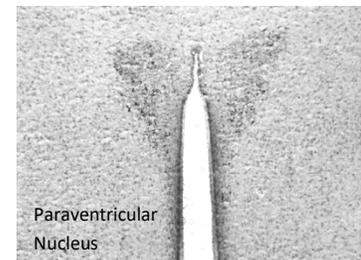
Oxytocin (OT) is a neuropeptide in the brain that promotes differing individual and species specific social behaviors such as aggression, stress responses, communication, and reproduction. In most rodents, the binding of OT to its receptors in the paraventricular nucleus (PVN) is critical for social learning and behavior (Johnson et. al, 2016). OT seems to help animals overcome their aversion to proximity and inhibit aggressive behavior in species where it is uncommon. OT can be released from all parts of the brain and can affect near or far regions. Some of the most widely studied regions where OT is found are the bed nucleus stria terminalis (BNST), PVN and the supraoptic nucleus (SON) (Hathaway et. al., 2015). It is also capable of influencing long or short actions and its amount in the brain can be altered by the environment which indicates high plasticity (Wang et. al., 2012).



In the California mouse, OT in the bed nucleus stria terminalis (BNST) region of the brain has been proven to control inter-male offensive aggression. In males who exhibit less aggression, there were increased amounts of OT, whereas with more aggression, there was no change in OT amount from baseline. In addition, the OT levels positively correlated with attack latency and total time of attack. (Wang, et. al, 2012). A study by Bester-Meredith JK and Marler CA (2001), presents evidence that arginine vasopressin (AVP) and OT-ir cells in the BNST have a direct relationship with inter-male aggression during intruder tests.

AVP is another neuropeptide that is seen in many social behaviors such as maternal care to aggression. In California mice, its expression has been proven to mediate aggressive behaviors in the BNST and a positive correlation is seen between AVP levels, high levels of parental care, and aggression. AVP was shown to not have any change in the VPN or SON. However, it has yet to be studied whether or not OT levels will have any effect on the VPN or SON regions.

This summer I investigated the levels of oxytocin-ir (OT-ir) and subsequently compared my findings to whether or not the animal was subjected to high or low paternal care and the arginine vasopressin (AVP) data already analyzed. I assessed if the levels of expressed OT-ir in the BNST, VPN, and SON had lasting effects on the hypothalamic pituitary adrenal axis (HPA) functions when impacted by high paternal care (retrieval), low parental retrieval or not affected at all.



Effects of Paternal Deprivation on the Development of Oxytocin and Vasopressin Systems in *Peromyscus Californicus*

Julie Ford, '18

Alexander Gill, '18



Faculty Mentor: Elizabeth A. Becker

Department of Psychology



Supported by the SJU Summer Scholars Program

The California mouse is a monogamous and biparental rodent species that is ideal for studying paternal care, as such care is rarely demonstrated in nature. California mouse parents both actively care for young from the day of birth. A large body of previous research indicates that two neuropeptide systems in the brain, vasopressin (AVP) and oxytocin (OT) are implicated a wide array of social behaviors including aggression, parenting, pair bonding, and others. The early social environment of the pups affects these systems, particularly the care given to them by each of their parents. California mouse fathers demonstrate a sharp change in behavior around the 15th day of a pups life, changing from mostly huddling, licking, and grooming their pups to more actively retrieving them (grabbing them by the scruff of their neck and returning them to the nest). Experimentally increasing retrievals has been shown to impact AVP systems in offspring.

My research will observe if and how this change in paternal behaviors impacts these important brain systems. It will also observe both sexes to determine if paternal care affects each sex differently. The research will also fill in a confound in previous research, the effects of paternal deprivation studies on the mother left to raise offspring alone. Paternal care in this study will be reduced by removing fathers from the cage for different lengths of time at different points during the early life of their offspring. Eventually, brains of offspring will be collected to determine the effects that the presence or absence of a father had on development. The project is ongoing and no data has been finalized at the present time. will be ongoing throughout the school year, so no data has been collected yet.



Tetyana Berezovski
Department of Mathematics
Saint Joseph's University

Ph.D. Simon Fraser University

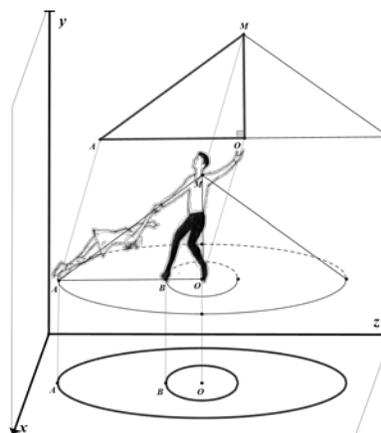
Research Interests: Mathematics
Teacher Education, Understanding of
Mathematics, Sporthematics

Sporthematics is the study of the relationship between mathematics and sports. It refers to a broader cluster of ideas ranging from the mathematics of scheduling tournaments to the application of sports to mathematics education. The goal of *sporthematics* is to contribute to both the understanding of sports and the understanding of mathematics, along with underlining the importance of the connections between the two.

In the past decade, Mathematics of Sports began to be recognized as an attractive platform for innovative teaching methods of mathematics. For six years I research the nature of the relationship between sports-related activities and mathematics learning and teaching. I have been working in the domain of the cross-disciplinary tasks design for the most part of my career as a researcher and as an instructor. During this period, my students and I have developed mathematical models as well as the sports-related tasks appropriate for teaching mathematics ranging from the middle school to the graduate level. The contexts for the design included ice-skating, lacrosse, karate, soccer, basketball, car racing, and rhythmic gymnastics.

During this summer, Lauren Hall and I engaged with mathematical modeling of volleyball. Different aspects of this sport were investigated, including the court, game apparatus, player's bodily movements, winning strategies, etc. Since Lauren is a volleyball player, it was interesting to learn from her that mathematical awareness of the sport informs players decisions in the court.

Students who love mathematics, physics, technology, and sports, find such cross-disciplinary studies particularly fascinating and enjoyable since they learn to intergrade various subjects' knowledge to experience *Cura Personalis* with respect to themselves and to those they plan to teach.



Bringing Mathematics to Life in Volleyball

Lauren Hall, '19



Faculty Mentor: Tetyana Berezovski

Department of Mathematics

Supported by the SJU Summer Scholars Program

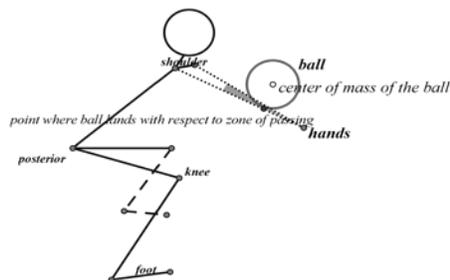
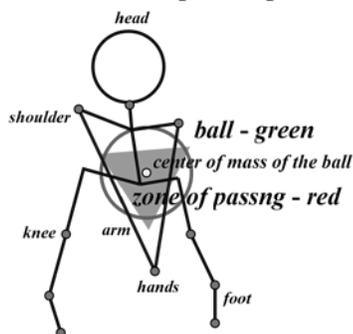
“Sporthematics is the study of the relationship between mathematics and sports” (Berezovski, 2018).

Coming into the summer scholars program, I wanted to establish the connection between volleyball and mathematics education. Sports are an engaging topic for high school students. Students learn best when they are interested, and can connect prior experiences to new knowledge. The goal of this study was to develop innovative cross-disciplinary tasks as alternative instructional tools.

We began with a literature review of the different types of sport-based learning activities currently implemented in mathematical classrooms, and the outcomes of their implementation. The first part was an article review of the existing publications in sports based mathematical teachings in *The Mathematics Teacher* journal from the past decade. One article in particular; *Galileo, Gauss, and the Green Monster* by Dan Kalman and Daniel J. Teague discussed the use of baseball to reinforce cumulative algebra and pre-calculus concepts. High schoolers used their knowledge of quadratic equations to analyze parabolic trajectories to determine if the vertical and horizontal distance the ball. The students in found that they needed to apply a variety of mathematical topics and concepts from throughout their mathematical discourse to solve this problem. The second part of the literature review we reviewed a textbook called the *Sports Math* by Roland B. Minton where we evaluated the first two chapters on projectile motion and rotational motion with respect to various sports. This textbook contained physics-based mathematical solutions for sports related mechanical questions. All these problems were analyzed and a common rubric was designed. We created a rubric for classifying sported based mathematical problems. This rubric included four content categories for rating wording, mathematics, physics, and sports which ran from a scale on 0-5 for each category, 5 being most difficult. After, we used this rubric to develop new problems.

We aligned new problems with the Common Core State Standards for Mathematics. Most images used in the problems were taken of me, Lauren Hall, by my mom. The corresponding diagrams completed in the GSP, the software I had to learn during this summer. In total we created 40 sport-based mathematical questions with complete solutions in the sport of volleyball. These problems are classified according to rubrics, aligned with appropriate CCSS_M.

I hope to continue this project further and develop 3D dynamic animations for sports-based mathematical problems. I also plan to present our findings the joint mathematics meeting 2018, if accepted.





Anthony J. Berret, S.J.
Department of English
Saint Joseph's University

Ph.D. Johns Hopkins University

Research Interests: Music and Literature

In researching the functions of music in the novels of F. Scott Fitzgerald and Toni Morrison, I found songs used for romance, remembrance, lamentation, dreaming, and pure enjoyment. Music in general can even contribute to the structure or style of certain books. *The Great Gatsby*, for instance, resembles a Broadway show with a song to accompany each major scene, and *Jazz* follows a pattern of improvisational solos spoken by the various characters. As fiction, though, the main focus of this music is its effect on the characters, and of course, indirectly on the reader. I wonder what influences a live musical performance would have on a group of real listeners.

My Summer Scholar chose this last topic for his project. Concentrating first on the 1960s, a decade of both innovative musical styles and of vigorous social activism, he will study the role that music played in rallying people to speak and march for social causes. Folk music, revived in the 1960s, had supported social issues, especially labor movements, for decades. Now folk songs were applied to the peace and civil rights movements of the 60s. Rock music absorbed some of the topical realism of folk music and added powerful voices and rhythm to further inspire social criticism and reform. One question that will arise is, how true can art be to its own goal and still strive for some goal outside itself?

The Revolution Will Not Be Televised: A Critical Analysis of Music, Literature, and Sociology

George Fenton, '18

Faculty Mentor: Anthony J. Berret, S.J.
Department of English



Supported by the SJU Summer Scholars Program

The 2016 awarding of the Nobel prize in literature to Bob Dylan has divided literary scholars on what can be literature, and whether the depth and meaning of music can match the value of literature. Musicians such as Bob Dylan redefined literary depth by capturing the social dissonance of the era through his music. In doing so they sparked the Folk Revival, and one of the most aggressive decades of social change: the 1960s. Along with Folk Revival artists, those in the African American community put their own story into sonic protest by intertwining the civil rights movement with the genres of Gospel, Soul, and R&B. These aural means of storytelling surpassed previous, more traditional, forms of both music and literature leading to new means of expression such as the concept album. This change paralleled the shift away from traditional institutions during the 1960s, and brought more depth and potency to music. The novel used to compensate for the frustration of human plight, and only provided comfort when those institutions were able to provide solace beyond the story. Novels may have described and analyzed social issues, but could not organize and inspire people to action the way music did. Music can ignite change by appealing to people together to seek answers to their common struggle. Even in the present day, with the current American social climate, the intrinsic power of music to unite the disenfranchised is evident.

For my project this summer, I worked alongside Father Berret S.J., analyzing various musicians from the 1960s Folk Revival and Rock movements through the lens of various forms of literary criticism. Along with these primary sources, we analyzed secondary sources that specifically contextualize these artists' music as being key figures in social movements of the 1960s. By examining the music in relation to the social movements, my project is hoping to gain greater insight into the relation between art and sociology, and establish that the literary elements of Rock music had a direct affect on the social climate of the sixties. The project is essentially being broken down into four different areas in order to gain a wider scope of the era in question. For the summer, Father Berret and I delved entirely into the Folk Revival moment in order to gain a basis of influence for how Rock music came to be as impactful as we believe it was. The project will then continue throughout the school year in the form of my honors thesis exploring the Rock movement in depth, and then switching over to the influence of Gospel, Soul, and Funk Rock through the sixties turbulent relationship with civil rights and social justice. By the end of the coming academic year, I will hopefully be situated to ask the question where is music now in terms of social influence, and where is it going?



Shantanu Bhatt
Department of Biology
Saint Joseph's University

Ph.D. Emory University

Research Interests: Investigation of the Roles of Regulatory Small RNAs (sRNAs) in the Virulence of Enteropathogenic *Escherichia coli* (EPEC) and *Escherichia albertii*

My lab focuses on the roles of regulatory small RNAs (sRNAs) in the virulence of the enteric pathogens enteropathogenic *Escherichia coli* (EPEC) and *Escherichia albertii*. EPEC and *E. albertii* belong to the class of pathogens called attaching and effacing (A/E) pathogens, because they adhere to intestinal cells and destroy microvilli. These ultrastructural changes, in turn, reduce the ability of intestinal cells to absorb water and nutrients, leading to diarrhea. Under extremes of conditions, severe dehydration can lead to death. The ability of A/E pathogens to cause diarrhea is housed within the genomic island, locus of enterocyte effacement (LEE). Therefore, understanding the regulatory controls that impinge on the LEE is critical for developing effective interventional strategies.

EPEC - To date, over 40 proteinaceous regulators are known to regulate gene expression from the LEE of EPEC. In contrast, the roles of regulatory small RNAs (sRNAs) remains cryptic. My lab identified the first three small RNAs – MgrR, RyhB, and McaS – that synchronize gene expression from the LEE of EPEC. Moreover, during our study we discovered a novel mechanism by which MgrR exerts its effect. Since then, we have discovered 4 additional sRNAs – Spot42, OmrA, OmrB, and DsrA – all of which further refine the transcriptional output from the LEE of EPEC. Recently, we submitted our findings on Spot42 for publication. To the best of our knowledge these 7 sRNAs are the ONLY identified riboregulators of the LEE in EPEC.

E. albertii – The bacterium was first isolated in 1991. However, it has been routinely mischaracterized. Moreover, until 2016, not a single gene had been mutated in the bacterium, because of the absence of a reliable method for genetic engineering. My lab developed the very first protocol for engineering mutations in the genome of this bacterium. We demonstrated the reliability and reproducibility of this technique by mutating multiple virulence-linked genes in *E. albertii*. We have, since then, begun to address the functionality of these genes. We have identified four regulators – Ler, GrlR, GrlA, and Hfq – that affect gene expression from the LEE of *E. albertii*. These four factors represent the ONLY experimentally validated regulators of the LEE of *E. albertii*. One of these regulators, Hfq, exerts its effect by facilitating base-pairing between sRNAs and their target mRNAs, thereby implicating sRNAs in bacterial virulence. Current ongoing research on *E. albertii* seeks to identify the specific sRNAs that regulate the LEE in this bacterium.

The Small Regulatory RNA DsrA is a Negative Regulator of the Locus of Enterocyte Effacement in Enteropathogenic *Escherichia coli*

Brian Critelli, '19

Faculty Mentor: Shantanu Bhatt
Department of Biology

Supported by the SJU Summer Scholars Program



Small regulatory RNAs (sRNAs) are important regulators of the major pathogenicity island, the locus of enterocyte effacement (LEE), in enteropathogenic *Escherichia coli* (EPEC). At least four sRNAs – MgrR, RyhB, McaS, and Spot42 – are validated riboregulators of the LEE. Herein, we have identified DsrA as a novel regulator of the LEE in EPEC. Regulated overexpression of *dsrA* negatively regulated the synthesis of Tir and EspA, which are encoded within the *LEE5* and *LEE4* operons, respectively. Because transcription from *LEE5* and *LEE4* operons is directly coregulated by the transcription factor Ler, we tested whether the observed DsrA-dependent effect was mediated via *ler*. Overexpression of *dsrA* repressed β -galactosidase activity from a reporter *ler'*-*lacZ*⁺ transcriptional fusion but not from a *ler'*-*lacZ* translational fusion, suggesting that DsrA indirectly affects transcription from the *ler* promoter but does not directly base-pair to the 5' UTR of *ler*. The proposed DsrA-*ler* regulatory circuitry would predict that the expression of other Ler-activated genes would also be reduced in the *dsrA* overexpressor. One such gene that is activated by Ler is *grlA*, which is encoded by the *grlRA* transcription unit. Congruent with our prediction, overexpression of DsrA repressed GrlA protein levels. Thus, collectively, our results suggest that DsrA globally silences the LEE of EPEC by indirectly affecting transcription of the *LEE1*-encoded master regulator *ler*. Current experiments in our lab are underway to identify the direct target(s) of DsrA through which the LEE is affected. Moreover, we are also interested in examining gene expression from the LEE in the *dsrA* loss-of-function mutant of EPEC.

Investigation of the Role of Hfq in Regulation of the Locus of Enterocyte Effacement in *Escherichia albertii*

Marisa Egan, '18



Faculty Mentor: Shantanu Bhatt
Department of Biology

Supported by the SJU Summer Scholars Program and the American Society of Microbiology (ASM) – Undergraduate Research Fellowship (URF)

Escherichia albertii is an emerging enteric pathogen that has often been misidentified as *Hafnia alvei*, enteropathogenic *Escherichia coli* (EPEC), and enterohemorrhagic *Escherichia coli* (EHEC). *E. albertii* was first isolated from the diarrheal stool samples of children in Bangladesh in the early 1990s. Today, very little is known about this diarrheal pathogen; so, its misidentification persists. Recently, multiple studies have shown that a substantial number of EPEC and EHEC isolates (~15%), which were previously incriminated in food-borne diarrheal outbreaks, are taxonomically *E. albertii*. *E. albertii* could be the causative agent of millions of cases of food-borne illnesses and thousands of diarrheal deaths in the world that have no known etiologic origin. In lieu of these observations, the Centers for Disease Control and Prevention (CDC) has branded *E. albertii* as an emerging pathogen. Clearly, there is an increasing urgency to aptly characterize the genetic basis of the virulence of *E. albertii* in order to readily identify and combat this potential food-borne diarrheal pathogen.

E. albertii falls under the morphotype of attaching and effacing (A/E) pathogens. A/E pathogens cause disease by effacing the microvilli of intestinal epithelial cells and, then, attaching tightly to such host cells by forming pedestal-like structures. These cellular remodeling events prevent the intestinal host cells from absorbing nutrients and water. Severe and, sometimes, fatal diarrhea ensues. The genetic basis for the virulence of these A/E pathogens is the locus of enterocyte effacement (LEE). The LEE encodes key virulence factors, including the type-3-secretion system (T3SS). The T3SS pierces the host cell membrane and facilitates the trafficking of toxic proteins directly into the infected host epithelial cells from the pathogen. These proteins hijack host signal transduction and regulatory pathways, which facilitates bacterial colonization and the observed attaching and effacing lesions.

In order to fully characterize the virulence repertoire of *E. albertii*, the genome of the bacterium must be mutagenized. It was not until last year that our lab engineered the very first chromosomal mutations in *E. albertii*. We used recombineering to introduce site-specific mutations in the bacterial genome by allelic replacement. Using this technique, we successfully deleted homologs of genes that are known to be involved in the virulence of related A/E pathogens. One such gene is *hfq*.

Hfq is known to regulate virulence in an array of pathogens, including the A/E pathogens EPEC and EHEC. Hfq acts as a molecular matchmaker that binds to and enables regulatory trans-encoded sRNAs to base-pair to target mRNAs. Previous results suggest that Hfq and Hfq-dependent sRNAs regulate the LEE of EPEC and EHEC. Whereas the role of Hfq in EPEC and EHEC has been systematically investigated, its role in *E. albertii* remains unexplored. In this study, we compared the virulence associated phenotypes of the wild type strain and the *hfq* mutant to determine if Hfq is a virulence determinant in *E. albertii*. We used western blotting to compare the levels of the LEE-encoded proteins Tir and EspA, both of which are necessary for the A/E pathomorphology, in the wildtype strain and the *hfq* mutant. The level of Tir and EspA were profoundly increased in the *hfq* mutant, suggesting that Hfq represses the expression of these proteins. These results provide the first concrete evidence that Hfq is a key virulence regulator of the LEE in *E. albertii*. Future studies are aimed at deciphering the precise regulatory mechanism by which Hfq affects the LEE in this emerging enteropathogen.

The Hfq-Dependent sRNAs – OmrA and OmrB – Indirectly Regulate the Locus of Enterocyte Effacement in Enteropathogenic *Escherichia coli*

Sarah Muche, '19

Faculty Mentor: Shantanu Bhatt
Department of Biology



Supported by the John P. McNulty Scholars Program and Sigma Xi

Enteropathogenic *Escherichia coli* (EPEC) is a gastrointestinal pathogen capable of forming attaching and effacing (A/E) lesions on the surface of the small intestine. These lesions, which allow the bacterium to be intimately attached to the host epithelial cell, also lead to the destruction of surrounding intestinal microvilli. Consequently, the cellular surface area for the absorption of water and nutrients is also reduced, leading to diarrhea. The pathogenicity island, locus of enterocyte effacement (LEE), confers upon EPEC the ability to form A/E lesions. The LEE encodes a type three secretion system, which enables the bacterium to directly traffic effector molecules into the host cell. Once inside the host, these molecules hijack host regulatory and signal transduction pathways that lead to bacterial adherence and A/E lesion formation. Therefore, understanding the regulation of the LEE is vital towards the development of interventional strategies.

Our lab's primary focus is on the posttranscriptional regulation of the LEE by the RNA binding protein Hfq, which has a prominent role in regulating virulence factors of related pathogens. Hfq is an RNA chaperone that assists sRNAs in base-pairing to their target mRNA to affect mRNA stability and/or translation. Recent results in our lab suggest that two conserved Hfq-dependent sRNAs – OmrA and OmrB globally repress gene expression from the LEE in EPEC. Both the sRNAs negatively regulate the levels of GrlA (encoded within the *grlRA* operon) and the GrlA-activated targets, Tir (encoded within the *LEE5* operon), EspA and EspB (encoded within the *LEE4* operon). Interestingly, OmrA and OmrB do not directly base-pair with the *grlRA* mRNA, suggesting that the effect on *grlRA* is likely to be indirect. Further investigation revealed that OmrA and OmrB also do not base pair to the *ler* mRNA, which specifies the major transcriptional activator of *grlRA*. Rather, the two paralogs repressed transcription from the *ler* promoter. In summary, our study shows that OmrA and OmrB indirectly repress the transcription of *ler*, which, in turn, causes the LEE to remain silenced. Current efforts in our lab are aimed at identifying the intermediate regulator(s) through which these sRNAs affect the LEE.



Thomas J. Brennan, S.J.
Department of English
Saint Joseph's University

Ph.D. Brandeis University

Research Interests: Poetry and the Occult;
Genetic Criticism; Psychoanalytic Criticism;
Lesbian and Gay Criticism

I can still recall the time, nearly thirty years ago, when, as an M.A. student in English, I stopped fearing difficult poetry. We were reading Alfred, Lord Tennyson's sonnet "The Kraken," and the professor offered a fascinating argument about it. This remote creature, whom no one has ever seen, sleeps "Far, far beneath in the abysmal sea" (line 2). Eventually, when fire heats this deep, the Kraken will surface: "Then once by man and angels to be seen/ In roaring he shall rise and on the surface die" (lines 13-14). Our teacher suggested that the Kraken is Tennyson's reflection on working as a poet. Disclosure—like the Kraken's dramatic appearance—is a kind of death. Once the word is out there—whether written or spoken—you don't get to take it back. So move precisely but daringly in putting your words together on paper. All of a sudden it hit me why I wanted to study this poet. It had to do with my questions about religion, and God, and sexuality. All of them, it seemed, were being asked in a coded and yet powerful way in Tennyson's works. Then I read his poem of mourning about his college friend, Arthur Hallam. Titled *In Memoriam*, this work consists of 131 sections of rhymed four beat stanzas—not including the Prologue and Epilogue. To my astonishment, I realized that this text, with its incessant beat ("ba bum ba bum ba bum ba bum"), actually spoke to me across more than 150 years.

Nearly twenty years ago, when I was a Ph.D. student, I had another breakthrough. We had to memorize Section X of James Merrill's occult classic *The Book of Ephraim*. I hated memorizing in third grade for a contest, and I didn't like having to run such a contest when I taught high school. The difference with memorizing Merrill was that we weren't performing our feats of memory. Rather, we used our memorizations in lieu of the printed text to discuss the poem in class that day. This experience made me want to read more of Merrill's vast corpus and—via genetic criticism and manuscript study—to delve into how these brilliant productions came together. I feel privileged to have had this chance during my recent sabbatical, and I hope to pass this enthusiasm on to my students!

Form and Reform in Robert Frost

Jacob Norberg, '18

Faculty Mentor: Thomas J. Brennan, S.J.
Department of English



Supported by the SJU Summer Scholars Program

My Summer Scholars Project is intended to be a comprehensive study on form in the poetry of Robert Frost and the implications his formalism has for a socially conscious individual. I looked at two of Frost's more socially realist poems: "The Death of the Hired Man" and "Two Tramps in Mud Time." In order to gain a more complete understanding of Frost's formalism, I turned to one of his more abstract poems: "The Most of it." Form, for Frost, is primarily concerned with making sense out of the chaotic world surrounding the poet. Frost is ever the realist, but in the three poems I chose to analyze in this paper I found that his formalism does have moral and social implications. Frost actively avoids labeling himself anything other than a poet, deliberately abstaining from outright social criticism and attempting to create an object in his poetry; something to be contemplated in an attempt to make sense out of seemingly meaningless social inequality. I contend that Frost's poetic formalism has implications for social reform to the degree that Frost represents his social context in his poetry. He may not have intended to call for social change or for specific political values, but his formalism creates a process of linguistic and aesthetic formalism that points towards actual social reform.



Keith R. Brown

Department of Sociology
Saint Joseph's University

Ph.D. University of Pennsylvania

Research Interests: Consumer Culture, Fair Trade, the Sociology of Food, and Ethical Consumption; Interest in How Consumers Make Moral Decisions Under Market Constraints

The purpose of this project is to compare the lived experiences of shopping for healthy food while on SNAP (Supplemental Nutrition Assistance Program) with the purchasing guidelines based on the USDA's Thrifty Food Plan. This comparison will both provide real-world insight into the motivations guiding low-income shoppers as they make decisions to best provide for themselves and their families; and also offer information to educators and policy makers for future projects that assess the adequacy of SNAP benefits for providing healthy food purchases.

This summer Colette Hanlon worked as the project manager scheduling, conducting, transcribing, and analyzing interviews with SNAP consumers throughout Philadelphia. The research brought our team into contact with residents throughout Philadelphia as we shopped alongside them at Shoprite, Weaver's Way, Cousins, and various other supermarkets in neighborhoods once labeled as food deserts. The project involved meeting with leaders of Weaver's Way and UpLift, two organizations helping fund this project. It also involved working alongside myself, Dr. Mary Segal (health disparity researcher), and Dr. Miriam Kahn (anthropologist) as we began to formulate and examine our views on the social meaning of SNAP benefits.

Through intensive interviews and ethnographic observations, we are starting to understand the limitations and possibilities of healthy food shopping while on a budget. Consistent with research in behavioral economics and the sociology of consumption, we are learning that consumers possess an impressive ability to hunt for deals to efficiently budget for their family meals. But this search for the deal comes at a cost. SNAP consumers spend a tremendous amount of time and mental energy searching for affordable and healthy foods. This loss of resources may mean individuals have less time taking care of their health, searching for work, and caring for their families.

The Social Meaning of SNAP Benefits

Colette Hanlon, '18

Faculty Mentor: Keith R. Brown
Department of Sociology



Supported by the SJU Summer Scholars Program

The Supplemental Nutrition Food Program, or SNAP, is the most important government funded program to help low-income individuals and families purchase food. It helps millions of people annually by giving them financial assistance in food purchasing. Welfare programs like SNAP are designed from a traditional view of economics, money, and finances. This traditional perspective sees money as being totally fungible. Yet economic sociologists and behavioral economists challenge this viewpoint by showing that money is contextual and is treated differently depending on outside variables. With few exceptions, there is little known about the social meaning of SNAP benefits. How individuals earmark this money, trade this money for other goods, and spend this money on food choices that will best benefit themselves has been under researched. There are a few exotic stories of individuals buying junk food or lobster tails, but not much is known about the lived experiences of these individuals. The lived experiences of individuals receiving SNAP benefits are important in improving understanding of poverty, welfare, food purchasing, and budgeting. How individuals shop while on SNAP can offer illuminating insights. This project seeks to understand the social meaning of SNAP benefits.

This summer, Dr. Keith Brown and I worked with two other researchers, Dr. Miriam Khan and Dr. Mary Segal, on this project. Our main goals this summer were to conduct the bulk of our interviews with SNAP recipients. The interview process consisted of a researcher meeting with a participant at their local grocery store and asking them questions while they shopped. I served as the project coordinator, where I scheduled around 40 interviews with participants. I also conducted interviews myself, transcribed interviews, wrote research memos, and did preliminary data analysis. I plan to continue working on this project with Dr. Brown through the fall and spring semesters.

Our findings so far have been fascinating, as we are seeing patterns and themes emerge in the ways SNAP recipients in Philadelphia think about food, budgeting, health, and a variety of other issues. Many of the individuals we have interviewed have had an extensive knowledge about weekly sales across many different grocery stores, prices, and budgeting. However, participants have often noted that SNAP is not enough to cover their monthly food expenses, so they have to rely on food pantries and soup kitchens to get through the month. The amount of time and energy spent thinking about food purchasing seems to take up mental resources and may limit an individual's ability to look for work and take care of their health and family. The search for a deal certainly comes at a cost.



James F. Caccamo

Department of Theology and Religious Studies
Saint Joseph's University

Ph.D. Loyola University Chicago

Research Interests: Catholic Social Thought,
Technology and Media Ethics

The Roman Catholic tradition has a rich legacy of examining our responsibilities to society and, more specifically, to those whom scripture refers to as “the least among us” (Matthew 25:40), who we often refer to today as being “on the margins” of society. This concern can be seen throughout SJU’s Mission Statement in the commitment to “engaged citizenship,” “being an inclusive and diverse community,” and “pursuing social justice.” Catholic Social Teaching is at the heart of SJU, and the heart of my work as a scholar and teacher.

The task of the Christian social ethicist such as myself is to work to increase our understanding of the good in society and then to identify specific ways in which that good can be instantiated in our particular space and time. Christian social ethicists do this by investigating a wide variety of social issues such as racism and economics, war and development, political participation and provision of health care, immigration and equity in education. My own work has focused on examining the mechanisms by which communities come to understand the world around them and enact their responsibilities within it. My recent teaching and research has focused on the role of media and technology in society, resulting in articles on ethics of post-humanism, adoption of IT in Catholic universities, and the U.S. copyright system.

This summer, the students I have worked with have explored another key social structure that profoundly shapes our communities: education. Through our education systems, we both communicate values and empower people with the skills they will need to be able to participate equally in the economic, political, social, spiritual, and aesthetic life of society—activities that we that are constitutive of a society characterized by social justice. And, notably, education is one of the few things absent from America’s founding documents that is widely recognized as a basic human right across the political spectrum. Education is necessary for each of us, and providing education for all makes our society better.

Yet, for all we talk about the right to education, the United States does not always live up to its aspirations. It is widely known, for instance, there are radical discrepancies in the quality of education among urban, suburban, and rural districts that lead to very different student achievement levels. Yet, the students that I had the opportunity to work with this summer have highlighted other issues that are not so well known: higher education and foster children in the United States, and higher education for children of undocumented immigrants in the United States. Both of these comprise groups that are at the margins of society, overlooked in our view of American society in general, and the American education system in particular. From the perspective of Catholic Social Teaching, they are groups to whom we should turn our particular attention.

An Ethical Analysis of a Foster Child's Education

Erin Breen, '19

Faculty Mentor: James F. Caccamo
Department of Theology and Religious Studies



Supported by the SJU Summer Scholars Program

Catholic teaching places a great deal of emphasis on preferential care for society's most vulnerable. As stewards of creation, Catholics see it as a common responsibility to protect individuals most at risk for falling through the cracks of society. The estimated 427,910 children that make up the United States foster care system are included in those that may not have accessibility to the care their vulnerability requires. This project exists with a twofold purpose. First, it examines the success of the current foster care system at providing the appropriate educational and developmental resources to secure a successful future for these children. Second, the study evaluates the adequacy of this situation in the light of the insights of Catholic social teaching. Catholic social teaching places a great deal of emphasis of the importance of education in the broader process of human development and social justice. When found that the current system reflect a need for change, this study suggests how the Catholic Social Teaching's emphasis on education and human dignity can play a role in the adjusting of the system.

The data that was collected and analyzed revealed that the way the foster care system currently stands does not sufficiently protect and provide the necessary support children need throughout their development. When a child enters foster care, they have already been exposed to struggle and circumstantial challenges in their home life. Once they are in care, they are subject to more abuse and neglect, frequent relocation, emotional disorders and issues and lack of familial involvement. All of these factors affect the individuals negatively and become barriers to a successful educational outcome.

Through the application of Catholic teaching to the problems of the current foster care system, an ethical evaluation can take place. Church teachings place a great deal of emphasis on the importance of human development, family life and participation in society. Because the Church sees an individual's development as well-rounded and interconnected between all aspects of a person, a child's spiritual, physical, mental, social and emotional health is to be protected and nurtured. The Church views the family unit as the foundation of society and a vessel through which the love of God can be shown. When an individual does not have familial relationships one which they can rely, the Church sees local parish communities as responsible for welcoming the individual in to the larger human family. Because of the societal disadvantages foster children face, they are less likely to succeed academically; later in life facing more obstacles in participating civically through actions such as holding a job. Catholic teaching sees it as a societal responsibility to expand the ability to make positive contributions to these marginalized.

In Catholic teaching exists all that is necessary to correct the issues of the current foster care system. The solution lies in taking the abstract principles discussed and place them in motion, creating a society where institutions are dedicated to the practice of putting love in action.

Universities and the Undocumented: Evaluating the Moral Response of Universities to Potential Governmental Targeting of Enrolled Undocumented Students

Julian Zuzarte, '18



Faculty Mentor: James F. Caccamo
Department of Theology and Religious Studies

Supported by the SJU Summer Scholars Program

There are approximately 11 million undocumented immigrants that reside in the United States, and a major portion of this population is comprised of students, specifically dreamers, that seek a college education in the United States. Dreamers are undocumented immigrants who were brought to the United States as young children, and who know the United States as their only home. In 2012, President Barack Obama created the Deferred Action for Childhood Arrivals, a temporary policy that protects dreamers from deportation so that they can attend college in the U.S.

Under the Trump administration, however, this protected status has been considered in jeopardy. My project, which was two-fold in nature, began with an examination of the statements and actions from the presidential administration, in addition to an analysis of existing state and university policies related to undocumented college students. Many members of the presidential administration have offered conflicting and inconsistent views on the DACA policy and how to address undocumented students and dreamers, eventually leading to the current stance that DACA will remain in place. Around the country, state policies on undocumented students varies widely, with a few states openly accepting undocumented students, other states admitting dreamers albeit with obstacles, and another few states intentionally inhibiting undocumented immigrants from receiving a college education in the state.

With this observation undertaken, the next step of my project was to create a set of principles by which I could measure the appropriate steps for universities to take in addressing their undocumented students in the future. Several Catholic universities have already explored potential steps, but to ensure that these steps are enough according to their Catholic mission, it was necessary to understand the principles of Catholic Social Teaching and their application to this project. Reflection on Vatican and Bishops' statements produced principles that adhered to the Catholic Social Teaching themes of upholding human dignity, the right to participation, and integral human development.

The effectiveness of university policies at a Catholic institution in this context depends on their ability to adhere to the principles derived from Catholic Social Teaching. Thus, these principles and their application provide a guideline for which Catholic universities should strive to meet when addressing undocumented students attending their institution, so that their university mission is put into practice when it concerns this vulnerable but significant population of the United States.



Peter A. Clark, S.J.

Departments of Theology & Religious Studies
& Health Administration
Director-Institute for Clinical Bioethics
Saint Joseph's University

Ph.D. Loyola University of Chicago

Research Interests: My research this summer focused on 2 writing projects that included: First, "To Treat or Not To Treat: The Case of Methylmalonic Acidemia." Methylmalonic acidemia (MMA) is a recessive genetic disorder in which there is a complete or partial deficiency of the enzyme methylmalonyl-CoA mutase or a defect in the transport or synthesis of its cofactors which results in an increase of organic acids in the body when proteins are ingested. The organic acids overwhelm the neonate causing severe ketoacidosis, hypotonia, hyperammonemia, neutropenia, and thrombocytopenia. MMA is a major concern in countries such as Palestine where immediate family members often marry and have children that inherit MMA at a much higher rate than neonates in western countries. The paper applies bioethicist Richard McCormick's two ethical criteria for treatment to Clark's 5 Diagnostic Categories to help parents and health care professionals decide whether to treat or not to treat handicapped newborns. Second, "Play Sure Kits: A Form of Harm Reduction for HIV/AIDS." Play Sure Kits, distributed in New York City, are small compact kits that allow an individual to easily and discretely transport everything needed to increase HIV prevention. Evidence has shown that Play Sure Kits as part of a comprehensive plan can be beneficial both at the individual level and the societal level. For the individual, it has been proven to effectively prevent the spread of HIV and to save lives. On a societal level, the use of Play Sure Kits can ultimately decrease the strain on the medical system as more individuals will be educated on the spread of HIV, which will lead at-risk individuals to use preventative measures to stop the increase in HIV transmission. Societally, it also has the potential to end the HIV/AIDS epidemic in the United States. Ethically, it is argued that this is allowable under the harm reduction theory and should be implemented in all major cities in the United States.

The remainder of the summer consisted in helping to formulate ethical policies for Caritas Baby Hospital in Bethlehem, Palestine. The Institute of Clinical Bioethics at Saint Joseph's University is now representing Caritas Baby Hospital as their Bioethics consultants. We are in the process of assisting the medical staff at Caritas in forming an Institutional Ethics Committee and helping them design and implement ethical policies on issues such as: brain death, Do Not Resuscitate Orders, medical futility, patient's rights, etc. The staff of the Institute of Clinical Bioethics has initiated and implemented a procedure to do ethical consults via Skype to assist patients, their parents and the medical staff in Palestine. In addition, the 2 bioethicists in the Institute consulted at the 14 hospitals we represent in Pennsylvania, Maryland, Delaware and the District of Columbia and taught ethics to over 350 medical interns, residents and fellows in these hospitals.

Interdisciplinary Death and Dying Education Curriculum for High School Seniors: A Practical Approach to End-of-Life Care

Andrew T. Myers, '18



Faculty Mentor: Peter A. Clark, S.J.

Department of Theology & Religious Studies and the Institute of Clinical Bioethics

Supported by the SJU Summer Scholars Program, the Institute of Clinical Bioethics and the Allen and Dolores Gustafson Distinguished Research Fellows Program

Currently, high school students are not exposed to the culture of death and dying. Death is a reality that everyone must face contrary to what is expressed by the “death-denying” society in which we live. The objective of this research is to develop a teaching curriculum surveying the practical aspects of death and dying by examining the philosophical, theological, and ethical principles surrounding the topic. This curriculum will be implemented at the level of high school seniors so that they may take the knowledge gathered and apply it in family settings throughout their lifetimes. The contributors to this curriculum hope that their efforts will cause a paradigm shift in the care of the terminally ill so that all people may properly prepare for death and experience the most dignified and peaceful death possible.

High school students are educated on life subjects ranging from biology and chemistry to English, financial literacy, and sexual education. These subjects all deal with important aspects of a balanced, healthy life. Yet students and the public are not knowledgeable about the final stages of life: dying and death. Most face death with silence and fear caused by the unknown. This leads to hopelessness, unrealistic expectations, and a loss of autonomy and dignity. There is not a “correct” way to prepare for death or a right way to die, but a practical curriculum educating young adults about the inevitable end-of-life likelihoods they or their loved ones may face is a critical step in transforming the culture surrounding death to one that is defined by honest acceptance manifested by open discussions and preparations. Instead of promoting beauty and youth and ignoring death, society will be better off if it learns how to care for the dying. Death and dying have always captivated philosophers, theologians, and ethicists, and these experts have produced a body of literature on the subjects. Although there is a plethora of writing, it has not been compiled in a succinct and practical secondary education curriculum in a way such as this project proposes.

This Summer I adapted a book written by Fr. Peter Clark titled *Death With Dignity: Ethical and Practical Considerations for Caregivers of the Terminally Ill* and compiled information from countless bioethical, medicinal, philosophical, and theological sources to explain the practical dimensions of end-of-life topics. In addition to writing, I visited local hospice units, the Gift of Life Donor Program, and mortuaries to plan appropriate activities for the dynamic curriculum. The curriculum covers issues such as terminal/end-stage conditions, how to communicate and receive bad news, palliative care and pain management, hospice, medical futility, advanced directives, organ donations, burial preparations, and other subtopics. There are three anticipated benefits: (1) It will spark conversation among today’s youth when their grandparents are nearing the end of life. This can immediately benefit society. (2) Teaching students at a young age will allow them to make informed decisions throughout their life and will allow them ample time to prepare for death. (3) It will strengthen the communication skill-sets of individuals who aspire to have careers in health care. It will teach them how to give bad news, recognize when a patient is not expressing their true preferences, and it will strengthen the virtues of prudence and compassion which are fundamental in providing care to the dying.



Clare E. Conry-Murray
Department of Psychology
Saint Joseph's University

Ph.D. University of California, Berkeley

Research Interests: Social and Moral
Development, Gender Development

I am currently focused on researching how children from preschool ages through high school coordinate concerns with personal choice, fitting in to gender norms and fairness. My research shows that children are concerned with all three but that at times, these issues conflict.

In general, children state that people should be able follow their own interests or preferences when it comes to gender roles, but they also consider the situation. For example, children state that hypothetical children should follow unconventional interests (like a boy who likes pink bikes) in private, but not in public, where they might be teased (Conry-Murray, 2013). This is an important indication that children follow gender norms to fit in and not only as an expression of their real interests.

There are some important developmental differences in children's endorsement of personal choice and fairness. Younger children around the ages of 4-7 tend to overestimate the likelihood that preferences will be in line with traditional gender roles, and they are more likely than older children to be inflexible about gender norms. In one study, I found that young children accepted a teacher treating boys and girls differently and unequally if it was consistent with gender roles. For example, young children approved of a teacher giving boys each a robotics kit and girls each an old maid card game, while older children were less likely to approve of this. Young children seemed to see these unequal gifts as a response to the interests of boys and girls and therefore, as justified. However, both younger and older children disapproved of a teacher who gave unequal, but gender neutral gifts, to boys and girls (e.g. M&Ms to girls and bananas to boys). This is concerning because it means that young children may not be aware of the diversity of preferences that exist and they may not challenge unfair treatment based on gender norms.

I have examined reasoning about gender and fairness in several age groups from preschool through adulthood and in several countries (Turkey, Benin, West Africa and South Korea). This summer I worked with Megan McKechnie to examine how adults view children who have ADHD and whether their judgments about personal responsibility are affected by the child's diagnosis. With Amelia Martinie, I am also examining how group composition affects children's judgments about whether to change a moral or conventional rule.

Moral Development and Group Membership in Children and Adults Evaluations of Political and Medical Issues

Amelia Martinie, '19



Faculty Mentor: Clare E. Conry-Murray
Department of Psychology

Supported by the SJU Summer Scholars Program

Moral Development and Group Membership in Children and Adults investigates how children aged 8-16 think about different types of norms in various peer settings. Three norms were investigated: moral, group functioning, and traditional norms. Participants will be read stories about imaginary sports teams in which they encounter the given norm. All norms involved some sort of peer group interaction: moral norms involved a moral dispute amongst the team regarding fair equipment distribution, group functioning involved a team change that was not moral but would affect how the group functioned as a unit, and the traditional norm change had no effect on the team itself except that the norm being changed was 'how they had always done it.' It is expected that the children will take more offense to changes of moral and group functioning norms than they will purely traditional ones.

The study also introduces the variable of peer group composition. Each story read to the participants has a main character – either male or female – that encounters the norm change and decides how to vote on it. The peer group is either made up of only the main character's gender or the opposite, making them the only of their gender in the group. It is predicted that the participants will think the main character more likely to speak up when they are in the same-sex group setting, rather than the opposite-sex setting. It is also predicted that the participants will vary their answers, depending on whether the main character's gender matches their own.

The final variable involves public and private voting. Participants are told that the main character must vote by raising their hands in front of their peer group and then again on paper in private. It is expected that participants will see a difference in the types of voting and be more likely to go against the norm if the vote is private. Due to complications with the summer camp where the research was to take place, this study will be completed during the school year.

Evaluations of Political and Medical Issues researches how the recent changes in American politics have shifted and polarized people's views of important issues. Participants take an online survey that asks them to identify as a Republican or Democrat and then assigns them to a condition of either party. Once assigned, the participant is given an imaginary Senator's position on a series of neutral and polarizing issues. An example of a neutral issue would be a bill 'improving bridge maintenance' where a polarizing issue would be a bill '(de)funding Planned Parenthood.' The Senator either matches or is the opposite affiliation, this is expected to affect ratings of the proposed legislation as well as their issue importance rating. Participants are expected to rate the proposal as less important and a worse idea when an opposing party Senator proposes it. Data for this study is forthcoming.

A Closer Look at Peoples' Judgments of Social Situations for People with and Without ADHD as Well as Peoples' Views on Gender Roles

Megan McKechnie, '18

Faculty Mentor: Clare E. Conry-Murray
Department of Psychology



Supported by the SJU Summer Scholars Program

Labeling people with disorders not only impacts how a person views himself or herself but can also influence how society views that person. Although there are upsides of diagnosing, we must also be aware of the downsides that come along with labeling people. We must educate ourselves on how it not only changes the observers' views of the person with the diagnosis but also that persons' view of themselves as a whole.

My first and main project revolved around studying how people with and without ADHD viewed moral and conventional issues differently for people with and without ADHD. Specifically, I wanted to see if a person with ADHD views a child breaking a conventional or moral rule differently for children with/without ADHD, and compare it to how a person without ADHD responds differently to children with/without ADHD. My experiment was conducted through the use of a custom survey that included sixteen different scenarios. The scenarios were composed of four conventional forethought prompts, four conventional impulse prompts, four moral impulse prompts and four moral forethought prompts. There were two males and two females for each prompt category to test to see whether the gender of the character had any impact on the survey takers responses. Six of the stories had children who had ADHD and the other six did not. After each prompt the participant was asked to rate the acceptableness of the action, the amount of control the child had over the action and the severity of punishment deemed appropriate. Data for this study is still being collected since the pool of participants with ADHD was lower than desired.

The second study that I conducted was an extension of my final lab project for my Developmental Psychology class. The main focus of the study was to see if males and females reacted differently to photos of male and female roles in their stereotypical and non-stereotypical form. The study consisted of sixteen different advertisement photos that represented traditional and non-traditional male and female roles. For example, a traditional role was depicted through the use of a photo of a women vacuuming or a male mowing the lawn and a non-traditional role photo was a women mowing the lawn or a male vacuuming. The participants viewed all 16 photos and rated each photo on how controversial they felt the photo was and how the photo made them feel. Data analysis for this study has been put on hold in order to better focus on the first study.



Robert Tom Coyne
Department of English
Saint Joseph's University

M.F.A. University of Notre Dame

Research Interests: Creative Writing

I am interested in stories and storytelling. My writing ranges from fiction to nonfiction, from travel writing to screenwriting to sports writing (as part of my life's goal of making golf tax-deductible, I write a great deal about this particular pastime). But the common motivation behind all my work is a curiosity about the ways we process our experience of the world and share that experience with others.

Life is a great story, something with a beginning, middle, and end, and the more richness and thoughtfulness that we can bring to that story makes not only our lives better, but as writers, can deepen the experience of those around us. It's in our DNA to need stories—we require them as human beings. Comedy, tragedy—we learn how to walk through our day via the experience of others. Ever since humankind started scratching scenes on cave walls, we have looked and listened and learned: This is how I got the bear. Or this is how the bear got me.

We all have stories and experiences to share, if we look at our lives closely enough. The challenge in the noise of our culture is to make those stories stand out and capture an audience. This is where the craft of creative writing enters our work. We work at organizing our thoughts in a way that reaches out and engages and reveals something genuine. The beauty and wonder of writing—of all art, really—is that it gives us the chance to create and convey something that has never quite been captured before, at least not as it comes through our unique and individual consciousness. This is a great gift. And one worth our most sincere efforts.

Poems of Philadelphia

Emma Seely, '18

Faculty Mentor: Robert T. Coyne

Department of English

Supported by the SJU Summer Scholars Program



Philadelphia is a city full of interesting, passionate people, and this summer I was lucky enough to meet some of the best of them. I didn't just meet these people though, I helped them write poetry. And they helped me see the city in a whole new way. Thus begins the story of Poems of Philadelphia.

Originally stemming from a job interview task that asked me to teach a five-minute lesson, this project started with a list of questions that were designed to get participants to think deeply about a topic of their choice, and then write about it without fear of judgement, all within a few minutes. Questions such as "What does the object look like?" and "How did the word change when this thing came into it?" were created specifically to make the process of writing poetry accessible to anyone and everyone. After a few successful "lessons" I decided that the only logical next step was to take my idea to the streets by approaching random people in and around the city of Philadelphia. After willing participants selected a topic of their choice, I would give them my prompts, and allow them around 30 seconds to write about each, based on the topic that they had chosen. When all the prompts had been given, I had the poets read their work to me, asked them a few questions about the writing process, and went on my way.

One of the questions that I asked my participants was which neighborhood that they live in, and I am very glad I did because I ended up with answers ranging from West Philadelphia to Belarus. I didn't ask too many other formal questions, but I found that people were, usually, more than happy to tell me all about their lives, and ask me about mine. Through these conversations, I found out that I had interviewed a retired English teacher, a Jehovah's witness attending a convention (I have the brochure to prove it), a few published authors and even a woman who had come right from the dentists, to name a few. The poems that I collected were similarly diverse, with topics including books, gargoyles, the sun, gold, acceptance, emails, growth, broken down cars, favorite quotes, and even more abstract concepts like "where are we?"

To display these works of literary achievement, I posted scanned images of the original hand-written poems on my blog, poemsofphiladelphia.wordpress.com, along with some of the quotes that participants gave me about the process, the final poem, and their feelings about the city. Eventually, I realized that my collected poetry would be perfect for Instagram as well. I've been relatively successful with this account, reaching almost 100 followers within a few months, and getting likes and follows from interesting people and businesses across the city. Very recently I decided to also add a Facebook page for the poems to live, offering another opportunity for people to check in as new poems were added.

This project has been extremely rewarding to me, and on top of that, a whole lot of fun. When this summer is over, I plan to continue with this project by going into the city whenever I can and collecting poetry. As the tagline for my blog says, poetry is all around us, and I am so glad that I was given the chance to find it in some of the most unexpected places.



Laura M. Crispin
Department of Economics
Saint Joseph's University

Ph.D. The Ohio State University

Research Interests: Economics of Education, Economics of Poverty and Income Inequality, Time Use, Applied Econometrics

My primary research interests are extracurricular participation and the effects on educational and labor market outcomes. Extracurriculars help students to gain both cognitive skills such as math and reading, and non-cognitive skills such as interpersonal, leadership, and teamwork skills, all of which increase human capital and ultimately wages. Furthermore, there is an opportunity cost associated with participation: time spent in extracurriculars must take time away from other activities, which tends to reduce risky behaviors such as smoking and drinking. Thus, it is likely that participants will be more successful than non-participants in terms of educational attainment and wages.

The causal effect of extracurricular participation on educational and labor market outcomes are often difficult to ascertain due to selection issues: students who choose to participate may also be those who choose to continue their education, which is difficult to account for empirically. Using econometric techniques and rich, nationally representative data from the Department of Education, I am able to estimate the causal effects of extracurricular participation in high school on students' high school dropout decision and college attendance and completion decisions. As an example of my findings, I find substantial effects of participation on dropout rates, reducing the likelihood of dropping out by 14 to 20 percentage points.

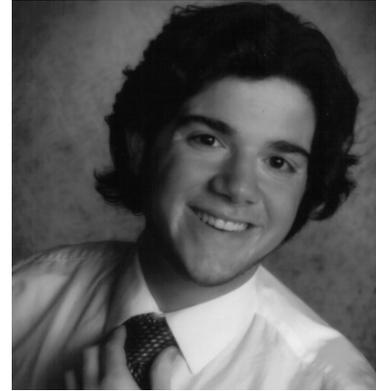
A related project that I've recently begun is to estimate the effect of time allocated to extracurriculars and work on college students' time spent on homework and sleeping. I focus on these time use categories because organizations such as NCAA have increased funding for scholarships, which requires recipients to increase time spent on extracurriculars. Additionally, due to the rising cost of college, students may feel an increased pressure to work during college to reduce their need for loans. These two trends may lead to the final trend: an increase in the time to graduation, with many students in four year colleges taking significantly longer than four years to complete their degree. If time spent in extracurriculars and work reduce time spent on studying and sleep, then policies that promote extracurriculars and work during the school year may have unintended consequences for current college students.

I have begun a related project to understand the effect of sports in particular on the likelihood of being bullied. In this paper, my co-author and I use data from the Youth Risk Behavioral Study (YRBS) to estimate the causal effect of athletic participation and physical exercise on the likelihood of being bullied for a sample of high school students. Preliminary results show that sports and physical activity participants are less likely to be bullied during high school by as much as 10 percentage points. We plan to extend this analysis to study cyberbullying as well as the effect of sports/physical activity on being the bully.

Understanding Gaps in Low-Income Students' College Readiness

Alexander R. Velazquez, '20

Faculty Mentor: Laura M. Crispin
Department of Economics



Supported by the SJU Summer Scholars Program

Prior research suggests that there are substantial differences in college enrollment based on a student's family income. In 2014, 87 percent of high school graduates with family incomes in the top quartile continued their education, compared to only 60 percent of those in the lowest quartile. A large body of research documents the existence of this gap, yet less has been done to explain why the gap exists.

A possible cause of these inequalities is lower college readiness levels among low-income students. According to a report by ACT Inc. in 2016, only 11 percent of low income students met college readiness benchmarks in four subjects, compared to 28 percent of all other students. In another ACT study (2014), findings show that students from low-income backgrounds are less likely to have details on financial aid and the steps towards college. If low-income students, on average, are less prepared for the college admissions process, they will most likely receive limited college admittance, or simply not apply at all.

My study provides an analysis of existing research related to low-income students' access to information through parents and counselors, and their access to resources, such as test preparation, advanced college preparatory courses, and extracurricular activities.

After an initial round of research collection, I was surprised to find few research studies that addressed these topics in depth. While there is knowledge to gain from qualitative studies or empirical research with small samples, it is also important that national representative data is analyzed to understand these issues as they relate to all students within the American education system. Using research to analyze exactly where in the college planning process lower-income students are disadvantaged can enhance abilities to provide services that are directed towards remedying these disadvantages.

From the research I have examined thus far, I have seen support for disparities in how low-income students receive information related to college planning, and their preparedness for the college admissions process. The research analyzed in this paper supports that parents and counselors at low-resource schools struggle to provide accurate information to students, that low-income students are extremely underrepresented in AP courses in which they are qualified for, and that low-income students show lower participation in extracurricular activities. These disadvantages are all part of key factors in the admissions process, and greatly impact the way in which low-income students apply and are accepted into various institutions of higher education. However, the research that supports these claims lacks depth and complexity. The process of understanding gaps in low-income students' college readiness is nowhere near complete. This paper takes a step by collecting research related to this topic to express our already existing knowledge, and analyzing what research should be conducted in the future to create a deeper understanding.



Neil T. Desnoyers
Department of Decision and System Sciences
Saint Joseph's University

M.S., M.B.A. Drexel University

Research Interests: Analytical Approaches to
Volunteer Scheduling

Scheduling volunteers for an event or project is not something to which many people who find themselves performing the work give much thought. But as the scheduling requirements become more complex and the number of volunteers required increases, the effort needed to produce a workable schedule increases exponentially. Analytical approaches to volunteer scheduling can both improve the efficiency of the process and increase the robustness of the resulting schedule. As with many tasks in today's world, tools that have been developed can make our lives easier. The tools or software used to create volunteer schedules for an event or project perform mathematical optimization, specifically binary integer programming. In this context, binary refers to the fact that a volunteer can either be scheduled (1) or not scheduled (0) for a particular task or shift.

Scheduling volunteers for an event or project is similar in many important ways to scheduling employees in a work environment. The tasks, roles/positions, locations, and other requirements need to be matched with volunteer/worker availability to produce a viable schedule. But there are some important differences between the two. Volunteers, by definition, are giving away their time and effort. So volunteers whose needs (in terms of schedules, roles, responsibilities, etc.) aren't met will simply stop volunteering. This is quite different from employees, who by and large must do what their supervisors or management tell them to do. And since most people are unable to get by without a paycheck, employees are a great deal less likely to stop showing up.

The process of scheduling volunteers starts with identifying requirements. Tasks, roles/responsibilities, locations, required skills, and number of volunteers required must be identified. Next, the necessary number of volunteers are (hopefully) recruited and their availability determined. The volunteer availability and the requirements are then entered into the appropriate software (i.e., MS Excel) and an optimization engine (or "solver") then produces a schedule. If everything is done properly and there are enough volunteers, the resulting schedule satisfies both all the requirements of the event or project and the volunteer availabilities. One of the biggest benefits of using analytical approaches when scheduling volunteers is that any necessary changes (i.e., if one volunteer pulls out and is replaced by another volunteer with different availability) can be addressed with the push of a button which creates a modified schedule.

The tools, or solvers, used in scheduling employees are software. Software, as with most other things, is being continually improved. My research has helped identify problems with one of the solvers available in Google Sheets spreadsheets. Other researchers are working on improving the mathematical optimization techniques that are used to solve these problems.

Analytical Approaches for Scheduling Volunteers

Rabia Ansari, '20

Faculty Mentor: Neil T. Desnoyers Department of Decision & System Sciences



Supported by the SJU Summer Scholars Program

When faced with the problem of scheduling volunteers manually, it can be a huge responsibility for the people in charge and quite frustrating. Even when the final schedule is finished with each volunteer listed with his/her preferred shifts, the coordinators are uncertain of any urgencies that may come up. From my experience at volunteering at Inglis House, I saw that it can be such a hassle for a volunteer coordinator just to remove one volunteer and then to readjust the whole schedule by hand. In this modern era of technology, scheduling volunteers shouldn't be challenging.

Being a freshman and not have taken any business intelligence courses, my first task was to learn integer programming before I applied it to any situations that require scheduling volunteers. At first, it was difficult to grasp the concept, but after some practice of understanding of how to do mathematical optimization problem and help from my mentor, integer programming became a lot easier. The analytical method that we used to schedule volunteers is binary integer programming. The word binary means a volunteer is assigned (1) to a task or is not assigned (0) to a task.

Also, I assisted my mentor with the case study (INFORMS Case Study) he is preparing which is an example of a situation that required scheduling volunteers. As we moved along in solving the case study, we happen to find some issues and when we corrected the issues, we were able to solve the problem. My work on this case study will improve the final version that will be submitted for publication. To prepare for scheduling volunteers for Hawkfest which is my main project, solving the INFORMS Case Study was good practice.

Our goal for Hawkfest is to utilize analytical methods to make the process more robust. The steps to create a more structured schedule: 1. Obtain requirements of number of students needed and tasks that need to be accomplished. 2. Create and distribute a survey to obtain student availability information. 3. Create an availability matrix and an assignment matrix in Excel. Also, we need to specify the Hawkfest requirements. 4. Using an optimization tool in Excel, we will then create schedule that will meet the needs of Hawkfest and the volunteers. This project will continue after the end of the Summer Scholars Program due to the fact the event is not held until the end of September. We expect to be working on this project until then. This process will save administrators time so they can work on more productive tasks.



Anne M. Fetherston

Department of Interdisciplinary Health
Services
Saint Joseph's University

Ph.D. The Graduate School and University
Center of the City of New York

Dr. Fetherston started her career working with children who have Autism at the Princeton Child Development Institute. She subsequently earned a Master's Degree in Communication Sciences and Disorders (Speech-Language Pathology) from Montclair State University and completed her Ph.D. in Psychology (Learning Processes and Behavior Analysis subprogram) at the Graduate School and University Center of the City of New York. Dr. Fetherston is a Board Certified Behavior Analyst-Doctoral and a licensed Speech-Language Pathologist in the state of NJ. Prior to joining St. Joseph's University, she provided intervention based on the principles of Applied Behavior Analysis to various populations, including individuals with Autism, ADHD, conduct disorder, and language learning disabilities. She has supervised in-home and residential intervention programs for both children and adults with Autism. She has also worked with individuals recovering from Traumatic Brain Injury. Dr. Fetherston has published in *Research in Developmental Disabilities* and in the *Journal of Applied Behavior Analysis*. She has been teaching at the college level since 2005 and joined the faculty at St. Joseph's University in 2015.

The Use of TimeSlips Creative Expression to Reduce Anxiety in Learners with Autism

Nicholas O'Malley, '19

Faculty Mentor: Anne M. Fetherston
Department of Interdisciplinary Health Services



Supported by the SJU Summer Scholars Program

In 1998, a group of gerontologists at the University of Wisconsin's Institute on Aging developed Timeslips, a creative expression therapy for persons suffering with dementia and Alzheimer's and living in long-term care settings. Timeslips therapy has been proven to be quite effective at combating the symptoms of anxiety and agitation in populations with Alzheimer's and/or dementia in a number of different studies, including one done by Saint Joseph's own Dr. Eileen Sullivan in 2015. Anxiety is a problem in populations with Autism Spectrum Disorder (ASD); in fact, one of the most common comorbid conditions with ASD is social anxiety disorder (Simonoff, Pickles, Charman, Chandler, Loucas, & Baird, 2008). Thus, the premise behind this experiment is quite simple: as Timeslips has been effective in alleviating anxiety and agitation in individuals with Alzheimer's we believe it will also mitigate anxiety and agitation in people with ASD.

As is the case with all research involving human subjects, the experiment must first undergo a long and arduous journey towards Institutional Review Board review. The majority of my research this summer was researching how this experiment could most safely and ethically be implemented. The main component that needed to be developed then, was demonstrating that conducting this research would present no more than minimal risk to participants. Through hours of extensive research, it is the research team's belief that this experiment poses only minimal risk to all those who participate.

Originally, this experiment was proposed to take place at the Kinney Center for Autism Education and Support. Unfortunately, due to some logistical obstacles and complications, the Kinney Center could not be used. Therefore, the study proposal was amended to include students from the ASPIRE program. In order to give the study more statistical weight, it was opened up to the general student population at Saint Joseph's as well. While exciting, these developments came with some complications. Specifically, the scales originally selected to assess anxiety in the subjects would no longer be valid. In fact, very few scales used in autism and anxiety research would have statistical weight in this experiment as they had all been used in children under the age of eighteen. In order to combat this problem, a hybrid scale was created piecing together the most relevant questions and assessments from both behavioral and self-reported measures of agitation and anxiety. This scale is currently under review, and will hopefully be of use to this experiment and many like it. In addition, the rest of this experiment is ongoing and will commence after the Institutional Review Board review.



Janine M. Firmender
Department of Teacher Education
Saint Joseph's University

Ph.D. University of Connecticut

Research Interests: Instructional Practices
for Elementary Mathematics and Gifted
Education

Most students with high potential in mathematics, or mathematically talented students, spend the majority of their elementary school time in the regular classroom and to meet their learning needs, teachers may look to best practices in the field of gifted education for guidance. One such practice involves engaging students as the practicing professionals in a field, or providing students authentic learning experiences. In the case of mathematics, teachers would engage their “student mathematicians” in the practices that are authentic to mathematics, which would include problem posing and solving, reasoning, and communication. It is this practice of communication that has been the focus of recent attention in mathematics education, as there have been recent calls for writing in all grade levels across the curriculum, including mathematics.

With these current calls for engaging all students in writing mathematically and the recommendation that mathematically talented students communicate in ways that mirror practicing mathematicians, one may wonder about the guidelines provided for elementary teachers to engage their mathematically talented students in this practice. Until recently, guidelines and recommendations for engaging all elementary students in mathematical writing have been unclear. For example, a recent study of almost 2000 writing prompts across 9 nation-wide grade 3 mathematics curricula highlighted that there is a wide variety in the types of writing prompts provided. In response to the lack of coherent guidelines, the Elementary Mathematical Writing Task Force, which I co-led, recently identified the types of and purposes for mathematical writing in which to engage students to engage them in reasoning and communication and to leverage their mathematical learning: exploratory, informative/explanatory, argumentative, and mathematically creative.

Given my interest in both mathematics and gifted education and knowing that teachers seeking to meet the learning needs of their mathematically talented students may use the enrichment or extension resources provided by their mathematics curriculum series, the summer scholars project we engaged in was to analyze the characteristics of the writing prompts in these resources. While ultimately meeting the learning needs of mathematically talented students through mathematical writing depends on how teachers engage their students in the practice, determining the characteristics of the prompts available may help teachers make more informed decisions about the types of prompts or which curriculum resources to use in this effort.

The Situation Surrounding Gifted Education for Hispanic English Language Learners in the Greater Philadelphia Area

Elaine Estes, '19

Faculty Mentor: Janine M. Firmender
Department of Teacher Education



Supported by the SJU Summer Scholars Program

The influence of increased immigration to the United States is felt in many aspects of American society. Education is a sector of society that sees many of these effects. Primary and secondary schools as well as higher education institutions are challenged in myriad ways by the needs of immigrants, and most of these are resultant of the fact that many immigrant students enter school systems as learners of the English language. Adapting curriculum and school practices in order to reach and serve the growing demographic of English Language Learners (ELLs) is complicated, and approaching the situation with attention to serving all of the needs of ELLs—not just the apparent requirement that they attain English fluency—is important. Particularly, the deficit-correcting philosophies created by the No Child Left Behind Act have shifted teacher effort from developing the skills and talents of all students to bringing struggling students, such as ELLs, up to the par of nationally normed standards. While correcting the achievement gap is a pressing issue within American schools, so is rectifying the excellence gap, or the difference between the percentage of majority groups performing at advanced levels and the percentage of minority groups achieving the same feat.

In pursuit of closing the excellence gap, the field of gifted education has seen a recent emphasis on adapting identification and service practices so that they are more inclusive of diverse students. The provision of gifted services for ELLs is often a notion that falls to the wayside in school, district, state, and federal education goals and policy. This oversight does not take into account that intelligence is not more present in humans of one language background than those of another. The disadvantages of the United States' education system have yielded the current and historical struggles of ELLs and other minorities with barriers to the same quality of education as other student groups. Despite these issues, the need to identify and develop diverse talent in students of diverse language backgrounds is a pressing matter that requires more attention from those within the field of education.

As a large metropolitan area, the greater Philadelphia region experiences a significant amount of immigration. As a result of increased immigration, there has been a subsequent significant increase in ELL populations within area schools over the past several years. While ELLs in the greater Philadelphia area speak many languages, the most common native language of students is Spanish. By focusing primarily on Hispanic ELLs within this study, the varied group of ELLs is narrowed and exploring methods of gifted identification and services for these students is more feasible. From there, researchers can expand upon and adapt findings to serve more students outside this specific linguistic group.

The components of this investigation included a literature review, conducting local gifted administrator interviews, and a final synthesis. The analysis of the literature and interviews suggest that measures including, but not limited to, universal screening of all primary school students, multipronged identification methods, inclusion of at least one enrichment program within the general education classroom per academic year, increased professional development for teachers concerning serving gifted ELLs, and the appointment of more staff who manage gifted programming at numerous levels within the education system would be building blocks in the effort to reach and attend to talent development for all student populations, especially gifted, Hispanic ELLs.

Future research into this topic will remain to be necessary as diversity grows within the United States. As research is applied within schools, American society will experience the benefits.



Mark A. Forman
Department of Chemistry
Saint Joseph's University

Ph.D. University of Pennsylvania

Research Interests: Strained and
Theoretically Interesting Organic
Molecules

The focus of my research program involves the synthesis and study of non-natural products that possess unique properties and enhanced reactivity as a result of forced deviations from their ideal geometries. In particular, my research group has been interested in studying the effects of bond angle distortion on the structures and properties of alkenes.

The carbon-carbon double bond of an alkene is made up of a sigma (σ) bond and a pi (π) bond as shown in Figures 1a-d. Maximum overlap between the p-orbitals of the π bond occurs when the axes of the p-orbitals are exactly parallel, as shown in Figures 1c and 1d. Any deviations from this ideal geometry are manifested in the form of enhanced reactivity and unique properties of the alkene. One type of distortion in alkenes is referred to as pyramidalization and results from a *syn*-folding of the R group substituents (Figure 1e). The degree of folding may be conveniently measured via the pyramidalization angle, θ , which is defined as the angle between the plane containing one of the doubly bonded carbons and the 2 substituents (R) attached to it and the extension of the double bond. Representative alkenes possessing pyramidalized double bonds include cubene (**1**) and pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene (**2**) (Figure 1f).

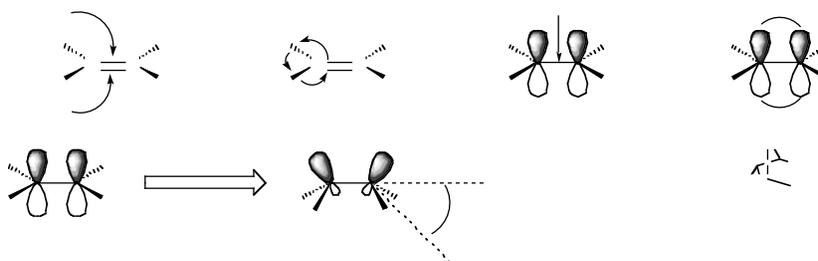


Figure 1

During the summer of 2017, my research group continued the investigation of the synthesis and study of pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene (**2**) and direct synthetic precursors.

The Synthesis of Pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene

Isabella Armento, '19

Franco Baccari, '18

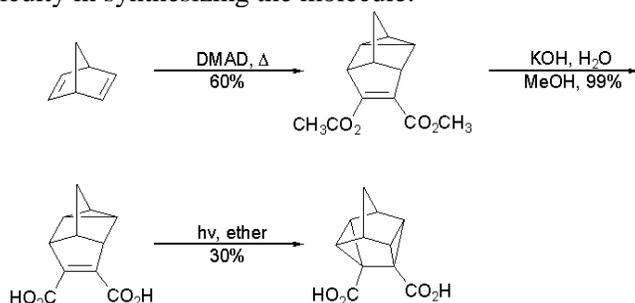


Faculty Mentor: Mark A. Forman

Supported by the SJU Summer Scholars Program

This summer, the Forman research group focused on the study and synthesis of manmade products. Through various synthesis reactions, the Forman research group attempts to create pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene. The study of these products focuses on geometric derivatives of alkenes from their ideal structure, by means of bond angle distortion. The carbon-carbon double bonds of alkenes, ideally form bond angles of 120°. Pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene has unique bond angle strain on the carbon-carbon double bond that deviates from its ideal shape, resulting in increased reactivity and high energy.

Pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene experiences syn-folding, a source of the strain in the carbon-carbon double bond. Syn-folding, or pyramidalization, causes substituent groups on the molecule to bend toward one another, resulting similarly to a tetrahedral geometry instead of the optimal trigonal planar geometry. With this strain, our target molecule is highly reactive and thus, it results in a short life span of only seconds. The high reactivity and short life span of pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene contribute to the difficulty in synthesizing the molecule.



The focus of this summer's research was to synthesize the intermediate products of pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene. Building up a stockpile of the intermediate products allows the research to continue efficiently during the year. The supply of the precursor molecules made during the summer was important because the reactions required a large amount of time to carry out. The precursor we focused on was closed diacid. To achieve the closed diacid, first a Diels-Alder reaction was carried out, the end product being diester. This diester then underwent hydrolysis resulting in open diacid. The last step is to expose the open diacid to ultraviolet light forming closed diacid, our desired product. However, this last step of the synthesis proved itself to be challenging, for the entire reaction runs overnight, and produces very low yields. Each of the above reactions was repeated numerous times with careful attention to detail so that the maximum amount of closed diacid, our target product, could be synthesized.

At the conclusion of the summer, we synthesized enough closed diacid to further our research goals for the upcoming school year. The closed diacid will be used to aid in our efforts to potentially synthesize pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene.

The Synthesis of Pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene

Elise Brutschea, '19

Linda Bui, '18

Amanda Tallon, '18

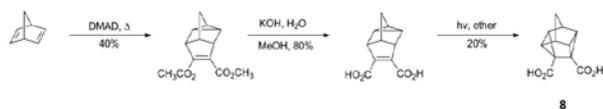


Faculty Mentor: Mark A. Forman

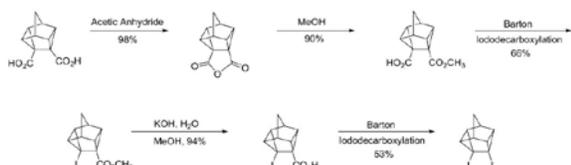
Department of Chemistry

Supported by the SJU Summer Scholars Program and the John P. McNulty Scholars Program

The synthesis of strained organic molecules, molecules with abnormal chemical structures, allows for the exploration of the limits to the chemical bond and chemical stability. Moreover, the study of these molecules allows for a better understanding of regularities in structure, stability and reactivity. The Forman research group specifically studies the effects of bond angle distortion on alkenes, a class of molecules that contain carbon-carbon double bonds.



doubly bonded carbon atoms, with bond angles of about 120°.



This summer, the Forman research group focused on the study and synthesis pentacyclo [4.3.0.0^{2,4}.0^{3,8}.0^{5,7}] non-4-ene, a pyramidalized alkene. The study of pyramidalized alkenes concentrates on geometric derivatives of alkenes from their ideal structure, through bond angle distortion. An unstrained alkene has trigonal planar geometry about its two

Pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene has unique bond angle strain on the carbon-carbon double bond that deviates from trigonal planar to a geometry more similar to tetrahedral. This distortion renders our target molecule highly reactive, and thus has a short life span of only seconds. The high reactivity and short life span of pentacyclo [4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene contribute to the difficulty in synthesis.

The focus of this summer's research was to optimize the synthesis of pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene, as well as build up a stockpile of intermediate products for future research during the school year. To optimize the synthesis, each reaction in the overall synthesis was studied individually, and reaction conditions were altered to produce higher yields. Specifically, the fourth step, titled the anhydride reaction, produced yields of 60% when heated in the CEM Microwave Reactor. By heating the reaction conventionally in the presence of 60W light bulbs, the product yield increased to 98%. Also, the fifth step, the acid ester reaction, produced similar yields as the microwave anhydride reaction. By removing the addition of sodium methoxide from the reaction procedure, thought to be needed as a catalyst, yields increased to 90%.

The Barton Iododecarboxylation reactions were producing low yields. With longer reaction times, one of the cyclopropane bonds was cleaving and DIH was iodinating across the cleaved bond, producing interesting but useless side products. By changing the heat source from microwave to traditional heating with 60W light bulbs and stopping the reaction after 5 hours, 60% yield of the desired product was obtained and the unreacted reactant was recovered without cleavage of the cyclopropane bond.

By improving the quantity and purity of yields in each synthesis reaction, we were able to collect more intermediate products, which in turn will allow us to make further advancements in the synthesis. This school year we plan to react our direct precursor, diiodide, with refluxing dioxane to yield pentacyclo[4.3.0.0^{2,4}.0^{3,8}.0^{5,7}]non-4-ene.



Richard A. Fusco
Department of English
Saint Joseph's University

Ph.D. Duke University

Research Interests: American Literature

One of the more difficult research tasks in literary scholarship is to trace paths of influence from one generation of authors to another group writing twenty or fifty or even one hundred years later. I specialize in American literature. Among the best books and articles published in my field have been “continuity studies,” which provide valuable insights to both scholars and teachers about matters such as how do Edgar Allan Poe’s concepts of terror and horror from the 1840s fare in the works of Stephen King from the 1970s to today. In particular, the continuities throughout the history of American poetry present unusual challenges for scholars. The poets of each successive generation begin by recognizing the worth of their predecessors, but the egos of new writers (and most good poets have strong ones) compel them to reject the artistic, philosophical, and aesthetic dogmas of the past—in essence, the young wish to find a new voice and approach worthy of the different world and experience they try to describe.

In a similar way, it is incumbent upon each new generation of literary scholars to examine the society around them, to recognize its significant artists, and to research and argue how these new poets have become the inheritors of Walt Whitman, Emily Dickinson, Edwin Arlington Robinson, Robert Frost, T. S. Eliot, Langston Hughes, H. D., and many more. The student I am mentoring this summer, Mr. David Garton, follows in the footsteps of the eminent literary scholar Roy Harvey Pearce, whose seminal work, *The Continuity of American Poetry* (1961), continues to inspire academics today. Mr. Garton’s study traces the arcs of influence and reaction from Romantic poets Ralph Waldo Emerson, Walt Whitman, and Emily Dickinson, through postmodernists Allen Ginsburg and Sylvia Plath, to twenty-first-century poets Amy King, C. A. Conrad, and Terrance Hayes. The most original and valuable contribution of the finished essay will reside with his insights on how the political stances of the latter three poets altered their conceptions of the purpose of poetry from the values held by their predecessors. In effect, Mr. Garton’s theory explores how the social awareness of poets filters into the very fabric of their work in that the post-9/11 sensibility of the artist has viscerally affected what society now calls art. The poets of today essentially reject the unresolvable angst of postmodernism in favor of reexamining the appeal of aesthetic strengths from America’s Romantic past.

The Emergence of Postmodern Irony in American Poetry and the Transition into a New Form in the 21st Century

David Garton, '18

Faculty Mentor: Richard A. Fusco
Department of English

Supported by the SJU Summer Scholars Program



I designed this project as an influence study to determine connections between three distinct periods of American poetry. The study began with an examination of American Romantic poetry with a focus on Ralph Waldo Emerson, Walt Whitman, and Emily Dickinson as three important early poets who had distinct influence on American poetry of the 20th century. My influence study moves from the Romantics to a study of the ways in which Whitman and Dickinson influence the work of Allen Ginsberg and Sylvia Plath writing in the 1950s and 1960s representing a transition in American poetry toward postmodernism.

Through reading of primary and secondary materials about the Romantic poets alongside Allen Ginsberg's "Howl" and poetry collections by Sylvia Plath, I draw direct connections between Whitman and Ginsberg with Dickinson and Plath. Ginsberg and Plath represent an adapted formulation of the expansive poetry of Whitman and the introspective poetry of Dickinson. All four poets offer nuanced and insightful representations of their world, external and internal, but Ginsberg and Plath provide a more pessimistic and chaotic representation of the world reflective of a move towards a literary mindset influenced by the emergence of postmodernism in the middle of the 20th century. My reading of Jacques Derrida's *Of Grammatology* and excerpts from his other works provided an understanding of the philosophy of postmodernism and of deconstruction to reveal hierarchies of meaning and privilege of certain ideas above others in Western Culture. This tension between hierarchies of meaning is reflected in the poetry of Ginsberg and Plath as they struggled to fit their work into a changing America.

In turning to an examination of current poets, I examined the work of Terrance Hayes, Amy King, and C.A. Conrad, three influential and active 21st-century American poets. Whether intentional or not, the works of these 21st-century poets represent a response to the poetry of Ginsberg and Plath. I conclude that Terrance Hayes rejects postmodernism by composing meaningful poetry reflective of his honest account of American life. Hayes's work is not concerned with hierarchies of meaning and the deconstruction of meaningful poetry, an idea which he rejects. The work of Amy King and C.A. Conrad follow a political ideology by promoting a poetry focused on societal oppression of LGBTQ individuals and other minorities, rejecting the work of past poets who do not fit this ideology, most notably Walt Whitman. In current American poetry this division seems to be between maintains a genuine commitment to poetry as a meaningful form of art and an expression of the human experience, and as ensuring the equality of ideas and artists in American society. Poetry is responsible in its consideration of the American society it reflects. The path forward is difficult to predict but the balance between politically responsible poetry and poetry for its own sake must be maintained if it is to remain an essential art form.



Peter M. Graham
Department of Chemistry
Saint Joseph's University

Ph.D. University of Virginia

Research Interests: CO₂ Activation

As part of nature's carbon cycle, photosynthesis converts atmospheric carbon dioxide into carbohydrates which provide cells with energy and the chemical building blocks needed to synthesize other compounds. The world economy continues to rely on fossil fuels to provide energy and the chemical building blocks needed for the manufacture of everything from plastics to pharmaceuticals. This reliance on fossil fuels has broken the balance of the global carbon cycle by concentrating carbon in the atmosphere. The development of alternative chemical processes that use carbon dioxide as a chemical building block would ease this imbalance. Not only would such processes decrease the reliance on petroleum raw materials, but they would also consume excess carbon dioxide by converting it to useful chemicals. This would provide an economically viable way to mitigate carbon dioxide emission by chemical industry, and could become an important facet of ultimately restoring balance to the global carbon cycle.

Carbon dioxide is an attractive alternative carbon starting material for a number of additional reasons. Unlike petroleum or natural gas, carbon dioxide does not have to be extracted from the ground, and does not require transportation across the globe in order to be used. It is also nonflammable and nontoxic. However, carbon dioxide's innate stability presents a major challenge, and only a handful of known chemical processes can make use of carbon dioxide as a starting material. Therefore, in order to effectively use carbon dioxide in chemical reactions, its chemical stability must be overcome.

In my laboratory, we are investigating transition metal complexes of tungsten, molybdenum, and rhenium that can overcome the stability of carbon dioxide. These metals strongly coordinate carbon dioxide and in doing so bend the normally linear molecule. This activates carbon dioxide towards otherwise impossible reactions. Gaining a better understanding of how such metal complexes interact with carbon dioxide and promote chemical reactions is critical to developing new catalysts for carbon dioxide activation. Such catalysts could convert carbon dioxide into carbon monoxide, formates, acrylates or dialkyl carbonates, all traditional chemical building blocks.

Reactivity of Molybdenum Carbon Dioxide and Carbon Monoxide Complexes

Brandon Jiannotti, '19

Faculty Mentor: Peter M. Graham
Department of Chemistry

Supported by the SJU Summer Scholars Program



From the start of the industrial revolution to today, the climate has experienced a dramatic disturbance. Carbon dioxide, the carbon-containing product produced by the combustion of fossil fuels, has become more concentrated in the atmosphere. This imbalance in carbon dioxide in the atmosphere is linked to global climate change.

However, one strategy to address this excess carbon dioxide and return the atmosphere to a more balanced state is to use carbon dioxide as a chemical feedstock. Carbon dioxide is a tricky molecule to work with since it is not very reactive. One strategy is to first reduce carbon dioxide to carbon monoxide which is more susceptible to chemical reactions at a metal center such as molybdenum. Previous work in the Graham group has shown that lithium borohydride can reduce a carbon monoxide complex. Thus, the reactivity of the carbon monoxide complex must now be explored. The molybdenum carbon monoxide complex that I have been investigating is $TpMo(NO)(PPh_3)(CO)$.

My project has focused on the removal of the triphenylphosphine ligand (PPh_3). The loss of triphenylphosphine allows further reactivity of the molybdenum complex. There have been a few promising reactions observed such as the reaction with lithium borohydride ($LiBH_4$) and hydrogen gas. Analysis by Nuclear Magnetic Resonance spectroscopy indicates the triphenylphosphine ligand is no longer bound to the molybdenum complex. These new products will be crystallized so that they can be identified by X-ray crystallography.

Reactivity of a Molybdenum Carbon Dioxide Complex

Madelyn MacDonald, '20

Faculty Mentor: Peter M. Graham
Department of Chemistry



Supported by the SJU Summer Scholars Program

The conversion of carbon dioxide (CO_2) to useful hydrocarbon compounds has been a plant's mechanism for storing energy for as long as recorded evolution. This process is limited to plants who use photosynthetic energy to overcome the inherent stability of CO_2 . Other strategies must be used in order to convert CO_2 into hydrocarbons in the laboratory. One approach is introducing CO_2 to a heavy metal, in this case molybdenum. Certain complexes of molybdenum have the ability to pull two of the bonding electrons away from CO_2 molecules. This changes the CO_2 's structure from its very stable linear conformation to a more reactive bent conformation.

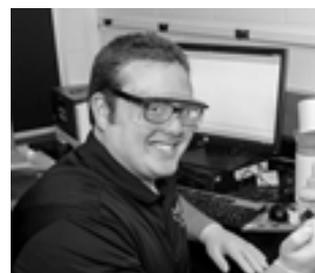
The coordinated CO_2 molecule is now susceptible to other chemical reactions and, under the proper conditions, could potentially combine with other molecules to form the hydrocarbons of interest. Attempting to protonate or methylate this activated CO_2 complex has been the main focus of my research this summer. This can be accomplished by introducing the complex to an acid or a compound with a reactive methyl group. The goal is for one of these components to react with the complex and change the structure of the CO_2 without compromising any of the other ligands attached to the complex metal.

Another focus of my research this summer has been attempting to determine the decomposition product of the CO_2 complex by heating it in solution at high temperature. This can potentially cause the strong bonds within the compound to rearrange to give either a carbon monoxide or oxide complex. My preliminary results suggest that an oxide complex is formed. Such oxide complexes are interesting because they are known to catalyze oxidation reactions.

Reactivity of Molybdenum Alkene Complexes with Carbon Dioxide

Steven Oldenburg, '19

Faculty Mentor: Peter M. Graham
Department of Chemistry



Supported by the SJU Summer Scholars Program

Even though climate change is a major issue that is affecting the world today, there is debate about whether or not it should be addressed. The main justification used by those who do not want to address climate change is that doing so would have an immediate negative economic impact. If climate change could be addressed in a way that would produce a valuable commodity, people might have fewer reservations in helping to improve the planet's health. The main cause of climate change is excess carbon dioxide in the air. If this gas can be used to make chemical products, the amount of carbon dioxide in the air would decrease and the products produced could be of positive economic impact. It is important to note however, that simply developing carbon-dioxide-utilizing reactions alone will not be sufficient to fully confront climate change.

One trait of carbon dioxide that makes it difficult to work with is that it is very stable. In order to be able to react carbon dioxide, this stability must be overcome. To do this, a catalyst would be required. This project is focused on investigating whether certain transition metal complexes, specifically molybdenum complexes, are able to catalyze a carbon dioxide reaction. The complexes that have been investigated by the Graham group have shown the ability to coordinate the carbon dioxide molecule and change its shape so further reactions can be possible. With that being said, more research needs to be done on these complexes to determine how exactly they interact with carbon dioxide and which reactions can be made possible.

My project has focused on investigating the reactivity of the molybdenum alkene complexes with carbon dioxide. The precursor is first synthesized, and is then reacted with iodine. This particular reaction has been optimized by varying the temperature and amount of iodine added. Reacting the $\text{Tp}(\text{Mo})(\text{NO})(\text{PPh}_3)(\text{CO})$ with one and a half equivalents of iodine, dissolved in dichloromethane, at -78 degrees Celsius consistently produces the product, $\text{Tp}(\text{Mo})(\text{NO})(\text{PPh}_3)\text{I}$. Once this product is isolated, it is reacted with sodium metal in an oxygen free environment in the presence of the alkene cyclopentene, as the sodium is very sensitive to air and moisture. This reaction has produced less consistent results; however, small quantities of cyclopentene complex have been isolated. This cyclopentene complex will next be reacted with carbon dioxide with the goal of producing an acrylate product.



Eileen D. Grogan
Department of Biology
Saint Joseph's University

Ph.D. College of William and Mary

Research Interests: Evolutionary Developmental Biology of Early Vertebrates (Sharks, Chimaerids & Bony Fish), Paleoecology, Functional Morphology, and Community Structure of the Bear Gulch Fossil Fish Fauna

Vertebrates, animals with a backbone, have a long evolutionary history; over 500 million years! How are the forms living today related to those extinct? What did the earliest vertebrates (fishes) look like? Did they live in communities and environments like today's forms? Have sharks, long considered an example of the primitive vertebrate, changed at all over their evolutionary history? What can living and extinct fish, in all their diversity, teach us about how the body (including its skeletal tissues) can be designed to achieve various functions and specializations? Can humans use this information from design and function to our advantage? Thanks to fossil deposits like the 323 million years old Bear Gulch Limestone of Montana, we can answer these and other questions about vertebrate life in deep time.

The Bear Gulch Limestone is a rare type of fossil deposit, one in which the conditions of animal death, burial, and fossilization result in preservation of much more than teeth, scales, and bones (mineralized tissues). Many of our fish preserve information of internal organs, blood vessels, and even skin pigment patterns. Because of this quality of preservation, the Bear Gulch preserves a unique glimpse into the diversity of organisms and their community structure in a well-defined shallow tropical marine bay that existed near the earth's equator over 300 million years ago. Nearly five decades of excavation across the entire Bear Gulch deposit have resulted in approximately six thousand fossil fish finds, virtually all of which are entirely new to science. Thus, much of our work begins with the formal description and naming of each new taxon. Yet, because of the quality of preservation we have other information, like how different fish gave birth, where they lived, what they ate, how they aged and if sexual selection played a part. For these reasons, the Bear Gulch is internationally recognized and valued by the scientific community and non-specialist enthusiasts.

Research students working with me and co-principle investigator, Dr. Richard Lund, may be found working on any of a number of projects in the lab, ranging from anatomy, morphology, and tissue histology to ecology and community structure analyses. In the field they learn about geology, field techniques, camping, and interact with the local community near our Paleontological dig site. Here the student learns how to share their science with the public.

In summation, workers in the Grogan-Lund lab strive to "Make The Dry Bones Come To Life and Let the Dust Of Ages Past To Rejoin The Pageant Of The Living"!

Aphol: An Enigmatic Scale-less Actinopterygian

Aswathi "Asha" Jacob, '18



Faculty Mentor: Eileen D. Grogan and Richard Lund
Department of Biology

Supported by the John P. McNulty Scholars Program

About 323.3 million years ago, before the advent of dinosaurs, the state of Montana was a tropical marine bay rich with diverse life forms such as arthropods, sponges, shrimp, cephalopods, starfish, and most notably: fish. Today, this ancient marine ecosystem is known as the Bear Gulch Limestone of Montana, where excavations by Drs. Lund, Grogan and crew continue.

The Bear Gulch Limestone is known as a lagerstätte which is a sedimentary deposit characterized by exceptional preservation of fauna that even include soft tissues, blood, and skin pigments. The Bear Gulch limestone preserves the bay in its entirety, providing important information on fish diversity, number, habitats and life histories. Through studying these fossils, we can shed light on morphology and ecology of early vertebrate life which in turn creates a greater understanding and appreciation for diversity of life (including humans, as vertebrates) in the context of evolution.

From the Bear Gulch comes a fossil fish I have been studying with Drs. Grogan and Lund codenamed Aphol. Under the phylogenetic tree, Aphol is a gnathosome and more specifically it falls under Osteichthyes which are bony fish. There are two groups within the Osteichthyes: sarcopterygians (lobe finned fish and some tetrapods) and actinopterygians ("ray-finned fish" owing to their fins being internally supported by rays). One objective of this study of Aphol is to determine if Aphol is an actinopterygian (as it exhibits rays in its fins) or to raise the question if it belongs in a new group within the Osteichthyes. In order to answer these questions, it is important to understand the morphology and possible functionality of Aphol.

I have focused on describing and drawing Aphol's postcranial anatomy and considered possible swimming mechanics. An important and exciting component of this research was to understand Aphol's unique vertebral column. Aphol's vertebral column exhibits midline processes off of its vertebral segments which generally are termed apophyses. Apophyses are structures that are not expected for a vertebral column at this time period and have not been recorded in any Paleozoic fish to date. These apophyses serve to restrict dorso-ventral movement, but allow lateral flexion and help to stabilize the intervertebral joints exhibited in Aphol's vertebral column. Not only have I focused on Aphol's vertebral structure, but have looked into its fin morphology to postulate possible swimming mechanics, which appear to support the idea that Aphol's elongate dorsal, anal, and caudal fin moved in a wavelike motion and served as the main source of propulsion. Aphol's pectoral fin structure also indicates a wave like movement, but likely was not used as propulsion, but for hovering and orientation.

I have compared Aphol to the extant Garden Eel, especially since its vertebral morphology draws similarities to Aphol's. I have also considered if Aphol was a tail first burrowing fish like the Garden Eel. In order to answer these questions and to also consider Aphol's phylogenetic placement I will continue studying this fish during the school year, this time considering cranial features and meristic data.





Piotr Haldas
Department of Physics
Saint Joseph's University

Ph.D. University of Silesia

Research Interests: Glass Transition, Soft Condensed Matter, Rheology of Non-Newtonian Liquids

During summer of 2017 two summer scholar students worked in my laboratory, and three students volunteered for part of the summer. Miranda Mazzio '18 and Rui Zhang '18 worked on extracting properties of complex liquids by tracking motion of magnetic beads suspended in dilute and dense colloidal suspensions. Michael Jenkins'19 studied dynamics of colloidal particles in dense suspensions with various strengths of inter-particle attraction and ways to extract particle trajectories using machine learning. Two high school students, Alex Rudnicki (Lower Merion High School) and Liam Ward (La Salle College High School) worked on measuring impulse with object of various elasticity.

Rui made samples with dilute colloidal suspensions and a small number of magnetic beads. Next, he constructed a motorized system next to a microscope in order to move a magnet near the sample and therefore exert a range of forces on the magnetic beads. From the motion of the magnetic beads one can extract properties of dilute colloidal suspensions. We have obtained preliminary results of how a magnetic bead moves through a dilute colloidal suspension. We plan to conduct systematic studies of magnetic beads moving with various speeds through colloidal suspensions of various concentrations.

Colloidal suspensions of spherical particles have been used successfully as a system that models the behavior of a regular glass. Miranda made samples with various attractive strengths between colloidal particles, thus making them stickier, to see how particle dynamics change as the particle stickiness increases. Using confocal microscopy, we collected 3D data over several hours and then tracked the centers of the colloidal particles. We were able to study how colloidal particles interact with each other and study their collaborative motion. We are continuing analysis of data to extract more information about cooperative particle motion and how it changes with the concentration of colloidal suspensions and with inter-particle attraction.

Typically, data is collected in colloidal suspensions using confocal microscopy over several hours and then centers of colloidal particles are determined. The process of finding the centers of colloidal particles is time intensive. Recently, neural networks have started to be used in order to accelerate this process. Moreover, real time particle tracking can allow to determine if the data collection parameters are optimal or if there is something wrong with a sample. This summer Mike has constructed a neural network that determines if the image has a colloidal particle or not. This is just a start and we hope to construct neural networks that will eventually allow for real time particle tracking.

Funding: NSF RUI-1306990 and Summer Scholars Program.

Dynamical Heterogeneity in Dense Colloidal Suspensions Using 3D Confocal Microscopy

Miranda Mazziio, '18

Faculty Mentor: Piotr Habdas
Department of Physics



Supported by NSF RUI-1306990 and the SJU Summer Scholars Program

For decades, physicists have been seeking insight into the nature of the movement of the molecules of glassy materials. Unlike a traditional solid whose molecular make up consists of crystalline and neatly ordered structures, glasses exist in formless, packed, non-symmetric configurations. One system that is structurally analogous to glassy materials are suspensions of spherical colloids, small solid particles suspended in liquid, making them ideal models for quantifying the dynamics of glass molecules. While in the suspension, the particles experience Brownian motion on a microscopic scale. Systems of spherical colloids suspended in solution are known as hard-sphere particles that interact in the same manner that pool balls would, bouncing off of each other upon contact. As more particles are added to the system, they become increasingly encaged by their neighbors until the system reaches a point of critical packing where these cages become permanent. The resulting state is known as a repulsive glass.

Repulsive glasses are not the only system in which dynamical arrest can be observed. The addition of different, smaller particles produces an interesting effect. When the smaller particles surround the colloidal hard-spheres a short-range attraction is induced and the colloids become "sticky" leading to a phenomenon known as depletion attraction. Multiple states that glassy materials occupy can be observed by simply changing the volume fraction, the volume of colloidal spheres divided by the total system volume and the strength of attraction between particles. Most of my research this past summer has focused on collecting data in hard-sphere glasses, but one of my main future endeavors is to observe how particle dynamics change in an attractive glass.

The samples are created using the hard-sphere particles suspended in liquid (Fig. 1). Once the sample is created, we are able to use confocal microscopy to take pictures of the sample at different depths, allowing us to follow the movements of each particle in 3-dimensions. Trajectories of thousands of particles are identified and various techniques are used to analyze the observed movement. Motion is never as simple as a particle finding a gap in its cage and squeezing through to another position. Instead, there are instances of cooperative rearrangement where particles move together in clusters. The goal of our future research is to look more in depth at this cooperative motion and glean more insights into the dynamical arrest that occurs in repulsive and attractive glasses.

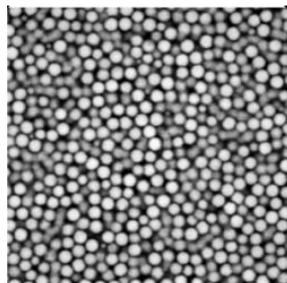


Fig.1. A snapshot of a colloidal suspension in a repulsive glass state.

Force-Induced Diffusion in Colloidal Suspensions

Rui Zhang, '18

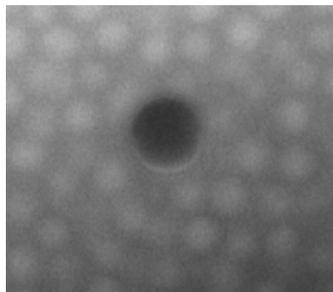
Faculty Mentor: Piotr Habdas
Department of Physics



Supported by NSF RUI-1306990 and the SJU Summer Scholars Program

Rheology is the study of a material's flow behavior under applied deformation forces. Conventional rheometers are widely used for measuring the rheological properties of a material, such as viscosity and diffusivity. However, conventional rheometers have limitations. To perform rheological measurements, conventional bulk rheometers usually require a relatively large volume of fluids. In some cases, fluids can be composed of expensive, rare, and volatile materials, especially in the medical and pharmaceutical fields. Moreover, rheometers can only measure macroscopic rheological properties. In the case of micron-sized colloidal suspensions, this approach may not be entirely applicable.

In recent years, the demand for understanding microscale systems has been growing dramatically. A novel approach known as microrheology has become more practicable in the last two decades due to the significant improvements in imaging technology and computing power. A micron size probe is followed in time in order to determine the dynamic response properties such as microviscosity and microdiffusivity [1].



In this study, $4.5\mu\text{m}$ size magnetic probes are placed in colloidal suspensions. An electromagnet above the sample exerts a vertical force to suspend the probe; another magnet on the right side of the sample exerts a horizontal force to drag the probes through the colloidal suspension. The horizontal force applied on the probes can be changed by adjusting the distance between the magnet and the sample. Fluorescence microscopy is used to acquire data. With image analysis and particle tracking techniques, the microrheological properties of the probes can be calculated. Finally, the experimental results are used for exploring the connection between microrheology and macrorheology.

[1] R.N. Zia* and J.F. Brady, "Microviscosity, microdiffusivity, and normal stresses." *J. Rheol.*, 56, 1175-1208 (2012)



Emily K. Hage
Department of Art
Saint Joseph's University

Ph.D. University of Pennsylvania

Research Interests: 20th - and 21st-
Century American and European Art;
Magazines, Museum Studies, Art and
Social Justice

With a background in philosophy, political science, and economics, I am fascinated by the social, political, cultural, and financial contexts of Western art in the twentieth and twenty-first centuries. My research focuses on artists' manipulations on the magazine medium, from Dadaists' art journals from 1910s and 20s to artists' sustained involvement in *Fortune* magazine through the 1960s and punk zines in the 1970s. Although often overlooked, artists' involvement with print media constitutes some of their most direct and widespread effectiveness. The often subversive relationship between image and text in magazines and collages is especially compelling to me. My research on artists' magazines informs my analyses of 21st-c. artists' infiltration of mass media channels and questions about how present-day social media alter the landscape of artistic practice and activism.

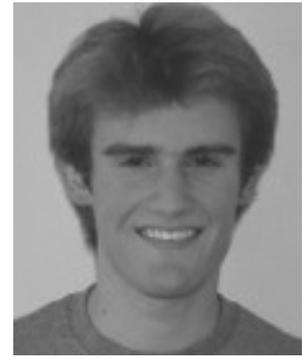
Having worked in museums for years, I am committed to making cultural institutions accessible and engaging for a broad range of audiences and raising awareness of the importance of display design. Locally, I am involved in supporting artists in Philadelphia, whose work speaks to issues of social justice and contributes significantly to the increasingly globalized art world of the twenty-first century. I have worked with summer scholars on a variety of topics related to my research, including yarn bombing, representations of African Americans, and present-day Philadelphia artists' efforts to promote social justice.

Social Media as Artistic Medium: The Instagram of Amalia Ulman

Daniel Hughes, '18

Faculty Mentor: Emily K. Hage
Department of Art

Supported by the SJU Summer Scholars Program



Social media is rapidly having a greater effect on how information is shared and the way we perceive the world. It allows us to communicate more efficiently, but in many ways, social media has become a performance, where users create a version of themselves, selecting only the facets of their life that will show them in a beneficial light. For many, the process of cultivating a professional and successful online identity is extremely strenuous.

This is no different in the art world. Although social media has allowed the viewing of art to become easier and more widespread than ever, many artists are forced to compromise their work in an effort to maintain their online appearance.

One artist who has seized on this concept is Amalia Ulman. In 2014, Ulman staged a performance piece on her Instagram account where she created an online persona who behaved strangely without giving her followers any warning. The piece, entitled *Excellences & Perfections*, lasted for six months, and addressed many stereotypes which are enforced prevalently on social media, in some cases borrowing from events in Ulman's own life to do so. In a medium such as Instagram, Ulman's art consists not of the pictures she takes, but the persona she creates. This also means that when Ulman's followers interact with her they become unknowing participants in the artistic process. What these users write on her profile, as well as what they don't write, all becomes part of the piece.

My paper focuses on Ulman's work as a mirror to our own social media reality, and how *Excellences & Perfections* shows us a great deal about the different ways we use social media, and reveals the nature of conformity on social media. She compares the process of self-branding that we conduct on social media to the artistic process, but in doing so also reveals that the final product is a fake version of ourselves that we have created, and not an accurate window into our lives.





Steven R. Hammer

Department of Communication Studies
Saint Joseph's University

Ph.D. North Dakota State University

Research Interests: Rhetoric and Composition,
New Media Art, Glitch and Dirty New Media,
Sound Studies, Media Ecology

Technologies have shaped our lives and societies for as long as humans have used tools to enhance their bodies and abilities. Sometimes technologies enrich our lives, allowing us to connect with one another or make resources more available. Sometimes technologies are destructive. But it is increasingly evident that technological innovation is both rapid and life-changing. I remember my first email account in my early teens, thinking it a novelty. I remember trying to convince my parents in the late 1990's that a cellular phone (as big as a brick!) would make me more responsible and better prepared for an emergency. Twenty years later, it seems the entire world has changed in terms of how we work, communicate, and entertain ourselves. And while it is a pretty obvious observation that "technology has changed our world," it is less obvious to delve deeply into just how they change us. Public opinions range from uncritical praise for anything new and shiny to complaints how "kids these days" just don't appreciate how things used to be. But as media and communication scholars, we try to ask more nuanced questions such as "what happens when Twitter becomes a legitimate, even primary, venue for political debate and policy?"

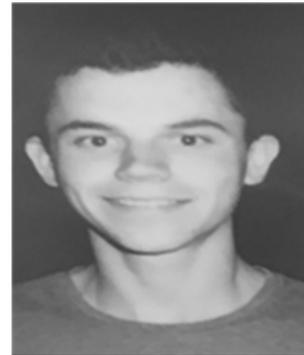
This research question has been at the forefront of our summer scholar activity. But to answer, we needed to ask a lot of other questions: How is Twitter as a technology different from large-scale communication like television and print? Why is Twitter such a socially and commercially successful platform? What are the opportunities and limitations when public discourse takes place on a platform like Twitter? Our investigation ultimately requires us to think deeply about how each communication technology is not only shaped to work in the world, but also how it works to shape experiences and communication strategies of its users. Or, in the words of Marshall McLuhan, we needed to acknowledge and understand how "we shape our tools, and thereafter our tools shape us."

Our research has centered around the ways that attention has changed: how many young people, particularly in the U.S., have marked differences in attention than their parents' generation. We have applied existing theories and studies that examine this trend to contemporary discussions of accuracy and honesty of news media organizations, politicians, and public figures, particularly during the 2016 election season. We interpret and explain these events and offer suggestions to citizens and educators who value critical thinking and truthfulness but also acknowledge the cultural relevance of platforms like Twitter and the changes in attention they foster.

#PostTruth Politics, Disinformation, and Shifting Cognitive Modes

Michael Farrell, '19

Faculty Mentor: Steven R. Hammer
Department of Communication Studies



Supported by the SJU Summer Scholars Program

In 2016, Oxford English Dictionary named “post-truth” the word of the year, an adjective defined as “relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief” (OED). Post-truth became a widely used term within political conversations in relation to far-right and populist political communication practices, most notably the UK Referendum (“Brexit”) and President Trump’s campaign in the U.S. While neither Brexit nor Trump were particularly new in terms of tone, policy, or controversy, both were unprecedented in terms of the ways social media enabled their messages and strategies to flow with minimal cultural resistance. Why is this so? Amongst a multitude of factors, I argue the most crucial factors are a significant societal shift in cognitive modes that has been exploited by the design, function, and use of new technologies and media. The relationship between cognitive modes and new media has changed favor as implications on the political become more apparent.

At the heart of Post-Truth politics lies disinformation. “Disinformation does not mean false information. It means misleading information--misplaced, irrelevant, fragmented or superficial information – information that creates the illusion of knowing something but which in fact leads one away from knowing.” (Neil Postman, *Amusing Ourselves to Death: Public Discourse in the Age of Show Business*) Disinformation has found an ideal home/medium within our social media newsfeeds and timelines. Filter bubbles, specialization tools, and lack of validity checks have allowed disinformation to dominate social media with fake news serving as a prime example of this. Fake news can be considered as 1: simply false information/stories that have no factual basis and 2: news that provides disinformation; the information is not necessarily false; however, it serves to distract readers/viewers from the real issues at hand.

The responsibility here does not lie solely in the hands of social media developers but also in the users’ discretion and use of social media. There is an increasing “trend” or pattern of users actually sharing articles without reading them. This practice significantly contributes to the spread of fake news and disinformation. I argue that there is a direct link between users’ seemingly careless use of social media and a current generational shift in cognitive modes from deep attention towards hyper attention. While it is rather obvious that the shift in cognitive styles poses a major threat to education at all levels (Hayles, *Hyper and Deep Attention: The Generational Divide in Cognitive Modes*); it is also apparent that additional political consequences arise when these trends are exploited in political communication practices using social media as an ideal vehicle for delivering Post-Truth messages.



Christina King Smith

Department of Biology
Saint Joseph's University

Ph.D. University of Maryland, Baltimore
County

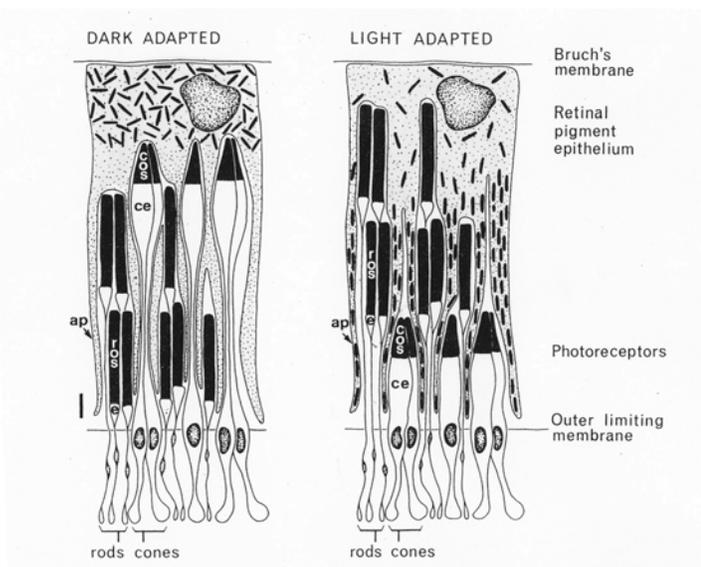
Research Interests: The Cytoskeleton and Cell Motility

Research in my laboratory centers on questions concerning cell motility. Our current areas of investigation focus mainly on understanding mechanisms of actin-dependent organelle motility and how motility is regulated. As a model system, we use retinal pigment epithelial (RPE) cells from fish eyes. These cells are found at the back of vertebrate eyes, and contain numerous pigment granules that in fish, undergo mass migrations in response to light. RPE cells can be isolated from the eyes of fish, dissociated, and cultured as single cells. Aggregation and dispersion of pigment granules within RPE is dependent on the actin cytoskeleton, and can be chemically triggered in isolated cells, allowing investigation of the mechanisms involved in motility.

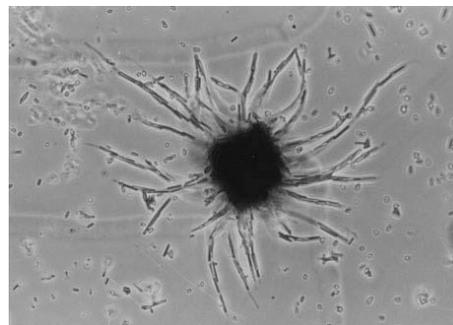
Questions we are addressing include:

- What role do actin dynamics and non-muscle-myosin motors play in pigment granule motility?
- The signaling molecule, cAMP, stimulates pigment granule aggregation in RPE cells *in vitro*. cAMP is an activator of a protein kinase, protein kinase A (PKA). What are the targets of PKA?
- What is the distribution of PKA isoforms and non-muscle myosin II in RPE cells?

We are currently focusing on identifying proteins that are phosphorylated by protein kinase A in RPE using immunoprecipitation, so we can isolate them and determine their identity using mass spectrometry. We are also testing reactivity of various antibodies against PKA isoforms and non-muscle myosin II using immunoblotting, to allow us to label these proteins in isolated fish RPE cells to characterize their localization.



Left: section through a vertebrate eye showing the rod and cone photoreceptors and the RPE (shaded grey). In light adapted eyes, pigment granules disperse into long apical projections. In the dark, this motility is reversed and granules aggregate into the cell body. **Below:** single isolated RPE cell in culture. After dissociation, the cell's long projections extend radially from the central cell body. The dark center is caused by accumulated pigment granules.



Burnside and Nagle, *Prog. In Ret. Res.* Vol 2, 1983

Identification of Myosin II in Fish RPE Cells

Elizabeth Del Rio, '19

Faculty Mentor: Christina King Smith

Department of Biology

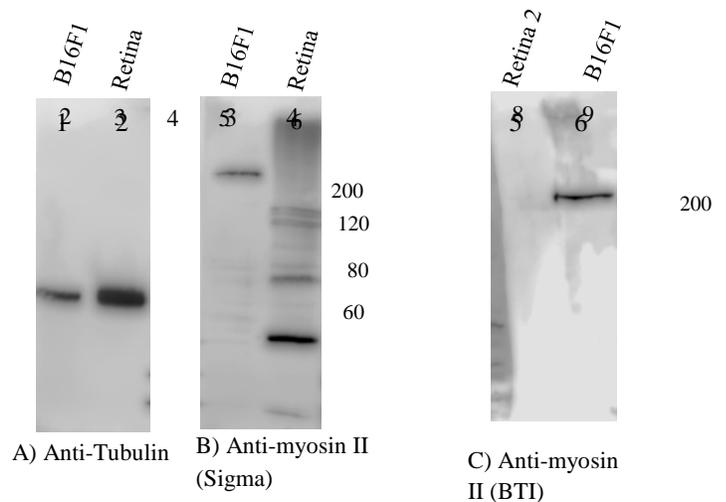
Supported by the SJU Summer Scholars Program



In vertebrate eyes, Retinal Pigment Epithelial (RPE) cells are located next to the retina and are essential in helping the animal see properly. In eyes of lower vertebrates such as fish, RPE pigment granules move through the cells' long apical projections to protect photoreceptors from bleaching. When the pigment granules move towards the cell body and out of the apical projections it is called aggregation, which is triggered by cyclic AMP (cAMP). Studying pigment granule movement can be done easily outside of the organism since pigment granule movements occur by the addition of cAMP the same way as if it was in the organism. This allows us to get a better understanding of intracellular motility. Previous research has shown that actin filaments, part of the cytoskeleton, and protein motors are involved in moving pigment granules in and out of the apical projections. The specific motor protein that associates with actin and is involved in pigment granule aggregation in RPE is myosin II.

One goal of our research is to identify and characterize the distribution of myosin II in RPE. This is done through a technique called immunofluorescence and Western blotting, where specific proteins from cell lysates can be identified using antibodies against that protein, then the protein can be labeled in preserved cells using the antibody. Two different antibodies against myosin II were tested. Before testing them with RPE lysates, antibodies were tested on lysates of mouse melanoma cells (B16F1) and fish retina samples. Both myosin II antibodies bound to the B16F1 sample around the expected molecular weight of 200 kD. One myosin II antibody (Sigma) produced non-specific binding in retina (Figure, B), while the other myosin II antibody (BTI) did not bind to retina (Figure, C). Future work will by test both myosin II antibodies on RPE samples.

Figure: A) Lanes 1-2 show the binding of anti-tubulin at 50 kD, a control to confirm that our blotting procedure has worked; B) Lanes 3-4 were treated with anti-myosin II (Sigma) C) Lanes 5-6 were treated with anti-myosin II (BTI) and only appears in the B16F1 sample



Identification of Protein Kinase A (PKA) Substrates in Retinal Pigment Epithelium (RPE) from *Lepomis macrochirus*

Joseph G. Quinlan, '19

Faculty Mentor: Christina King Smith
Department of Biology



Supported by the SJU Summer Scholars Program

The retinal pigment epithelium (RPE) is a pigmented layer of cells in the vertebrate eye that is essential for proper visual function. In contrast to most mammalian species, fish and other lower vertebrates do not possess eyelids nor dilatable pupils to control influx of light. Rather, migratory melanin pigment granules located within the RPE are transported throughout the cells to protect photoreceptors from bleaching. When eyes are exposed to light, pigment granules migrate from the RPE cell body out into elongated apical projections to protect the dim-vision-associated rod photoreceptors from overexposure. In the dark, they reverse this movement to aggregate back into the cell body to allow maximum light exposure to photoreceptors, a process that requires actin filaments. The goal of this research is to study the regulation of aggregation of pigment granules in RPE cells.

Past research has provided evidence for an aggregation regulatory signaling pathway that includes the phosphorylation of unknown target protein(s) by the enzyme protein kinase A (PKA). The objective of this project is to identify target proteins of PKA in RPE that regulate pigment granule aggregation.

Phosphorylated proteins were identified by isolating RPE cells and treating them with a phosphatase inhibitor to promote protein phosphorylation. An antibody that recognizes proteins phosphorylated by PKA was used to immunoprecipitate PKA-phosphorylated proteins. The target proteins were then separated via gel electrophoresis and compared to control lysates.

Research from the previous summer has provided evidence of PKA substrates with molecular weights of 112, 82, 48, and 42 kD. RPE immunoprecipitation results have provided further evidence for phosphorylated proteins at 82, 48, and 42kD, along with several additional low molecular weight proteins. Future work will involve specific protein identification via mass spectrometry.

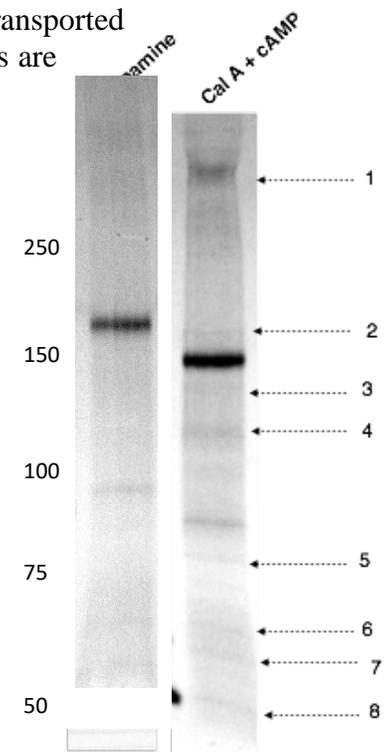


Figure 1 - Large scale immunoprecipitation of phosphorylated proteins. RPE cells were isolated and treated with either 10 μ M dopamine (which triggers granule dispersion) or 100 nM Calyculin A (a phosphatase inhibitor) and 1 mM cAMP. The cell lysates were immunoprecipitated with anti- pSer/Thr PKA substrate antibody, the immune complexes were washed, and the bound proteins were eluted by boiling and resolved by SDS-PAGE. The gel was then Coomassie-stained. Molecular mass markers (in kDa) are indicated on the left. Arrows indicate proteins with increased phosphorylation compared to the dopamine control.

Protein Kinase A Identification in Retinal Pigment Epithelium (RPE) From Sunfish, *Lepomis spp*

Meghan Quinlan, '19

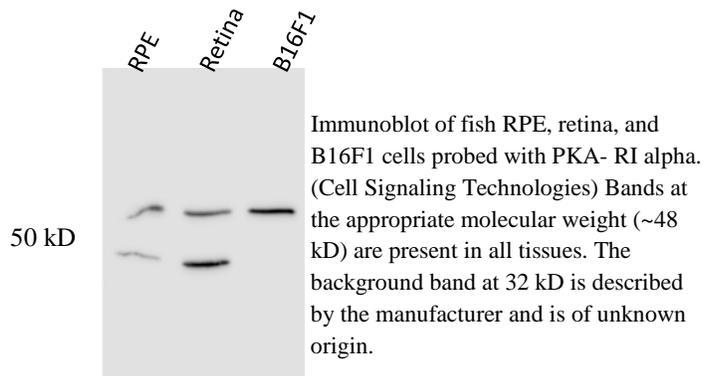
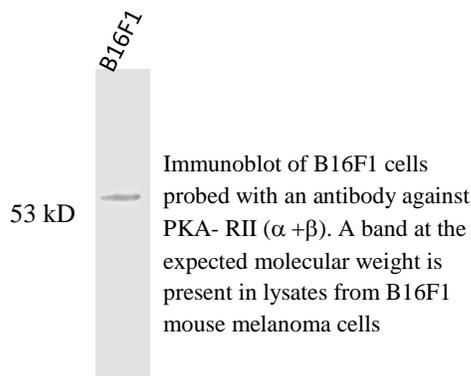
Faculty Mentor: Christina King Smith
Department of Biology



Supported by the SJU Summer Scholars Program and the HHMI Undergraduate Science Education Grant

The retinal pigment epithelium is a layer of pigmented cells located in the back of the vertebrate eye. Since fish do not have a dilatable pupil the RPE is essential for the regulation of light. Located in the RPE cells are pigment granules that are transported throughout the apical projections to protect the photoreceptors from excessive light. In the dark, pigment granules aggregate into the cell body to optimize the retina for dim light reception. In the light, these movements are reversed and granules disperse from the cell body into the apical projections to shield dim-light rod photoreceptors. In RPE isolated from fish eyes, pigment granule aggregation is induced by application of the signaling molecule cyclic AMP, which activates protein kinase A (PKA). We are interested in studying the distribution and localization of PKA in fish RPE.

Kinases are enzymes that phosphorylate other molecules. The activity of PKA is regulated by the signal molecule cyclic AMP (cAMP). PKA is composed of two catalytic subunits and two types of regulatory subunits, RI and RII. PKA having type RI regulatory subunits localizes to the cytosol, while PKA having type RII regulatory subunits localizes to cell membranes (Tasken and Aandahl, 2004). As a first step in characterizing the distribution of PKA in RPE cells, immunoblotting was used to find antibodies that cross react with PKA in fish. Antibodies against RII (□□□□) were tested against retina, RPE, and B16F1 cells. Bands at the appropriate molecular weight were observed in only B16F1 cells. Antibodies against RII (□) bound to only B16F1 cells, and antibodies against RI (□) bound to RPE cells, retina, and B16F1 cells. The R1 antibody will be used to characterize distribution of PKA in RPE cells.



Tasken, K., Aandahl E.M. 2004. Localized Effects of cAMP Mediated by Distinct Routes of Protein Kinase A. *Physiological Reviews*. American Physiological Society 2004; 84 (1): 137-67.



Shawn M. Krahmer

Department of Theology and Religious Studies
Saint Joseph's University

Ph.D. University of Chicago

Research Interests: Christian Spirituality, History of Monasticism, Asceticism

The primary question that has animated my teaching and research has been “What does it mean to get to God, and how do you get there?” Another way to translate this is to ask how the seeker might attain to the greatest intimacy possible with God in this life? How is “God” perceived? What is the pathway? What sacrifices does this require? What personal transformations take place?

There is, of course, no singular answer to this question. My research began with the biographies and spiritual writings of or about individuals identified by the Christian tradition as spiritual adepts such as the early martyrs, desert monks, Cassian, Bernard of Clairvaux, Catherine of Siena, Francis and Clare of Assisi and the like. As curricular needs changed, it has moved through the archeological record and the literature of pre-classical and classical Greece to contemporary anthropological studies on shamanism in South America.

The answers my students formulate to the questions of God and living in right relation to God will naturally differ in their details from mine and from those of the authors and figures they study. But I am always excited to walk for a short time with a student on his or her spiritual journey, and to challenge students to ask the questions and seek the answers that transform lives.

Investigating the Role of the *Difficult* in the Traditional Spiritual Path of the Catholic Mystic Catherine of Siena

Nathaniela Bourdeau, '19

Faculty Mentor: Shawn M. Krahmer
Department of Theology and Religious Studies



Supported by SJU Summer Scholars Program

Chronic illnesses, difficult marriages, losing a child – through tough times like these, a person may begin to question, “Why me?” or “Where is God?” Suffering is inescapable. It is a part of life that makes individuals feel vulnerable, saddened, and often full of despair. Religion is a spiritual tool that is frequently experienced as a source of the kind of strength, joy, and comfort which enable us as human beings to tackle the hardships of the world by remaining in touch with the Divine. My first encounter with Catherine of Siena’s work was in an introductory level theology course my sophomore year at Saint Joseph’s University. I was attracted to Catherine because she tackled the main question that runs through my mind on a daily basis – why do we suffer and how should we react to the suffering we face? This project explores the Christian spiritual pathway as laid out by Catherine of Siena in her book *The Dialogue* and my reflections on how to address the question of suffering for contemporary believers.

Catherine’s treatise explores suffering in the context of personal atonement, the negation of self-will, and the consequent union of the penitent with Christ. The path to sanctification in medieval Europe was a path set by the sufferings of Christ. Suffering for one’s sins in an attitude of charity and true contrition makes “every suffering of infinite worth” according to Catherine. Suffering in this context can then be understood as a means to salvation. But suffering is also clearly linked to love. God so loved the world that he gave his only begotten son to live and die on the cross for us (John 3:16). How is love linked with suffering? In Catherine’s concept of reality, moving herself out of the center of the universe is the necessary requirement to a genuine love for God. In this way, love forces individuals to let go of ego, selfishness, and pride, and moves the individual out of the center of their own motivations. Love attends to and seeks to please the other. Love, then, is always a sacrifice. Catherine’s way of mortification is thus an ultimate sacrifice of love. Union with Christ enables her, in turn, to willingly suffer for others, just as God in Christ did.

The idea of mortification¹ which was practiced by Catherine as a way to not only pay for her sins, but the sins of others for the sake of love is an idea that I view as too extreme and radical. I do not believe that an individual must undergo self-inflicted suffering in order to pay for their sins. Christ dying on the cross was enough to cover the sins of those who believe, paving a way to salvation through him. Christ is our bridge to God. Because of the love we have for God and others, we will accept suffering when it comes, but we do not need to actively look for suffering. So I agree that love and suffering are linked, but differ from Catherine in believing that suffering, when it comes, is a circumstance used by God to put individuals in uncomfortable situations which can bring positive change in an individual’s life.

¹ the acceptance of suffering, the self-imposed suffering which draws her into the mystery of union with Christ



Joseph M. Larkin
Department of Accounting
Saint Joseph's University

Ph.D. Temple University

Research Interests: Cost-Volume-Profit Modeling, Ethics in Accounting and Job Satisfaction and Turnover in Accounting

For professional services firms such as the Big Four public accounting firms, training new hires, whether they be auditors, tax professionals or consultants is costly. It is essential for these employers to retain their staff. One of their strategies to manage turnover is to monitor the job satisfaction and professional growth of their employees. Many studies have investigated job satisfaction across numerous professions. However, none considered interns, all of which will be starting full-time employment with the firm with which they interned.

My research interests include job satisfaction and turnover, and has appeared in journals such as, *Advances in Management Accounting*, *The Review of Accounting Information Systems*, *Journal of Business Case Studies*, *Journal of Applied Business Research*, the *Pennsylvania CPA Journal* and the *Journal of Business Ethics*.

This summer I had the pleasure of working with Nathan Vrabel, 20 on his project, which dealt specifically with job satisfaction of recent hires and interns with the Big Four. His research paradigm considered two established theories regarding job satisfaction, namely the Value-percept Theory and the Job Characteristics Theory. After a thorough review of the literature, Nathan developed a questionnaire, pretested the instrument, administered it, and analyzed the results. I think you will find them very interesting. I know I did.

Job Satisfaction in Public Accounting

Nathan Vrabel, '20

Faculty Mentor: Joseph M. Larkin
Department of Accounting



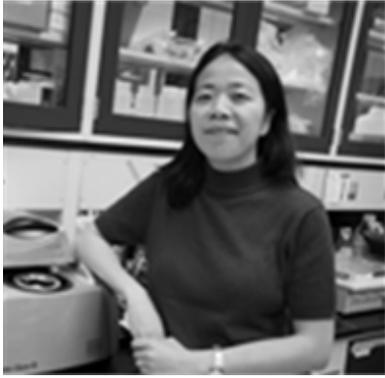
Supported by the SJU Summer Scholars Program

Accounting is a growing and popular field in business. As thousands of college graduates enter the work force of public accounting, job satisfaction is an important aspect to consider. While it is an important part of any job, it is interesting to study trends in public accounting to see how responses compare to the various stereotypes about the field. This study aims to measure how satisfied individuals in public accounting are with their jobs.

To measure the job satisfaction levels, a 20-question survey was constructed and distributed to recruiters of the Big 4 accounting firms in Philadelphia, who forwarded the survey to employees. Both full-time employees and current and past interns from Saint Joseph's University participated. One-hundred usable surveys were returned. The work experience of the participants ranged from less than 1 year to a high of five years.

Two job satisfaction theories were particularly useful in gaging the satisfaction levels of the respondents. The first theory used to determine job satisfaction of the respondents was the Value-Percept Theory, which contends that a person will feel satisfaction in their job when they perceive that their job supplies what they value. The theory argues that the five facets necessary for job satisfaction are pay, promotion, supervision, coworker, and satisfaction with the work itself. According to this theory, if a job provides an individual what they desire in these five categories, they will be satisfied with their job. Second, the Job Characteristics Theory was considered. This theory digs deeper into the 5th facet of the Value-Percept Theory: satisfaction with the work itself. The five components of this theory are variety, identity, significance, autonomy, and feedback. According to this theory, if an individual is satisfied in these five categories, they will achieve three critical psychological states: meaningfulness of work, responsibility for outcomes, and knowledge of outcomes. These states contribute to job satisfaction. The survey tested these 10 components of job satisfaction, with each component having two questions in the survey.

While there is no way to arbitrarily determine who is satisfied and dissatisfied with their job, the survey was useful in determining what areas of public accounting respondents were most satisfied with, as well as the different demographics who displayed the highest average levels of satisfaction. Overall, respondents are most satisfied with their supervision and opportunities for promotion. From a demographics standpoint, interns showed higher levels of satisfaction than full-time workers, while females showed higher levels of job satisfaction than males. In terms of area of practice, respondents in the Tax practices of their respective firms showed higher average levels of job satisfaction than those in the Audit or Advisory practices. The findings of this study can prove to be valuable to current and future students as well as recruiters.



Julia Y. Lee-Soety
Department of Biology
Saint Joseph's University

Ph.D. University of Pennsylvania

Research Interest: Telomere Biology, Yeast Genetics

Eukaryotic cells have linear chromosomes with ends that must be protected. Telomeres cap these ends with specific repeat DNA sequences that form unique secondary structures and recruit a variety of proteins. Because cells lack mechanisms to fully extend these ends during DNA replication, telomeres shorten with each round of cell division. This is thought to be a way for cells to limit their life spans so that aging cells may be replenished. Certain stem and progenitor cells express the telomerase enzyme complex and are able to avoid telomere losses, but cancer cells may inappropriately express telomerase to help them divide limitlessly. Understanding how telomeres are properly maintained may, therefore, further the knowledge in the natural processes of aging and cancer.

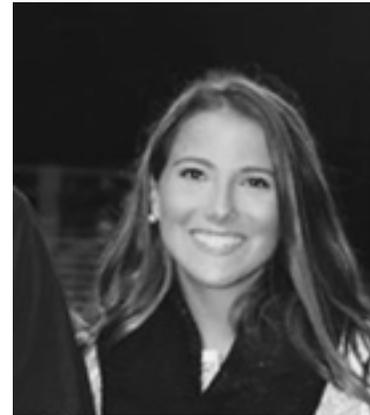
My lab uses baker's yeast as a model system to study telomere maintenance. Yeast cells express telomerase constitutively, but genetic manipulations can be done to disrupt telomerase function. The *tlc1* mutant cells are missing the RNA template component of telomerase and behave similar to many human cells. In the yeast, numerous mechanisms are known to play roles in telomere maintenance that interact with telomerase or other telomere-specific proteins.

One particular RNA-processing protein, Npl3, interacts with telomeres and thereby help maintain them. Yeast telomerase-null cells with the full *NPL3* gene deleted (*tlc1 npl3*) greatly accelerated the rate of senescence (cell cycle arrest) compared to telomerase-null cells with intact *NPL3* (*tlc1*). Furthermore, transcription in the telomeric region is turned on in the double mutant cells, generating non-coding RNA (TERRA); whereas in healthy cells, no such transcripts are made. This suggested that the expression of TERRA from telomeres is associated with cell senescence and that Npl3 may have a functional role at their repression. Npl3 is involved in gene expression from beginning to end, from unpacking the DNA so transcription machinery can gain access to transporting the transcribed RNA out to the nucleus for protein translation; we sought to ask how Npl3 specifically regulates transcription at the telomeres. We have been overexpressing several proteins with similar but narrower functions as Npl3 to see if each can rescue the defects of cells lacking Npl3. We have also been measuring and comparing changes in the levels of TERRA in these cells.

Yeast Npl3 Regulates the Termination of Telomere-Derived RNA (TERRA) Transcription in Senescing Cells

Corinne Merlino, '20

Faculty Mentor: Julia Y. Lee-Soety
Department of Biology



Supported by the SJU Summer Scholars Program

In eukaryotic cells, DNA replication cannot fully extend to the very ends of linear chromosomes. Over time, this results in gradual shortening of the telomeres, the protective DNA and protein complexes at the chromosome ends. In yeast and human germline cells, the enzyme telomerase is recruited to reverse the shortening of the telomeres. Without telomerase, telomeres will continue to shorten, eventually leading to cell cycle arrest, known as replicative senescence. In yeast cells that no longer express the RNA component of telomerase (encoded by the *TLC1* gene), the erosion of telomeres gives rise to the expression of non-coding telomere-derived RNA (TERRA). What the cells make use for TERRA is not entirely clear, but one function for TERRA may be to facilitate alternative lengthening of telomeres when telomerase is not available. TERRA expression and the rate of cellular senescence are increased significantly in *tlc1*-deleted cells that have a second deletion in the *NPL3* gene which encodes a RNA processing protein. The Npl3 protein plays many roles throughout gene expression, two of which include regulating transcription elongation and termination.

The objective of my summer project was to determine if the transcription termination activity of Npl3 is regulating TERRA expression. To answer this question, we overexpressed the ribonuclease Rat1, which processes 3' ends of transcripts. By using galactose-inducible system to allow overexpression of Rat1, we performed a senescence assay. We observed that additional Rat1 in *tlc1 npl3* double mutants did not accelerate the rate of senescence, but did appear to help these mutant cells escape senescence sooner by finding alternative ways to re-lengthen telomeres. We compared TERRA levels by tagging the transcripts with dBroccoli aptamer tags. Since accumulated TERRA also forms RNA:DNA hybrids (called R-loops), we compared the levels of these complexes by labeling them with the S9.6 antibody. Using these tags, we could take and analyze fluorescent cell images. The analysis of the images showed that Rat1 overexpression caused a dramatic decrease in overall levels of TERRA and R-loops in the *tlc1* cells and more so in the *tlc1 npl3* double mutants. Overexpressing Rat1 in *tlc1 npl3* double mutants also resulted in a dramatic decrease in co-localization of the dBroccoli and R-loop signals. These results suggest that Npl3 may have a role in terminating TERRA transcription efficiently if this is required to help senescing cells re-lengthen telomeres and escape senescence.



Edwin Li

Department of Biology
Saint Joseph's University

Ph.D. University of Rhode Island

Research Interests: Membrane Protein Structure and Assembly; Protein-Protein Interaction

My research area focuses on understanding the physical and chemical principles governing the interaction of membrane proteins. The membrane proteins that I study belong to a class that elicits the response to the extracellular signal by forming complexes with other membrane proteins. These complexes are often composed of two proteins interacting with each other, forming a stable new structure. In this context, dimerization, refers to the process in which two monomers (single proteins) come together to form a dimer.

Dimerization of membrane proteins is often one of the initial steps in a series of events that triggers cellular responses such as movement, division, and even cell death. Diseases in living organisms may arise because their cells cannot function properly if dimerization is out of control. The specific disease that may result depends on which membrane protein is affected. For example, unregulated dimerization of a membrane protein may result in unregulated cell growth and division, eventually leading to the formation of tumors. In some other cases, unregulated dimerization of another type of protein may lead to abnormalities during development such as cranial disorders. These are just a few examples highlighting the important physiological roles of these proteins and the medical relevance of studying membrane protein dimerization.

The main focus of my laboratory is to elucidate the physical and chemical principles behind the interaction of membrane proteins. This information will facilitate the design of better therapeutics targeting these proteins.

Measurements of MUC1-C Transmembrane Domain Dimerization with the ToxR Assay

Ksandros Cani, '19

Faculty Mentor: Edwin Li
Department of Biology



Supported by the SJU Summer Scholars Program

The mucin (MUC1) gene codes for a glycoprotein that is O-glycosylated. The mucin 1 protein is essential for intracellular cell signaling. These transmembrane proteins are prevalent on the surfaces of the lungs, breast, stomach and pancreas. Mucin 1 dimerizes and the dimerization can be associated with the formation of disulfide bonds. These disulfide bonds are formed because of the CQC motif which is a cysteine, glutamine and cysteine and are located in the juxtamembrane domain. Upon dimerization mucin 1 can make its way into the intracellular space, and then the nucleus, from where it can activate certain genes that can give rise to the formation of a tumor. The prevalence of these mucin 1 proteins has been shown to be linked with metastatic cancers that have dispersed from the source.

The ToxR assay can be used to measure the dimerization of the transmembrane domain mucin 1. This is done by constructing a chimeric protein in which the ToxR transcriptional factor is attached to the transmembrane domain of interest. When the transmembrane domains dimerize, two ToxR bind to a promoter to activate the beta-galactosidase gene. Therefore, the amount of beta-galactosidase is directly proportional to the strength of the dimerization. In the ToxR assay the enzymatic activity of beta-galactosidase is used as a reporter of dimerization.

The role of the cysteines in dimerization is already known. The main objective of this study was to determine whether the change from glutamine(Q) in the CQC motif would have an effect on dimerization. To test this, the glutamine was changed to an alanine resulting in the CAC mutant. The homodimerization of the two mucin 1 transmembrane domains (CQC and CAC) was measured using the ToxR assay. Preliminary results show that substituting glutamine with alanine does not affect the dimerization of mucin 1 transmembrane domain. Further study will implement the use of the other mutants and test them against the wild type.

Subcellular Fractionation to Study Mucin1 Nuclear Transport

Roberto Herrera, '18

Faculty Mentor: Edwin Li
Department of Biology



Supported by the SJU Summer Scholars Program

Mucin 1 (MUC1) is a glycosylated single-pass membrane protein involved in forming protective mucous barriers on epithelial surfaces. MUC1 also plays a role in intracellular signaling, specifically targeting cell growth and preventing cell death. However, overexpression of this protein has been associated with cancer due to it preventing cell death and contributing to cancer metastasis.

Usually, this protein is found in the edge of the cell known as the plasma membrane, but when it is overexpressed, a subunit of the protein is transported to the nucleus. Here, it acts as a transcription factor on DNA and activates genes that signal for cell growth and tumor formation.

Studies have shown that before being transported into the nucleus, two MUC1 proteins have to interact with each other; a process known as dimerization. Previous studies have shown that a specific location within this protein, the CQC motif in the juxtamembrane domain, is important for dimerization to occur. Other studies have shown that dimerization is important for the transport of the subunit of the protein into the nucleus.

My objective has been to develop an assay to study the mechanism of MUC1 nuclear localization. Since MUC1 contributes to the prolongation of a cell's life and its overexpression leads to the growth of tumor cells, it is important to find out why and how this protein is transported to the nucleus when overexpressed.

I performed subcellular fractionations, which is a technique that separates proteins into different compartments of a cell. This technique separates proteins into 5 different fractions: cytoplasmic proteins, plasma membrane proteins, nuclear proteins, nuclear proteins bounded to chromatin, and insoluble proteins usually bounded to the cytoskeleton. I ran western blots to determine if the fractionation samples contain the protein of interest. This technique is used to identify proteins of interest by running an SDS-PAGE to separate proteins based on size and then using highly specific primary and secondary antibodies that detect the proteins of interest. The subcellular fractionation assay was tested using HEK (human kidney) cells and ZR75-1 cells. ZR75-1 cells are cancerous mammalian cells that show overexpression of MUC1.

In the months to come, I plan to continue my research by studying other factors, besides the CQC motif, that may affect MUC1 dimerization and nuclear localization.

Temporal Analysis of AAK-2 Phosphorylation During Stress Induced Sleep in *C. elegans*

Ryan Schuck, '18

Faculty Mentor: Edwin Li
Department of Biology



Supported by the SJU Summer Scholars Program

Caenorhabditis elegans is a microscopic worm that is about 1 mm in length and is frequently used as a model organism for biological research. These worms are useful as model organisms because they reproduce quickly, are transparent, and are easy to maintain and handle. Furthermore, their genome is similar (approximately 40%) to that of humans. Thus, studies with *C. elegans* allows us to learn about cellular and physiological pathways, such as those controlling sleep, that may be closely related to humans. One such physiological pathway is the AMPK pathway and its role during stress induced sleep within these microscopic worms.

5'-AMP- activated protein kinase or AMPK, known as AAK-2 in *C. elegans*, acts as an energy regulator within the cell. One of its main roles within the cell is to maintain cellular energy homeostasis. It is activated by an increased ratio of adenosine monophosphate (AMP) to adenosine trip-phosphate (ATP). Overall, AMPK activation following cellular stress may lead to metabolic changes which are necessary for cell recovery.

When animals are exposed to environmental stressors that damage their cells like UV irradiation, extreme temperatures, infection or injury, they display a compensatory sleep response, termed stress-induced sleep (SIS). I hypothesize that AMPK underlies these mechanisms and regulates SIS. After *C.elegans* are exposed to cellular stress, the ALA neuron responds by releasing neuropeptides which then interact with G- protein coupled receptors. This may lead to the inhibition of adenylyl cyclase and thus, the shutdown of the second messenger molecule, cyclic adenosine monophosphate (cAMP). This leads to the inhibition of Protein kinase A (PKA). How this connects to both sleep regulation and metabolic changes within the cells is unknown.

My goal over the summer has been to measure AAK-2 phosphorylation in *C.elegans* using temporal Western Blot analyses. I began by exposing the nematodes to UV stress and collect the worms into a pellet two hours after being stressed. After collection, I further prepare the sample by homogenizing the pellet of worms in order to break through their thick cuticle. Finally, I ran western blots of the samples and used an AMPK- specific antibody to detect the overall amount of phosphorylation, which was then able to be visualized on a special film. Overall, by measuring AAK-2 phosphorylation, we can further our knowledge of AAK-2 and its role within stress induced sleep.



J. Michael Lyons
Department of Communication Studies
Saint Joseph's University

Ph.D. Indiana University

Research Interests: Community Media,
Communication Activism

Think of the public sphere as a swimming pool with several large floating beach balls filling much of the pool and a whole bunch of tennis balls filling in the gaps. The beach balls are giant media companies, like General Electric (which owns Comcast, NBC and Universal Pictures), Time Warner (CNN, HBO, Hulu etc.) or The New York Times. The tennis balls are small – sometimes very small – community-driven, civic media projects that fill in the gaps. I'm interested in the tennis balls. I study media projects in the past and present that provide communities a platform to discuss what is important to them. These communities could be actual physical places or groups of people joined in pursuit of similar goals.

That work has led me to write on the role of “small media” – specifically, a comic book – in the Civil Rights movement and the use of hand printed newspapers used by Russian dissidents at the turn of the 20th Century.

Together with three “juvenile lifers,” men serving sentences of life without parole for crimes they were convicted of as teens, I founded The Redemption Project, a multimedia documentary project focused on the stories of incarcerated men and women. The project provides men and women the opportunity to tell their stories in their own words. Many of these men and women have suffered “civil deaths.” Their incarceration has largely prevented them from participating in the public sphere. They can't vote. They really have no voice in the political process. Our project is an attempt to help give them a voice on issues like mass incarceration.

I also co-founded West Philly Local, a website that provides news and information for several neighborhoods in West Philadelphia, where I live.

Telling the Story of an Incarcerated Woman Through Multimedia Journalism

Anne Clark, '19

Faculty Mentor: J. Michael Lyons
Department of Communication Studies

Supported by the SJU Summer Scholars Program



Discussing the multitude of social and cultural problems facing incarcerated women is complicated, as there are so many places where those issues intersect. There has been a larger conversation happening over the last few years regarding criminal justice reform, especially as it pertains to the phenomenon of life sentences in the United States. With the 2012 Supreme Court decision *Miller v. Alabama*, which ruled life sentences for minors to be unconstitutional, the issue of criminal justice reform has only become more dimensional. It is undoubtedly important to tell the stories of those affected by Pennsylvania's mandatory life without parole sentences for certain felony charges, especially those who were sentenced as juveniles, yet we cannot forget about the ways that those sentences impact certain marginalized groups more likely to be affected by mass incarceration, particularly women of color. My primary interest, and the crux of my project, was at the intersection of these three groups of incarcerated people; "juvenile lifers," a term commonly used to refer to those sentenced to life in prison while under the age of 18, incarcerated women, and women serving life in prison without the possibility of parole.

Through my research, I found the story of a woman named Avis Lee, who has served 37 years in prison for a crime she was involved with at the age of 18. As I read more about her story, and as we began to exchange emails and letters, I realized that I wanted to focus exclusively on the story of this incredibly intelligent, resilient, and compassionate woman. A native of Pittsburgh, Avis is currently serving her life sentence at Cambridge Springs State Correctional Institution in Cambridge Springs, PA. She was convicted of second-degree murder (also referred to as felony murder) as the lookout to an armed robbery that resulted in a homicide, which in Pennsylvania carries a mandatory life sentence without the possibility of parole. Avis's legal team is basing their appeal in a 2016 Supreme Court decision, *Montgomery v. Louisiana*, which decided that *Miller v. Alabama* applied retroactively to all people currently serving life sentences for crimes they committed as juveniles. However, as Avis was already 18 at the time of the crime she was involved with, the Pennsylvania Court of Common Pleas rejected her appeal under the *Montgomery* ruling. She currently has an appeal pending with the Pennsylvania Superior Court.

Throughout the course of my project, I researched a variety of topics, including the legal concept of "diminished culpability," which was the basis for ruling life sentences for minors unconstitutional. I was also interested in the neurological definitions of "youth," which many scientists believe continues until a person's decision making and rational capabilities are fully developed at age 25. I interviewed a woman who works exclusively with women serving life sentences in Pennsylvania, as well as two state legislators currently working to reform laws that have led to Pennsylvania's status as the second-highest incarcerator of people serving life sentences in the United States. I am hoping to turn my project into a short documentary with the help of Dr. Lyons's work with The Redemption Project.

The Redemption Project: The Story of David and Samuel Maldonado

Nico Tamborello, '19



Faculty Mentor: J. Michael Lyons
Department of Communications Studies

Supported by the SJU Summer Scholars Program and the Redemption Project

Pennsylvania accounts for the largest population of those serving life without parole sentences. The fact that there are approximately 2,200 juvenile lifers in America, and virtually none in any other country in the world, is a startling statistic that obviously presents a flaw in our prison system. The United States accounts for five percent of the world's population, and approximately 25 percent of its prisoners. A juvenile sentenced to life without parole can be problematic, because, as an adolescent, the brain is not fully developed, and decision making is not at its summit. This does not mean everyone can redeem themselves, but, there should be more deliberation behind the continuation of the sentence, and careful consideration into how to effectively rehabilitate a juvenile convicted of a major crime.

The documentary I am working on is centered around two brothers, David and Samuel Maldonado. The two were both sentenced to juvenile life without parole sentences in Pennsylvania in the early 80's, following an attempted robbery that resulted in a stabbing at a swimming hole called Devil's Pool in Fairmount Park. David was sixteen years old at the time, and his brother Samuel was eighteen. Even though David actually committed the crime, his brother was still charged with second degree murder, since he was an accomplice to the crime. David was released on May 16, 2017, but his brother is still serving a life sentence in Graterford Prison since he was a legal adult at the time of this incident. Sam has three options: Commutation, the application of the Miller Decision for his case, and lastly a legislative change of felony murder in Pennsylvania. This documentary shares a narrative that supports the idea that people can redeem themselves. David entered the prison system as an IV drug user and over the past 35 years of his incarceration has obtained a Bachelor's degree inside from Villanova University, a master's degree and is currently working on a certification to be a drug and alcohol counselor.

The Redemption Project is an ongoing project created by, Kempis "Ghani" Songster, John Pace and Aaron "Abdul Lateef" Phillips, three men serving life without parole sentences in Pennsylvania for crimes they committed as juveniles, and J. Michael Lyons a professor at our Communications Department on campus.



Scott P. McRobert
Department of Biology
Saint Joseph's University

Ph.D. Temple University

Research interests: The Genetic,
Ecological and Evolutionary
Foundations of Animal Behavior

Research in my laboratory involves the examination of animal behavior through studies on rare, exotic and, in many cases, endangered species of fish, reptiles, amphibians, and insects.

Our work with fish involves analysis of shoaling, or grouping behavior. My students and I examine the factors that fish utilize when choosing shoalmates, including coloration, pattern, size, shape and shoal composition. In almost all cases, fish shoal with individuals that have features similar to their own. This may benefit them through the 'Confusion Effect' in which predators have difficulty identifying and attacking an individual within a group of phenotypically similar fish. We have examined shoaling in a number of different species and are now looking at the effect of experience and learning on shoaling behavior.

Our work with *Drosophila* involves an examination of the invasive species *Drosophila suzukii*. This true fruit fly is a major agricultural pest that had been introduced to the United States. My students and I survey the local *Drosophila* community for the presence of *D. suzukii*, and our laboratory work is aimed at understanding the sexual behavior of this species.

Our work with amphibians and reptiles is focused mainly on conservation. We house many rare and endangered species, and a current research project involves an analysis of the effects of salinity on growth in hatchling diamondback terrapins (turtles).

Reproductive Biology and Choice Studies of *Drosophila suzukii*

Julia Cautela, '18

Haley Patrick, '19

Faculty Mentors: Jonathan Fingerut and
Scott P. McRobert
Department of Biology



Supported by the SJU Summer Scholars Program

Drosophila suzukii is an invasive fruit fly species that has caused agricultural damage across the United States. Originating in Southeast Asia, this species has similar sexual behaviors to other *Drosophila* but differs in its tactic for feeding and egg deposition. While *Drosophila* commonly feed on fallen, rotten fruit, *D. suzukii* has the ability to penetrate the skin of healthy and growing fruit that is still attached to the plant. This can be attributed to the unique morphology of *D. suzukii* females, who have large and serrated ovipositors which allows the flies to break the firm skin of the ripening fruit and lay its eggs inside. This makes *D. suzukii* a formidable agricultural pest.

In our first project, we examined post-copulatory behavior and fecundity (offspring production) in *D. suzukii* and a closely related species, *D. biarmipes*. It was found that for both species, the egg laying rates were higher during the second week following copulation than during the first week. For week 1, *D. biarmipes* averaged 50.45 offspring and *D. suzukii* averaged 38.05 offspring. For week 2, *D. biarmipes* averaged 57.45 offspring and *D. suzukii* averaged 52.05 offspring. *D. biarmipes* offspring production total average for the two weeks was 108.6, compared to *D. suzukii*'s average of 87.6. From this study, we were able to conclude that *D. biarmipes* has a higher post-copulatory fecundity rate than *D. suzukii* over a two-week period.

Our second project involved studies on specific food choices made by *D. suzukii* and another species, *D. melanogaster*. To run these studies, we used a MakerBot Replicator 2 3D printer to create choice chambers (see Fig. 1). Part of our work involved tinkering with the parameters of the chambers (length and composition of the chamber material), and then running preliminary choice tests. In our initial tests, we placed a capful of water at one end of the choice chamber, and a capful of instant *Drosophila* media and yeast at the other end. We then placed 20 flightless *D. melanogaster* in the central portion of the chamber and, 24 hours later, counted the flies at each end of the chamber. Our findings showed that an overwhelming majority of flies consistently chose the capful of media and yeast over the middle and the capful of water.

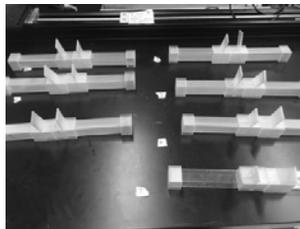


Fig. 1

Next, we used the choice chamber to prove *D. suzukii*'s affinity for blueberries. It has been observed that the addition of the fruit to a standard fly bottle maintains sexual attractiveness and receptibility levels in *D. suzukii* virgins. We placed one blueberry on the right side of the chamber and left the left side vacant. The results of these trials confirmed our hypothesis -- that *D. suzukii* preferred the right side of the chamber over the left side and middle.

Future studies will include isolating various qualities of the blueberry through the choice chamber to determine what specifically attracts *D. suzukii*.



Jason H. Mezey
Department of English
Saint Joseph's University

Ph.D. University of Iowa

Research Interests: Postcolonial
Literature, Trauma Theory

My research focuses on the areas of the world that were formerly colonized by the British, minus the United States, the British Isles, and Australia. I study and teach about the history and legacies of Empire, particularly as it impacted those nations in which there was a pronounced racial difference between colonizer and colonized. In my teaching, I pay particularly close attention to South Asia, South Africa, and Israel-Palestine, three regions that are still heavily impacted by divisions of the past that have survived into the present.

My main interest in literature is to examine the ways in which creative works transform the materials of history into narratives that show the individual impact of large events. Literary texts that directly confront and represent the history and continuing legacies of Empire enact a form of therapy, in which a work of fiction becomes a means of remembering a traumatic past in a way that attempts to reconcile it with the present. In this sense, literature produces another type of history, one that focuses on the emotional and psychological consequences of larger historical events. This is where I derive my interest in trauma theory, the study of mental, physical, and narrative responses to trauma. While my work engages heavily with the work of Sigmund Freud, I also incorporate contemporary Western adaptation and critiques of Freud's theories of trauma, as well as non-Western modes of representing traumatic events and their impact. Trauma has a life beyond the victim, the perpetrator, and the witness; the way it is acknowledged and processed on a community, national, or even a global level can grant insight into our relationship with the past and the means by which we decide our future.

“The Cage” – Traumatic and Social Impact of Sexual Assault

Jennifer Nessel, '19



Faculty Mentor: Jason H. Mezey
Department of English

Supported by the SJU Summer Scholars Program

It is troubling, that in an era of comparably greater social acceptance, there is a lack of sympathy for victims of sexual assault. Although women’s rights have remained on the forefront of legislation in recent years, such as the passage of Title IX legislation in 1972, sexual assault still remains an issue. Sadly, the statistics hold true: “every 98 seconds, an American is sexually assaulted, and only 6 of every 1,000 perpetrators will end up in prison” (Rainn.org). These unnerving statistics along with recent media coverage, including recent trial of one Bill Cosby, led me to create a fiction piece following the life of a trauma victim named Esther Roberts. In order to create an accurate representation of such a tragic circumstance and its aftereffects, I conducted research under the guidance of Jason Mezey, Ph.D.

My research began with the examination of sexual assault through the lens of its psychological impact; mainly, the effects of trauma on the brain. When a victim is in a “hyper stress situation,” their brain reacts by shutting off the primary decision maker, the prefrontal cortex, in favor of the amygdala, the fear center. This means that the victim is unable to recall particular details other than the ones that will help them survive. They will focus on details of danger; this can be anything from the sensation of touch on a particular area of the body to the scent of the room, an unrelated detail. Victims also recall events in fragmentary sensations, because the area of the brain responsible for encoding long term memory, the hippocampus, temporarily shuts down. This becomes a problem on college campuses, where the victim and the perpetrator both give their sides of the story. The victim lacks the information that the perpetrator makes up for, thereby undermining the victim’s story in favor of the perpetrator’s. I also studied the historical impact of ‘hysteria’ and the social impact on women. I read “Fragment of an Analysis of a Case of Hysteria (‘Dora’),” by Sigmund Freud in an effort to understand the social stigma against trauma victims. Through this short snapshot of history, along with Judith Herman’s *Trauma and Recovery*, which tracks hysteria during the last century, I learned that “hysterical” women were actually victims of sexual assault. I believe that the stigma that arose from history, which restrained victims’ claims, still remains in part today, within society’s lenient view on perpetrators rather than a sympathetic view toward victims.

The research that I conducted inspired me to develop my story to include memory and perspective. I have read countless stories from real-life victims in order to ensure that I tell the truth within my writing. Though my story is not finished, my goal is to demonstrate that a traumatic event can follow a person into adulthood. I want readers to connect with the idea that ultimately, victims are not numbers – they are humans with real experiences.



Matthew D. Nelson
Department of Biology
Saint Joseph's University

Ph.D. New York University

Research Interests: Behavior and
Genetics

Every animal on earth sleeps or displays quiescent behaviors that resemble sleep. Humans spend greater than a third of their lives asleep but, amazingly, fundamental questions about sleep remain unanswered including: What is its function? And; how is it regulated at a molecular and genetic level? In fact, sleep remains one of nature's greatest biological mysteries.

Simple animals such as fruit flies and nematodes have become key tools in the sleep biology field. These animals are called "model organisms" because many of the same genes and molecules that drive their biology also control ours. The nematode *Caenorhabditis elegans* is a microscopic, free-living worm that has been widely used in the lab as a model for understanding development and behavior. *C.elegans* displays sleep behaviors at regularly timed intervals during larval development and in response to stressful environmental stimuli. But, why study sleep in a microscopic worm? First, *C.elegans* is a powerful genetic system that we can manipulate with ease. They are transparent and grow from an embryo to an adult in 4 days, thus allowing for fast genetic alteration and experimentation. Because of their simplicity, we know the location of every one of their cells and the connection of every neuron in its simple nervous system (Only 302 neurons!). My lab takes advantage of this amazing animal in hopes to further our understanding of sleep. Specifically, my research focuses on the following: 1) Identification of sleep regulating neurons and how they communicate as neural circuits to control sleep behavior and; 2) Characterize the mechanisms of how signaling molecules called neuropeptides regulate sleep. We use a combination of techniques common in the following disciplines: genetics, molecular biology, neurobiology and behavior.

Investigating a Role for Orcokinin-Like Peptides in Sleep Regulation in *Caenorhabditis elegans*

Natalie Barrett, '18

Faculty Mentor: Matthew D. Nelson
Department of Biology

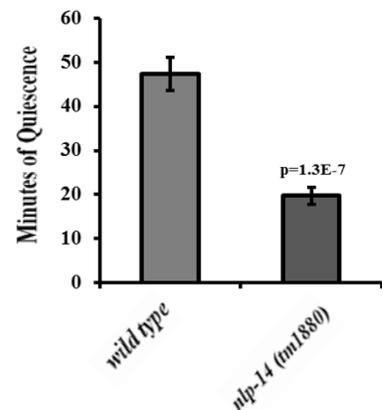


Supported by the SJU Summer Scholars Program and the John P. McNulty Scholars Program

Sleep is an essential behavior that occurs in all animals. However, little is known about how sleep is regulated and the reasons for its function. Because of the conserved nature of sleep across the animal kingdom, many labs have turned to studying the nematode, *Caenorhabditis elegans*, as a model for understanding how sleep is regulated at the molecular level. *C.elegans* is used because of its simplicity, ease of maintenance and available genetic tools, and most importantly, its conserved neurochemistry to humans.

One of the primary objectives that our lab focuses on is: understanding the molecular regulation of one type of sleep behavior called stress induced sleep, or SIS. SIS is a behavioral response that is induced after the worm is exposed to a stressful environment. Previous work in worms has shown that the ALA neuron is responsible for controlling this behavior. In response to a stressor, the ALA neuron secretes a series of signaling molecules called neuropeptides. Neuropeptides are involved in the regulation of sleep in both humans and *C. elegans*.

One specific neuropeptide-like protein that our lab focuses on is NLP-14. It has been shown that ectopic over expression of the gene encoding for NLP-14, induces sleep-like behavior. To test this neuropeptide's role in the regulation of sleep, I worked with *nlp-14* deletion mutants. After quantifying SIS levels in the mutant strain, I was able to determine that *nlp-14* mutants display a decreased SIS response compared to wild type. However, the neuron that releases *nlp-14* is still unknown. A construct to rescue *nlp-14* in the ALA neuron is currently being implemented to further understand the expression pattern and role of *nlp-14* in SIS.



Dispersal Behavior via *Drosophila suzukii* in *Caenorhabditis elegans*

Amelia Brown, '18

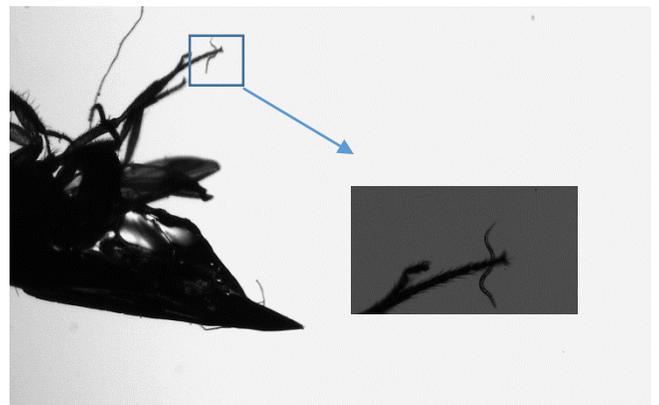
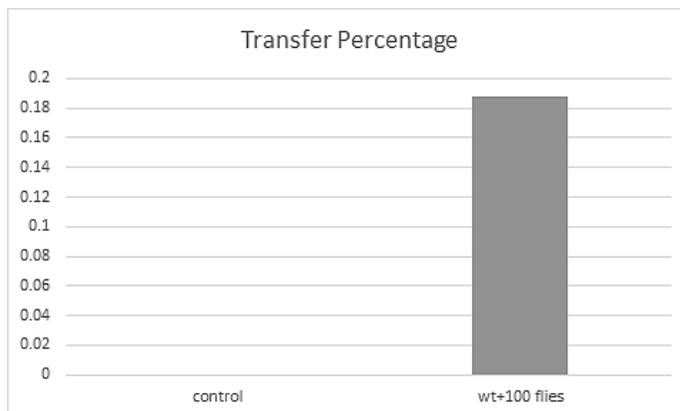


Faculty Mentor: Matthew D. Nelson
Department of Biology

Supported by the John P. McNulty Scholars Program

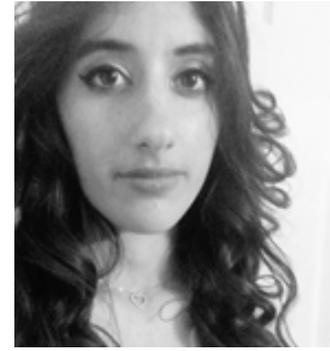
Caenorhabditis elegans is a microscopic nematode, widely studied as a model organism for understanding development and behavior. Even under the harshest conditions *C. elegans* can survive and reemerge in vast numbers as soon as conditions improve. The robustness of the species may be attributed to their incredible survival methods, including a dispersal behavior exhibited in a larval form of the animal. Dauer is a larval stage in *C. elegans* which is induced under poor environmental conditions, such as overcrowding or starvation. Organisms in the dauer stage protect themselves by forming an extra cuticle and minimizing energy consumption by ceasing feeding, defecation, and movement. In some ways, the Dauer stage is similar to what mammals experience when hibernating. An interesting behavior experienced by dauers is nictation; where the animals move in three dimensions on a fixed substrate. It is hypothesized that this behavior is performed to increase the likelihood of escape from the unfavorable condition via attachment to another organism that may be passing by. My research focused on the interaction between *C. elegans* and the fly *Drosophila suzukii*.

I was able to video-capture nictation behavior in the worms as well as photographic evidence that the worms attach to *D. suzukii*. Once it was established that the animals both nictated and could use this behavior to attach to the fly, an experiment was set up to determine whether this behavior could lead to the transfer of worms to more favorable environments. This was accomplished by placing dauers in a chamber consisting of the following: 1) one side with agar plates containing a fixed substrate for nictation in the absence of food (to stimulate the unfavorable environment), 2) the opposite side containing ample amounts of the worm's primary food source, bacteria. Flies were released into the chamber and left to move about freely for 48 hours. At the end of the experiment the 'favorable' plates containing the bacteria were collected and observed for *C. elegans*. I found that compared to the control, a significant amount of worms were transferred to the favorable condition on the opposite side of the chamber, as shown in the graph below.



Quantifying the Effects of Over Expression of the Orcokinin-Like Neuropeptide NLP-14 in *Caenorhabditis elegans*

Kristen “Kay” Buscemi, '20



Faculty Mentor: Matthew D. Nelson
Department of Biology

Supported by the National Institute of General Medical Sciences at the NIH (RI5GM122058)

Sleep/wake cycles are largely regulated by neurons that often release protein messengers called neuropeptides. These peptides, composed of short amino acid sequences, modulate synaptic activity in vertebrates, as well as invertebrate animals. In mammals, the neuropeptide melatonin increases sleep drive, while others such as hypocretin/orexin promote arousal. In invertebrates, like the microscopic round worm *Caenorhabditis elegans*, neuropeptides like NLP-22 and FLP-13 trigger sleep-like behaviors. Therefore, neuropeptides play a critical role in moderating sleep/wake behaviors in many species.

C. elegans sleeps during a period called lethargus, which precedes each of the four molts. Gene expression analyses showed that out of the 873 genes that are upregulated during the lethargus period, 20 encode for neuropeptides. One such neuropeptide, NLP-14, is analogous to orcokinins. Orcokinins are a family of neuropeptides found only in animals of the Ecdysozoa clade, which includes insects, crustaceans and nematodes. Previous studies suggest that orcokinins play a role during the regulation of their circadian rhythms. Furthermore, work in the Nelson lab has shown that overexpression of NLP-14 substantially inhibits locomotion in normally active animals.

My project focused on the effects of the over-expression of the neuropeptide, NLP-14, on defecation in *C. elegans*. The Nelson lab found that NLP-14 over-expression causes a reduced rate of locomotion in *C. elegans*. Research this summer was geared toward quantifying the effects of NLP-14 over-expression on defecation patterns. In wild type animals, defecation is a highly rhythmic behavior with one expulsion occurring approximately every 50 seconds. I hypothesized that I would see a decrease in expulsion rate in the transgenic strains engineered for overexpression of NLP-14.

Worms were grown on agar plates and fed DA837 *E. coli* at 20°C. Sealed plates containing the adult worms were fully immersed into a 33°C water bath. At 13°C above their natural body temperature, the transgenic worms will activate an inducible heat shock promoter which will drive the overexpression of NLP-14, which will subsequently be released throughout their bodies. I measured the average expulsion rate per 6-minute cycle in both the transgenic and N2, wild type, strain 2 hours post heat shock. I manually recorded defecation, which consisted of a posterior body contraction, an anterior body contraction, followed by an expulsion.

The N2 control group had an expected average defecation rate of about 6 expulsions per 6 minutes, while the transgenic strain showed a significantly diminished rate of about 3 expulsions per 6-minute cycle. From this data we can conclude that the over-expression of NLP-14 does induce sleep-like behavior in *C. elegans*, therefore, resulting in a loss of certain behavioral functions.

PKA, protein kinase A, is an enzyme in the adenylate cyclase-cAMP pathway which phosphorylates the substrate it binds to, to induce wakefulness. PKA mutation in the regulatory subunit, kin-2, causes kin-1, the catalytic subunits, to be constitutively expressed in cells, which causes the worms to be hyperactive. Prior research in the Nelson lab showed that a kin-2 mutation would suppress locomotion quiescence induced by NLP-14 over-expression. I wanted to test if the mutation of PKA would reduce the rate of expulsion. I conducted the same experiment with a kin-2 mutant strain and kin-2 mutant strain with an nlp-14 over-expression background. Kin-2 is the regulatory subunit of PKA. This mutant strain causes kin-1 the catalytic subunits, to be constitutively expressed in cells. Therefore, this kin-2 mutant strain displays hyperactive behaviors.

Results show that the hyperactive kin-2 mutants had an average defecation rate of about 6 expulsions per 6-minute cycle. However, I was not able to rescue this expulsion rate in the kin-2 mutant strain with an NLP-14 overexpression background, as the average expulsion rate per 6-minute cycle for this strain was 2.4. This data suggests that locomotion and defecation are regulated by two separate pathways.

Quantification of cAMP Levels in the DVA Neuron from Wakefulness to Sleep in *Caenorhabditis elegans*

Alana Cianciulli, '19

Faculty Mentor: Matthew D. Nelson
Department of Biology

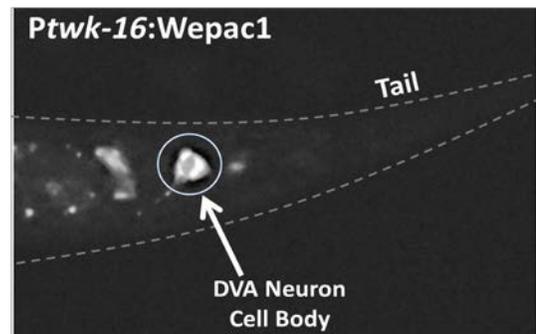


Supported by the National Institute of General Medical Sciences at the NIH (R15GM122058)

Sleep is essential for life but surprisingly the molecules and signaling pathways which regulate sleep in various organisms are still largely not understood. *Caenorhabditis elegans* is an ideal organism for studying sleep since the pathways identified to promote sleep in this animal have proven to be conserved in human sleep. Sleep in *C. elegans* is characterized by lack of locomotion and feeding and an increased threshold to arousal. *C. elegans* has periods of developmentally timed sleep during their larval stages and stress induced sleep when affected by unfavorable environmental conditions such as a lack of resources extreme temperatures, UV irradiation, infection or injury.

One pathway that regulates the sleep/wake cycle in mammals and *C. elegans* is the cyclic adenosine monophosphate/Protein Kinase A (cAMP/PKA) pathway. A decrease in cAMP levels, thus a decrease in PKA activity leads to decreased wakefulness. Higher levels of cAMP/PKA promote arousal. However, how and where in the nervous system these molecules connect to sleep behaviors is unclear.

This summer, my project focused on the quantification of cAMP levels *in vivo*, specifically in the DVA neuron, an interneuron whose cell body is located in the tail of the worm, which has been implicated in sleep regulation by the Nelson lab. Using a cAMP biosensor, called epac1-camps. This sensor consists of flanking fluorescent molecules, cyan fluorescent protein (CFP) and yellow fluorescent protein (YFP), and a cAMP binding site. Changing levels of cAMP result in a change in Förster resonance energy transfer (FRET) between the CFP and YFP, which can be quantified. The goal of my project is to measure FRET in the DVA as the worm falls asleep. To express the biosensor in the DVA, the promoter from the gene *twk-16* was amplified by PCR and ligated into a plasmid encoding for a worm codon adapted form of epac1-camps called, Wepac1. The plasmid, which contains an ampicillin resistant gene, was transformed into bacterial cells which were grown on plates containing ampicillin. The colonies on the plate were grown in LB broth with ampicillin and the new plasmids from the bacteria were purified. To ensure that the *twk-16* promoter was present, the DNA from each isolated colony was cut with specific restriction enzymes. The new plasmid (*Ptwk16:Wepac1*) was injected into young adult worms. Two transgenic lines expressing *Ptwk-16:Wepac1* transgenes were isolated. Currently, I am in the process of taking baseline images of the DVA neuron. As my project continues, I will quantify the levels of cAMP in the DVA during both stress-induced sleep and developmentally timed sleep. This will be the first instance of real-time cAMP measurements *in vivo* during sleep in any animal.





Aloysius Ochasi

Department of Theology and Religious Studies and the Institute of Clinical Bioethics
Saint Joseph's University

Ph.D. Loyola University Chicago

Research Interests: Reusable Medical Devices, Community Health and Clinical Bioethics

The demands of distributive justice, and the glaring disparities in global health, especially in the treatment of cardiovascular disease (CVD), have necessitated creative means of transforming “medical wastes” from developed countries, into life-saving devices for people in developing countries. With over 80% of yearly CVD deaths occurring in low-and-middle income countries, the reuse of refurbished pacemakers which are treated as “medical wastes” in the U.S, can save the lives of about 2 million people worldwide who die annually, due to lack of a pacemaker. Exploring ways of effectively acquiring and sterilizing the devices (and other allied devices) within legal parameters from funeral homes and hospitals, for reuse in developing countries, is of great interest to me. The outcomes could have tremendous impact on global health.

Another area of interest is community health and disease prevention. Despite the expansion of health coverage for millions of Americans through the Affordable Care Act (Obamacare), millions of people, especially the undocumented, still remain uninsured. Lack of access to health care for the uninsured and undocumented, has a significant impact on the overall health of the nation. The utilization of Emergency Room services at the late stages of a preventable or manageable chronic disease is not cost effective. My interest is to understand the healthcare needs of immigrant communities, and how best to meet them in order to keep the communities healthy. An exploration, understanding and adaptation of some health practices in their country of origin, may provide the potential to better manage and promote the health of both the uninsured and undocumented. This would ultimately enhance the patient's quality of life, increase community flourishing, and conserve scarce medical resources.

African Health Promoter

Kevin Cooney, '19

Faculty Mentor: Aloysius Ochasi
Department of Theology & Religious Studies
and the Institute of Clinical Bioethics



Supported by The SJU Summer Scholars Program, the Institute of Clinical Bioethics and the Mercy Health System

As the number of undocumented, underinsured, and uninsured immigrants in Philadelphia continues to rise, the Mercy Hospital System in conjunction with Saint Joseph's University, implemented the Health Promoter Program to cost effectively address the healthcare needs of these immigrant communities. The Health Promoter Program is aimed at preventative care, in a safe, culturally and ethnically sensitive environment. This program has seen significant success among both the Hispanic and Nigerian communities of Philadelphia [1]. However, a large number of foreign-born Africans from Liberia and other French speaking West African countries do not have access to this program. As per a 2013 census survey, there were approximately 8,000 Liberians living in Philadelphia in addition to thousands of other French-Speaking West Africans [2]. Many of these immigrants lack the necessary insurance for basic healthcare. As a result, many of their immediate healthcare needs remain unaddressed and untreated, potentially creating long-term health issues. When left untreated, many conditions can worsen, negatively impacting the quality of life for an individual, while also placing a financial burden on both the individual and Mercy Health System.

Working under the supervision of Fr. Aloysius Ochasi, my project had four main purposes. The first purpose was to tailor the Health Promoter Program to the needs of the Liberian and French-Speaking West African communities of West Philadelphia, providing basic healthcare screening for the uninsured and underinsured. If deemed necessary by the Health Promoters, patients were recommended for subsequent care provided by the Mercy Health System. The second purpose of this project was to collect data on and study the underlying medical and health related issues present within the Liberian and French-Speaking West African communities. These specific groups have yet to be studied, and our results will help to better address the specific healthcare needs of these communities. The third purpose of the project is to cut long-term costs for the Mercy Hospital System. The preventative care and educational aspects of the Health Promoter Program aim to reduce expenses caused by treatment of advanced stage illness. The final goal was to foster a sense of trust in the medical community among potentially distrustful and skeptical people in the Liberian and West African communities.

Citations:

1. P. Clark, J. Brower, M. Barkowski, A. O'Connell, G. Solorzano, M. Tremoglie. *Mercy Health Promoter Model: Collaborating with Hispanic Communities for Just Health Care*. The Internet Journal of Public Health. 2014 Volume 2 Number 1.
2. Data Access and Dissemination Systems (DADS). "American FactFinder – Results." *U.S. Census Bureau*. U.S. Census Bureau, 2013 American Community Survey, n.d. Web 03 Feb. 2017.
https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_10_1YR_B04003&prodType=table.



Eric Patton

Department of Management
Saint Joseph's University

Ph.D. Concordia University (Canada)

Research Interests: Workplace
Diversity, Absenteeism, Gender Issues
at Work, Workers at the Margins,
Business History

All of us spend almost a third of our lives at work. Whether we work in an office, outdoors, in a hospital, in a school, or from home, the work we do is a large part of who we are as people. Work is where we derive much of our identity, forge many of our most important relationships, and experience many of our meaningful successes and failures. Work is also a meeting place of diverse individuals with different backgrounds, different viewpoints, and different constraints. My research focuses on how different groups of workers navigate the various constraints of work and life, and what organizational behaviors these entail.

Most of my research centers on gender and absence from work, with specific emphasis on constraints faced by women in terms of stereotypes and gender norms, as well as on public policy issue such as maternity leave and daycare. My findings indicate that the social expectations surrounding work attendance are different for men and for women, and that these expectations vary by job and also by country. Also related to workplace diversity, another of my programs of research focuses on individuals with disabilities in the workplace. My focus in this area centers on workers suffering from psychological conditions such as depression, attention deficit disorder, and autism. In addition to the challenges caused by their medical conditions, these workers often face discrimination and stigmatization in the workplace. Another group of workers that I am interested in, and for which my summer scholar's project was key, are individuals with criminal records attempting to reenter society and the challenges they face in the workplace. In all, my research explores the dignity of work for individuals in all groups and in all countries. I am very fortunate at Saint Joseph's that I am able to connect my research directly to the teaching in my courses "Gender in the Workplace," "Workplace Diversity" (which is a Service Learning course where my students spend 3 hours each week serving, volunteering and learning from diverse communities in the Philadelphia area), and "International Human Resource Management."

Discrimination and Marginalizations Effects on Men Reentering Employment After Incarceration

Jacob Diehl, '18

Faculty Mentor: Eric Patton
Department of Management



Supported by the SJU Summer Scholars Program

For my research, I looked at the issues reentering citizens face when trying to reenter society and the workforce. My first step was to gain knowledge about reentry process from different articles and resources. My mentor and I also talked to Mr. Chris Welsh, a public defender for the Defender Association of Philadelphia, to gain more information. My mentor and I then developed a list of questions in which we could ask reentering citizens about their experience reentering the workforce and seeing what worked for them along with what barriers they did face. The way my mentor and I formatted the questions was having a few questions that were personal, a few systemic, a few of both, and a few about the criminal Justice system. The questions we developed would allow the reentering citizens to share their personal story, and provide my mentor and I with information about the barriers the men faced, their thoughts on the criminal justice system, and how they believe they are marginalized in society.

I performed four interviews which provided me with interesting results. All four of the men stated when reentering society, you have to have the proper mindset. They stated that a man reentering society has to want to change and stick to that mindset. They also all stated that this is hard because they also have to learn to adjust back into society. From being incarcerated the environment they lived in has changed, so once they are released they are behind society and have to adjust. This can affect a man mindset because learning to adjust can be difficult and scary and if they do not have the right support system can lead to being re incarcerated. Dave had this issue. Dave has been charged with four non-violent drug felonies and has served a total of fifteen years. He said, "It was not until a couple months before I was released for the fourth time that a friend of mine in prison said to me is this really what you want for the rest of your life." He realized at that moment he wanted to turn his life around and he had wished he had that friend the first time he was incarcerated. Two other men I interviewed John and Malik both stated if it was not for their support systems of family and friends that their process of reentry would have been much more difficult. All four men agreed that the prison system does not properly prepare people to reenter society so without the proper mindset and support system the process of reentry can be extremely challenging.

John and Vincent both made a comment that I found very interesting. They both stated all they want is a shot. Both described their experiences in Graterford prison, and how they learned strong work ethic and prepared themselves for the real world. Vincent said, "that if an organization gives us a shot then they are going the hardest working employees because 1. We would want to keep the job, and 2. It will help us sustain our lives. All these men want is a shot to prove themselves, and to show that they have changed and are hardworking citizens. One final point that I found significant was Malik, John, and Vincent's thoughts about the ban the box movement. All three of them said it was a good idea, but it not going to be affective until the mindset of society changes. They all comment on how they will still be marginalized even if the background check happens after an offer is made. These men said not until society decides to change the way they look at reentering citizens is when the ban the box movement will truly be affective. As you can see there are several barriers that these men face, so many that it is hard to fit on one page. I hope to continue my research on this topic to gain even more knowledge, and to be a voice to society for these men who are constantly marginalized against.



Kersti Tarien Powell
Department of English
Saint Joseph's University

D.Phil. Oxford University

Research Interests: Contemporary British and Irish literature, Archives and Modern Manuscripts, Authorship and Publishing, Science and Literature

My teaching and research center around 20th and 21st-century British and Irish literatures. In other words, I study and teach authors who are still very much alive, and are busy producing literature under our very eyes.

It is thrilling to work with texts that demonstrate how authors react to the issues, trends, and ideas that are part of our own existence. Writers do not live in a vacuum, and contemporary literature is living, growing proof that literary authors are real human beings who react with pain and anger, joy and sorrow to the political and cultural events that determine our local and global realities.

Contemporary Irish literature is a case in point here. Ireland's recent history is a true roller-coaster ride of ups and downs: from the late 1990s until the fall of 2008 the country witnessed an unprecedented economic growth, a phenomenon that was dubbed the Celtic Tiger. During these energetic and affluent boom years, the Irish national identity went through significant changes: from the struggling and not-so-cool country that so many young people were fleeing from, Ireland became the poster child of the European Union. But after the boom came the crash when the global economic downturn of 2008 brought the Tiger to its proverbial knees. I have studied how Irish writers dealt with the affluent Tiger years and reacted to the economic austerity that followed the crash. In a way, one could say that contemporary Irish fiction demonstrates how a global economic catastrophe can invigorate the novel format. The Irish authors who so far have interested me most are Tana French and John Banville. I am also working on a book that involves the works of John Banville, Tom Stoppard and John Fowles.

How Blame, After Ireland's Celtic Tiger Era, Was Given a Voice Through Contemporary Irish Confessional Narratives and Their Authors

Victoria Tralies, '18



Faculty Mentor: Kersti Tarien Powell
Department of English

Supported by the SJU Summer Scholars Program

Irish culture and culpability coincide in Celtic Tiger era literature, a genre consisting of writing that occurred during, or surrounding, Ireland's financial success that started in the 1990s and lasted until 2007. The Celtic Tiger was an period of financial highs – flush with opportunities that seemed to offer a good life. More government spending and lower taxes created an ideal economy; the national narrative seemed to promise a positive future. However, the trend didn't last for long. By 2008, the Celtic Tiger had officially come to an end and Ireland's people were set to pay the price.

The troika—another name for the European Union (EU), European Central Bank (ECB) and International Monetary Fund (IMF) combined—bailed out the government in 2010 at the steep cost of 85 billion euros (McDonald 66). By the time the Celtic Tiger was bailed out, the damage had already been done and an ominous feeling taken over. In January 2009, *The New York Times* published a piece in their World Business section, its title declaring “The Irish Economy's Rise was Steep and the Fall was Fast”. Two months later, *CBS News* hailed “Celtic Tiger No More”, reporting a high level of unemployment. The future looked ominous and it wasn't long before the thread of injustice revealed itself through literature.

In this project, I analyzed works that were published both during and after the Celtic Tiger era including Tana French's *Broken Harbor*, Anne Enright's *The Gathering*, Claire Kilroy's *The Devil I Know* and Donal Ryan's *The Spinning Heart*. I read a wide variety of criticisms and reactions on these works' additionally, I did research on the Irish news surrounding the crash and national bailout. The plots of these novels offered a creative outlet for authors to express the blame surrounding the country's economic distress. Nearly every character in each book had a unique reaction somehow relating to the Celtic Tiger, creating a diverse pool of primary (and secondary!) sources to work with.

However, not every author responded to Ireland's crisis the same way. French and Kilroy addressed their problem head-on, by having characters problem-solve conflicts related to Ireland and its fall; while authors like Ryan did the opposite, addressing the Celtic Tiger's crash more indirectly. Regardless, all authors I analyzed crafted characters with some amount of culpability. Through this literature, we are challenged to empathize with Irish narratives, even those that are at fault and were feckless with their finances.

Readers are effectively encouraged to question what they may have known before and listen to how artists understand this part of Irish history. Artists continue to be inspired by the world around them and channel this inspiration into fiction. Using a critical lens on Celtic Tiger literature can only continue to educate and enlighten a frustrating and vulnerable time for the Irish people.



Brendan T. Sammon

Department of Theology and Religious
Studies
Saint Joseph's University

Ph.D. Catholic University of America

Research Interests: Theology of Beauty,
Theological Aesthetics, Theology of
Disability

One of my primary areas of research concerns the theology of beauty or what is more commonly known as theological aesthetics. This is, in its simplest expression, a way of approaching God through the event and experience of beauty. Historically, this approach to God derives most fundamentally from the tradition of the divine names—a tradition found in all three major monotheistic faiths (Judaism, Christianity, and Islam). In Christianity, one of these names for God was beauty, identifying the way in which our natural experiences of beauty open us to something beyond nature, something divine. From the earliest origins of philosophical inquiry up to contemporary aesthetic discourse, beauty has always proven itself to be something that resists conventional modes of human thought while simultaneously uplifting that thought into something beyond, something that nourishes, fulfills, and augments it. Beauty, it might be said, calls us to new ways of thinking and being.

For this reason, beauty proves itself to be not only helpful but indelible for enriching both human experience and the reflection upon that experience found in the variety of discourses that constitutes human thought. Beauty is the first event of attraction to any experience or thought and so is there at the origins and activity of human consciousness. Beauty also expands that consciousness by instilling a desire for more of itself, pushing the inquiring intellect into ever new frontiers of exploration. Beauty is unique in that it both provokes and excites human desire while simultaneously bringing that desire to rest without causing desire to stagnate. Classical accounts of beauty saw it as a mode of being whereby the unity of existence itself appeared and attracted through the diversity of beings that exist. In this way, beauty balances in glorious harmony a unity in plurality and a plurality in unity.

The theological study of beauty, then, is the study not only of how God attracts or calls human beings to his own divine beauty, but also, as Hans Urs Von Balthasar—the father of contemporary theological aesthetics asserts—a new way of seeing. This capacity to see enriches every facet of human existence, whether social, political, economical, educational, and even mathematical and scientific. When beauty opens new ways of seeing it also impacts the variety of practices that constitute human activity.

One area of particular, though long term, interest to me concerns the phenomenon of human disability. It is my contention that a theology of beauty holds important riches for seeing the beauty of persons who are considered 'disabled' or 'differently abled.' The many strategies for approaching disabled persons today have proven fruitful. However, many of these strategies, informed as they are by trends in modern and postmodern thinking, tend to function as values extrinsically imposed upon social consciousness. It is my belief that a theology of beauty offers a more organic or internal way of embedding these values, thus fortifying them for posterity. Beyond attempts either to integrate disabled persons into a supposedly neuro-typical world, or to elevate them beyond the world into some holier-than-us status, a theology of beauty enables the beauty of human disability to contribute in its own unique way to the overall beauty of a creation brought forth from the Divine Source of all beauty.

An Exploration of Mary: How A Young Woman's Narrative Can Contribute to a Theology of Disability

Rebecca Judge, '18



Faculty Mentor: Brendan T. Sammon
Department of Theology and Religious Studies

Supported by the SJU Summer Scholars Program

The question this project seeks to approach is how Mary, the mother of Jesus who most Christians also believe to be the Mother of God, contributes to understanding the goodness and value of persons with disabilities. From this question arises the importance of narratology/tradition-based inquiry because both the person of Mary and the topic of disability prove recalcitrant to many conventional modes of scholarly inquiry. Rather, these two topics prove to be much more hospitable to the sort of scholarly approach found in narratology, or what is also referred to as tradition-based inquiry.

Narratology/Tradition-based inquiry identifies a method of research that, remaining attentive to conventional research methodologies, also takes seriously the inescapable drama at the heart of human life. From this perspective knowledge and understanding occur as the fruit of a unity between a knower and what is known, emphasizing certain values that many conventional research methods neglect or intentionally ignore: relationship, human interdependence, particularity, practices, even vulnerability. Certain dominant contemporary research methods tend to value a detachment between the knower and the known, a controlled environment freed as much as possible from the putative chaos of human life, a liberation from communities of the past, a priority of theory over practice and the universal over the particular. Within such methods, human reason is detached from the concrete drama of human life and reduced to a calculating instrument used to construct an equally detached form of knowledge. Narratology/tradition-based inquiry, in contrast, recognizes and seeks to overcome such limits by recognizing the need for all research to include those aspects of human life that are marginalized by instrumental rationality. As it is defined by Alasdair MacIntyre, the father of tradition-based inquiry, tradition is 'an argument extended through time in which certain fundamental agreements are defined and redefined.' This conception of tradition helps us to take reason embedded in the context of history more seriously, leading to a more fruitful and authentic understanding of the human person, both as an individual and as a member of a larger community. Narratology/tradition-based inquiry reveals that humans are intentional beings, and that human life is historical insofar as a human person is both actor and author, thus requiring full participation and immersion on behalf of the researcher. This paper argues that when it comes to both the person of Mary and the phenomenon of human disability, narratology/tradition-based inquiry becomes a necessity.

Since Mary does not lend herself to historical research methods, narratology/tradition-based inquiry becomes important. What emerges is a type of anthropology centered on the person of Mary which focuses on vulnerability, dependence, and unity. Many modern anthropologies tend to emphasize the values of independence and autonomy, seeing the human person as the center of individual interest whose relationships are merely a matter of choice. Such a conception leaves human beings in a state of fragmentation rather than of community. Mary is an antidote to this confusion, as in her it is possible to discover a valid paradigm of the human person whose actions reflect an authentic sense of independence and power through the embodiment of vulnerability and dependence. In her openness, she releases a multitude of ways to be human. This Marian Anthropology invites a more effective way of understanding the value of persons with disabilities by recognizing their authentic contribution to the world, a contribution that modern anthropologies centered on human independence and autonomy are unable to accommodate. In understanding the Marian identity, human nature becomes intelligible in new and diverse ways, making possible also the intelligibility of a broader narrative of the human family. This expansion includes persons with disabilities and recognizes the shared dependency in all humans. Thus, it is only through a narrative approach to scholarship that the openness of Mary allows, and even necessitates, that persons with disabilities be fully valued and integrated into society.



Becki S. Scola
Department of Political Science
Saint Joseph's University

Ph.D. University of California, Irvine

Research Interests: American Political Institutions, Gender Politics, State Politics, Inequality, Representation, Intersectionality

Who is represented in American institutions, broadly defined? Whose voices are heard and whose are ignored or overlooked? Who has power, and who does not? Where, how, and why? These are the primary questions that guide all of my teaching and research projects, and I am especially interested in how representational variation impacts the politics and policy of historically disadvantaged groups of citizens through an intersectional lens.

Within Political Science, the representational capacity of higher education is an important but often understudied institution. What we learn, how we learn it, and from whom we learn it are inherently political questions about power, knowledge, and privilege. How well do our institutions of higher learning include the voices and experiences of underrepresented groups? To begin addressing that question, this summer my Summer Scholar students conducted research on how the goals of diversity and inclusion are reflected in the curriculum at Jesuit Colleges and Universities. While a majority of Jesuit institutions declare a commitment to diversity and inclusion within their mission statements, the findings suggest significant variation in how this objective is articulated and implemented within the required curriculum. The criteria, content, number, and type of courses that fall under the umbrella of diversity at Jesuit institutions differ considerably across the U.S., and the results speak to larger questions of how well underrepresented campus populations are served within the curricular environment.

This project is an expansion of other areas of my research agenda, where I study how the intersection of gender, race/ethnicity, and class affect and inform civic participation within several representational arenas, including state legislatures, community organizations, and among the voting populous. At the state level, I examine the variation in state legislative service among women and people of color, as well as how their presence affects voter turnout across the states. Importantly, a legislator's gender and race/ethnicity matters because it tends to increase the likelihood of voting among constituents with similar identities. At the community level, I am engaged in a project that assesses anti-hunger advocacy in Philadelphia and across the nation. Families who are food insecure are not well-represented within our political system, and they often lack a voice in the policymaking process. The study focuses on the type of policy agendas that anti-hunger organizations produce and assesses why some policy prescriptions are less successful than others. The goal is to shed light on why the rate of food insecurity within Philadelphia continues to rise, despite the presence of several advocacy organizations within the city that are committed to alleviating hunger.

Diversity in the Curriculum: A Comparison of Saint Joseph's University and the 27 Jesuit Colleges and Universities

Kiana Porter, '19

Faculty Mentor: Becki S. Scola
Department of Political Science



Supported by the SJU Summer Scholars Program

Diversity expands perspectives and creates increased possibilities for creative solutions for a world that is becoming more global. Today, the United States is rapidly changing in terms of diversity and these trends will only grow within the next few decades.

The objective of this research is to compare Saint Joseph's University current curriculum for fall 2017, focusing on the diversity component, to the other 27 Jesuit colleges and universities to determine where we as a university are excelling and can improve. In this research, the Carnegie Classification system was used to match Saint Joseph's University with the Jesuit institutions that are comparable in size and outcomes. My research included researching each institution's mission, core curriculum requirements, and course offerings in terms of diversity including the department, number of courses, number of courses required, and category of diversity.

All 27 Jesuit colleges and universities mention preparing citizens for a global world but only 74% specifically mention diversity in some form within the mission. Despite the majority of institutions mentioning diversity in their missions, only nine of the institutions state a commitment to diversity in the core curriculum. However, 18 of the 27 institutions have some form of a "diversity" requirement implemented.

Using the Carnegie Classification system, it was found that Saint Joseph's University is comparable to 17 other Jesuit colleges and universities. Of these 18 institutions, 11 have diversity course requirements all of which require one "diversity" course with the exception of the University of Scranton which requires two courses. Furthermore, research found that Saint Joseph's University is the only university that allows students to choose between a "diversity", "non-western studies", or "globalization" course meaning that a specific "diversity" course is not a requirement. Out of the 11 institutions, Saint Joseph's University has the most "diversity" course offerings for fall 2017 and across all Jesuit institutions there are more "diversity" courses offered in the schools of Liberal Arts and Sciences than any other schools.

The research found that while Saint Joseph's University offers a large number of "diversity" courses, they primarily focus on race and ethnicity, while other identities such as sexual orientation and socioeconomic status are largely underrepresented.

Diversity of Jesuit University Curricula Compared to Saint Joseph's University

Hannah Salamon, '18

Faculty Mentor: Becki S. Scola
Department of Political Science

Supported by the SJU Summer Scholars Program



Most Jesuit colleges and universities value diversity in their mission statements and many require that undergraduate students address it their coursework. Saint Joseph's University also values diversity in its mission statement and offers students the opportunity to study it in their coursework; however, it does not *require* all students to confront diversity in order to graduate.

My research consisted of collecting the mission statements of Jesuit colleges and universities in the United States and searching particularly for mentions of “diversity” within them. Seventy-one percent, a healthy majority, of Jesuit colleges and universities mention “diversity” at least once in their mission statements, including Saint Joseph’s University.

Because no definition of diversity exists common to all schools, a definition that pulls from all of the universities’ own statements and criteria for “diversity” courses is as follows: *Diversity courses should explore topics including but not limited to race, class, gender and gender identity, sexuality, religion, and cultural differences, and the “issues and processes which may result in stereotyping and discrimination”² based on these identities. Privilege, subordination of minority and systematically marginalized groups, and social justice may be addressed to prepare students to become agents of social change in a globalized world.*

The Carnegie Categorization system was then used to match Saint Joseph’s with other comparable Jesuit colleges and universities that are of similar size and have institutional goals and outcomes that run parallel to those of Saint Joseph’s.³ The core curricula of these Jesuit colleges and universities were collected to find “diversity” course or overlay requirements.

Nine of the 18 colleges and universities within Saint Joseph’s category require students to take at least one “diversity” course. Four institutions have unique requirements that are congruent with *some* elements of the compiled diversity definition. Four have no “diversity” requirement.

Saint Joseph’s is the only Jesuit university with a “modified” requirement that allows students to choose to study either “Diversity”, “Non-Western Studies”, or “Globalization”. Therefore, Saint Joseph’s students are not required to complete a course that solely focuses on diversity. Saint Joseph’s University is one of just four of the 18 comparable colleges and universities that specifically mentions “diversity” in its mission statement, but fails to require students to study diversity by meeting a “diversity” course or overlay requirement.

² "University Mission and Identity." John Carroll University. Accessed August 01, 2017. <http://sites.jcu.edu/mission/>.

³ Saint Joseph’s is a M1 school: “Master’s Colleges and Universities: Larger Programs.” Eighteen out of 28 Jesuit universities are listed in the M1 category and therefore comparable to SJU.



Reecha Sharma

Department of Interdisciplinary
Health Services
Saint Joseph's University

M.D. Maharashtra University of
Health Sciences

Research Interests: Reproductive
Medicine, Autism Spectrum Disorders

I am interested in the finding ways to improve communication between health care providers and parents with children of autism spectrum disorders. In a previous study, we identified that there are important gaps in this communication and recommendations suggested creation of an informational questionnaire to be used to gather patient questions and then answer them. My students and I are currently utilizing a survey that we have created to facilitate the process of asking questions and providing necessary information to parents of children and adolescents diagnosed with autism spectrum disorders. In addition, we will be using another survey to assess the benefits and ease of use of the informational survey as well.

Our study once completed can be utilized to develop practice standards for all physician offices catering to parents with children diagnosed with autism spectrum disorders. Physicians can provide detailed information about medication use, providing adequate, timely information to parents, and improving outcomes for children and families. We hope that all physician offices utilize our surveys in future to enhance communication and to reduce informational gaps.

Improving Gaps in Communication Between Health Care Providers and Parents of Children with Autism and Autism Spectrum Disorders

Amanda Hoag, '19

Rachel Ledbetter, '19



Faculty Mentor: Reecha B. Sharma
Department of Interdisciplinary Health Services

Supported by the SJU Summer Scholars Program

Autism Spectrum Disorder (ASD) diagnoses have increased at a rapid rate in recent years. There is no cure for autism; however, there are many steps that can be taken to ensure that the patient lives a full and complete life. Rachel Ledbetter and Amanda Hoag, under the mentorship of Dr. Reecha Sharma, looked closely at all of the dedication, time, and patience it takes to manage the care of a child with Autism. Autism does not stop at the diagnosis. There is an extensive decision making process involved to determine each child's plan of care and treatment that includes finding the best medical insurance coverage, teams of doctors, teaching programs, respite care providers, and other forms of support to guarantee the child's well-being. Juggling all of this can put great stress on a parent, and often times parents who have had little exposure to ASD have a hard time figuring out which questions to ask and which outlets of information to use. This, combined with physician's inability to provide information that they do not know is needed, leads to an informational gap between parents of children with ASD and their health care providers. If this informational gap can successfully be decreased or eliminated, parents can feel confident that they are getting, and providing the best care for their child.

Rachel and Amanda reached out to several providers who treat children with autism, documented the number of children they treat or diagnose with Autism per year, how many physicians are in their practice, and whether they would be interested in participating in a movement towards closing the informational gap. If a physician was interested, a meeting was held to discuss the use of a questionnaire aimed at the parents of children with Autism. The questionnaire was developed to help parents target the questions they did not previously consider, or forgot they had upon entering the physician's office; in turn helping to close the informational gap. It outlines a series of questions regarding the child's diagnosis and the severity of their condition, and then goes on to ask what it is that the parents need to know or what kind of resources they have more questions about. Once a parent was provided with a questionnaire, they would have the option of allowing their answers to be used for research or to keep their information confidential, benefitting themselves and the physician, but not for use for research purposes.

Next, Dr. Sharma conducted multiple interviews with parents who have a child or children with autism. Rachel and Amanda transcribed and analyzed these interviews to gain a better understanding of the parent's perspective. Questions like: "Did you feel like your provider set you up with all the necessary tools to succeed?" and "What forms of communication seem to work best between you and your provider?" were asked. These interviews allowed the scholars to hear real situations, hardships, and successes that many have encountered. Thus, we can better assess what worked well and what many parents still found struggle with so that more attention can be directed where it is needed.



George P. Sillup

Department of Pharmaceutical &
Healthcare Marketing
Pedro Arrupe Center for Business Ethics
Institute of Catholic Bioethics
Saint Joseph's University

Ph.D. The Fielding Institute

Research Interests: Media Coverage of Ethical Issues About the Pharmaceutical Industry; Levels of Care in Nursing Homes; International Healthcare Delivery

Prior to joining the full-time faculty at Saint Joseph's University in 2004, Dr. Sillup worked in the diagnostic, pharmaceutical and medical device industry for 28 years and held positions from salesman to COO. He worked in major corporations, such as Johnson & Johnson, as well as in start-up businesses, where he sold products, conducted research and launched several new medical/pharmaceutical businesses into global markets. Dr. Sillup has attained favorable reimbursement coverage and coding for pharmaceuticals, medical devices and drug-device combination products with international regulatory authorities and with U.S. authorities, the FDA and CMS (Centers for Medicare & Medicaid Services). He is and has been a member of several boards of directors, e.g., Daemion Counseling Center, American Heart Association. In 2017, he and colleagues, Dr. Eileen Sullivan, College of Arts & Sciences, and Dr. Ronald Klimberg, Haub School of Business professor, have a forthcoming article in the *International Journal of Behavioural and Healthcare Research* entitled "Reduction of Agitation and Anxiety Observed in a Clinical Study of People with Dementia Using the Timeslips™ Creative Expression Program". Additionally he and Steve Porth published their 13th consecutive audit of the newspaper coverage of ethical issues affecting pharmaceutical industry in *Pharmaceutical Executive* entitled "Pharm Exec's 13th Annual Press Audit: Pharma in the Spotlight as Media Coverage Increases" and are working on the 14th with the Haub School of Business's Reference Librarian, Cynthia Slater, Pharmaceutical & Healthcare Marketing senior and EthicsTrak® Database Administratrix, Claudia Barbiero, and the 2017 Summer Scholars, Olivia Capperella, Kayla Herbert and Tyler Pham.



Stephen J. Porth
Department of Management
Saint Joseph's University

Ph.D. Temple University

Dr. Stephen Porth is Professor of Management at the Haub School of Business, Saint Joseph's University (SJU), Philadelphia, PA, USA. He also serves as the Chair of the Food Marketing Department at SJU and is Senior Editor of the *Journal of Jesuit Business Education*. Steve has chaired three academic departments at SJU and served for 17 years as Associate Dean and Executive Director of Graduate Business Programs. He is the chair of the Atlantic 10 Conference Council of Faculty Athletic Representatives (FARs).

Steve's research and teaching interests are in the areas of strategic management, leadership and ethics. Steve provides consulting services specializing in leadership development and strategic management programs. He has written two books, one which is now in its fifth edition and has been translated into Chinese, and he has published extensively in management journals.

Steve is the Treasurer of the Board of Directors of *Nutritional Development Services* and a former trustee on the Board of *Sacred Heart Academy, Bryn Mawr*. He is past president and a current board member of the *Colleagues in Jesuit Business Education*.

Analyzing the Pharmaceutical Industry Through Newspaper Coverage

Olivia Capperella, '18

Faculty Mentors: Stephen J. Porth and George P. Sillup
Departments of Management and Pharmaceutical & Healthcare Marketing



Sponsored by the SJU Summer Scholars Program

For my second and final summer of the Summer Scholars Program I analyzed the way media sources portrayed and viewed the pharmaceutical industry. This outside-the-classroom research has enforced the topics I have spent three years studying through real world examples. This summer I partnered with Kayla Herbert and Tyler Pham to read through hundreds of articles from the following top five newspaper sources: *The New York Times*, the *Los Angeles Times*, the *Wall Street Journal*, *USA Today*, and the *Washington Post*.

The research I have helped to continue these couple of summers is part of a larger project conducted by Drs. George Sillup and Stephen Porth for the last thirteen years. The trends we have studied and ethical issues we have recorded are all contained in a large database called EthiksTrak for record. This database contains well over 16,000 analyzed articles.

Our research could not be possible without the help of reference librarian, Cynthia Slater. She searches the online database specific to our newspaper selections to find articles relevant to our research. These articles are passed on to Dr. Sillup who formats the articles appropriately and passes them along to Claudia Barbiero, our database administrator. Claudia distributes the articles to Tyler, Kayla, and myself to analyze. The process to analyze an article requires patience and thinking outside the box. When reading an article, we cannot take it for what it is, but must dive in deeper to understand the perspective of the writer. To begin, I look at the headline. Is it positive, negative, or neutral? As I read each sentence, does this article message align to what I first perceived from the title? What companies are mentioned? What specific drugs? What ethical issues are present? Typically, you must read an article more than once to have a feel for what the author is conveying. We provide a three-sentence summary captured in an excel workbook with the other mentioned criteria. Once the articles have been thoroughly analyzed, we talk as a group to discuss our findings and see if anyone else can offer other insights or sees something the evaluator may have missed.

This summer we saw a lot of coverage on nontraditional medicines to treat pain, the upcoming and very successful immunotherapy treatment for late stage cancers, and the changing of political parties affecting Medicare/Medicaid. As always, I found my work extremely interesting and I was always wanting to know more. As I get ready for my last year at SJU, I am very thankful to have had this experience. It is one thing to study in a classroom, but another to participate in engaging work with a faculty mentor learning about the industry I hope to have a career in. Thank you to my mentors and my partners for their help and guidance this summer.

How Big Pharma is Portrayed by the Media

Kayla Herbert, '19



Faculty Mentors: Stephen J. Porth and
George P. Sillup
Departments of Management and
Pharmaceutical & Healthcare Marketing

Sponsored by the SJU Summer Scholars Program

As a first year Summer Scholars researcher, I have gained knowledge as well as my own personal opinion on how the pharmaceutical industry is portrayed according to different media sources. The Pharmaceutical and Healthcare Marketing department group of summer scholars are assisted by SJU's very own, Business Reference Librarian, Cynthia Slater. Ms. Slater uses specific keywords to search through all different databases in order to get the most up to date and applicable information on the Pharmaceutical Industry. After Ms. Slater finds the articles we are looking for, she communicates them to our mentors, Doctor George Sillup and Doctor Stephen Porth. Besides myself, I collaborate with my peers Olivia Caperella '18, Tyler Pham '20 and Claudia Barberio '18. As a team we analyze and interpret media opinions through sources such as the *New York Times*, *LA Times*, *Wall Street Journal*, *Washington Post*, and *USA Today*.

Claudia is the facilitator of our team as she is the one who distributes our articles from the different media outlets and then inputs the data that we discover into our 13 -year compilation of data into the EthicsTrak database. Tyler, Olivia and I conduct research based off of certain criteria that has continued to expand as the years go on. Specifically, we determine whether each article we analyze has a positive, negative or neutral affect based on the perspective of Big Pharma. Once that is determined, we also assess which pharmaceutical companies are mentioned and what kind of representation they are receiving in the article-positive, negative, or neutral. This same process is conducted on different pharmaceutical products or devices mentioned in the article in order to determine how the products of Big Pharma are seen through the media's eyes. This study is something that has not only taught me about different legal problems that pharmaceutical giants have faced but also made me gain my own opinion on how certain issues are dealt with.

This year the industry has seen increased criticism from the media over opioids and how they are one of the leading causes of death now. The media blames pharmaceutical companies for this since they produce prescription pain killers that, in certain cases, starts an individuals' addiction. While the pharmaceutical companies do produce and sell opiate painkillers, the blame cannot all fall on them.

Through this experience I have learned in order to conduct efficient research you have to see all sides of the story and not be bias. I feel that the Summer Scholars Program has helped me grow intellectually but also as an adult. What I have learned this summer will not only help me in the classroom but has applied to my everyday life. If it was not for summer scholars, I don't think I would be as engaged in worldly events nor would I have a knowledgeable opinion on healthcare related issues.

Portrayal of the Pharmaceutical Industry by Newspaper Coverage

Tyler Pham, '20



Faculty Mentors: Stephen J. Porth and George P. Sillup
Departments of Management and Pharmaceutical & Healthcare Marketing

Supported by the SJU Summer Scholars Program

When it comes to the media, the pharmaceutical industry is not always represented in a fair manner. The media has been known to advertise the pharmaceutical industry in a negative tone merely to make a profit rather than report the entire truth. As a result, businesses, potential investors, and consumers who read these publications, may fall victim to bias against these pharmaceutical companies which in turn would be unfair to the companies at hand. There may, of course, be some truth in the negative articles that must be reported; nevertheless, our focus consists of evaluating whether or not the positive information about the industry is also being reported.

For this project, we used an excel spreadsheet to classify, summarize, and review pre-selected articles from five different newspaper sources - *The Los Angeles Times*, *The New York Times*, *The Washington Post*, *USA Today*, and the *Wall Street Journal*. Reference Librarian, Cynthia Slater, searches through a database using keywords to find articles related to our research. These articles are then sent to Dr. Sillup to be formatted and Dr. Sillup sends the articles to our EthicsTrak database administrax, Claudia Barbiero. Claudia is then responsible for distributing the articles evenly between my partners, Olivia Capperella, Kayla Herbert, and I. Once we receive the articles, our job is to analyze the articles in numerous ways. First, we analyze the title/headline of the article and determine whether it is positive, negative, or neutral from the point of view of the pharmaceutical industry. While reading the article, we look for any pharmaceutical companies that or mentioned and/or any specific drugs mentioned. After reading the article, we determine whether the article itself was positive, negative, or neutral again from the point of view of the pharmaceutical industry. We also look for whether or not the article represented the pharmaceutical industry's perspective and look for any ethical issues that appear in the article. All of our findings are recorded into an excel spreadsheet that is then sent to Claudia to be entered into the database. This year we also implemented a new form of research consisting of recording the number of articles about a specific ethical issue within NBC Nightly News, NPR All Things Considered, and Google Trends. For this the three of us compiled a list of all of the ethical issues we read about and researched how many articles showed up for each issue within the three new sources.

I have learned a lot through the Summer Scholar's Program. Being only a freshman, I did not know too much about the pharmaceutical industry; however, throughout this summer I have learned so much about the industry and the way it is perceived through the media. I am extremely enthusiastic about the major and jump on any opportunity to learn more about the industry. As a result, the Summer Scholar's Program has been an amazing learning experience and I hope to continue to be involved in the program in the future.



Alexander J. Skolnick
Department of Psychology
Saint Joseph's University

Ph.D. University of Georgia

Research Interests: Emotion, Disgust,
Gender and Emotion, Emotions
Involved in Health and Stress

Life's path can be circular. As a kid I loved learning about different animals and would go to the American Museum of Natural History, the Bronx Zoo, and Aquarium in New York City as often as I could. Then in college and graduate school I was drawn to the behavior of primates and studied orangutans in zoos, capuchins in group colonies, and rhesus monkeys on an island off Puerto Rico. My PhD focused on the biopsychology of social relationships in primates. Then life's twists and turns led me to focus my research on stress and emotions in humans! Who knew that humans were so interesting? My scientific path led me to specifically examine the emotion of disgust in all its icky glory. Since disgust is the only basic emotion that animals do not express, it might be an odd research choice for me. However, this pathway was possibly inevitable as I have come to discover (and research) the relationship between nature and disgust, as the two are intricately linked. What things gross people out the most? All the things found in nature: things that are rotten, decayed, slimy, squishy, moist, and things related to death, sex, food, animals, and yes, things that bodies produce (blood, mucus, poop). Therefore, disgust is the greatest emotion to study (if one is not too queasy)! Why do these things disgust humans? They can all be related to contagious agents in the environment and disgust might help keep us safe. I study this relationship and how and why men and women differ in their disgust. I am also fascinated by the ways that disgust influences people's lives, for example, affecting food choices, occupations, politics, or even moral decisions. And now, how disgust might influence animal conservation issues. Life is making its way back to where I started.

Many people are afraid and disgusted by certain animals. Bats are one of those animals along with rats, roaches, spiders, and snakes, that are often the target of disgust. These negative emotional feelings towards bats might work against favorable views of bats and likely work against any conservation efforts to help bats. This year Maria Biancaniello's Summer Scholars project with me addressed people's views of bats and how these views relate to how easily disgusted people become. Maria and I created a list of characteristics of bats that might make them disgusting, fearful or interesting (e.g., wings, hairiness, disease carriers, nocturnal, unpredictable); adapted a previously published survey to measure attitudes about bats; and measured how easily people become disgusted. In a second study we are testing whether aesthetically interesting photographs of bats would increase positive attitudes about bats.

Investigating are Bats Just “Rats with Wings” That Want to Suck Your Blood? Identifying and Lessening the Grossness and Scariness of Bats

Maria Biancaniello, '18

Faculty Mentor: Alexander J. Skolnick
Department of Psychology

Supported by the SJU Summer Scholars Program.



Disgust plays a functional role in our lives by alerting humans to certain types of contamination-related and disease-related threats. Thus, disgust can be evoked from issues of sanitation, rotting foods, certain animals, and aspects of the body. Every individual varies in their level of disgust, especially towards animals. For example, rats may repulse one person, but another may own them as a pet in their own home. This phenomenon makes it difficult to protect animals that garner disgust by the general population. Research has shown that people who are disgusted by bats reject conservation efforts to protect them (Knight, 2008; Schlegel & Rupf, 2010). Bats are ecologically integral as they benefit the environment in many ways, by being pollinators, and seed dispensers, and by controlling insect populations. Unfortunately, several features of bats evoke disgust and fear in most people (Prokop et al., 2009). These include that bats are associated with disease (e.g., rabies), have odd features (e.g., faces, wings, no hands) and behaviors (e.g., hanging upside down, and sleep in caves), and have been associated with drinking blood (from vampire stories). Since bats do not pose a health threat to humans, human aversion to them is not likely evolutionary but culturally based on these features. Thus, there is a need to understand the traits that make bats aversive to the public, as this has not been fully examined.

The objective to this research project was to examine the characteristics of bats that evoke fear, disgust, and interest and to relate these to responses on a bat attitude survey. Additionally, a disgust survey was used to examine how easily disgusted someone gets and how that played a role in their feelings towards bats. We tested over 100 students and over 200 people across the country (ages 18-70).

It was found that the characteristics of bats that triggered the greatest disgust response were the fact that they are disease carriers, their assumed dirtiness, hairiness and their face. The characteristics of bats that induced the most fear were the fact that they hang upside down, that their nocturnal, speediness, unpredictability, and their bird-like qualities. As far as participant's interests were concerned, they were interested in the fact that they hang upside down, that they were nocturnal and their apparent blindness. We found that interest for bats and their characteristics increased with age. Study 2 of this project is ongoing and is testing whether negative attitudes towards bats might be improved with “positive” images of bats. These results will hopefully aid in understanding how to increase interest in bat conservation.



Brent Smith

Department of Marketing
Saint Joseph's University

Ph.D. Drexel University

Research Interests: International Marketing,
Culture, Ethics, Structural Equation
Modelling

I am fascinated by how people understand, process, and react to the worlds around them. My professional experiences and scholarly projects have allowed me to grasp some of the meaningful influences of cultural values and ethical values on individuals, within organizations, and across societies. Accordingly, I have examined such influences relative to the following:

- bracketed morality and sport fan behavior
- academic honesty of business students
- sport fans' perceptions of athlete activism
- performance of international retailers beyond their home regions
- communication strategies for international marketing channel partners
- consumer loneliness and shopping experiences in the USA and India

Aside from interest in the above topics, I enjoy learning and applying a variety of data analytic techniques in my research. I also teach some of these techniques. Most recently, I have focused on publishing articles that feature mediation analysis, text exploration, and partial least squares structural equation modelling, and importance-performance analysis. My tools of choice are varied, including mainstream and specialized tools, such as JMP Pro 13, SmartPLS, SPSS, Stata, and Tableau.

Injury Bug: How Impacted Are Soccer Teams from Injuries

Kevin Shank, '18

Faculty Mentor: Brent A. Smith
Department of Marketing



Supported by the SJU Summer Scholars Program

Injuries are a part of every sport and can dramatically affect a team's performance and season. The goal of this project was to analyze professional soccer teams' performances as they encounter injuries by constructing a metric that quantifies how injured a team is. By using data from American Soccer Analysis, Transfermarkt, and Goalimpact, my own Man Games Lost (MGL) metric was constructed to measure how injured Major League Soccer teams were in the 2015 season. For this project, MGL is defined as the playing time lost when a player is injured; a team's MGL is the cumulative playing time lost among all their injured players. My studies showed that while injured teams were more likely to perform worse over the course of the season, there was little evidence to show that having the injury bug affects a team for an individual game's outcome.

To create the MGL metric, there were three necessary components; playing time data was needed to see how often a player played before an injury, player rating data to see how important a player is to his team, and injury data to determine when and how long a player was injured. The data for this project was collected from three different sources: American Soccer Analysis (blog), Goalimpact (scouting consultancy), and Transfermarkt (stats/consultancy). While the blog's minutes played data and Goalimpact's player ratings data were accessible, collecting the injury data from Transfermarkt was a challenge as it was not available in a spreadsheet like the others. Therefore, through scraping each team's injury profile into Excel and using Macros functions, the injury data was organized into a spreadsheet and later merged with the minutes played and the player rating data.

By using minutes played by game data, I calculated each player's average time played for every matchday. When a player was injured, his average playing time was considered his time lost; for example, if Player A is averaging 80 minutes per game and is injured two games, then he has lost 160 expected minutes played over that period. The model was improved by adding player ratings from Goalimpact. By weighting the time lost according to how valuable a player is on his team, the final MGL value was calculated. Through using the data visualization software Tableau, I created an interactive dashboard where users can view how each team's injury profile related to its game performance throughout the season while also showing each player's and team's share of the league's total MGL.

The results of this project show that there was a -0.17 correlation between a team's season total MGL and their performance measure in Points per Game (PPG); while this is not a strong correlation, it does suggest that injuries can affect long-term performance. However, when analyzing individual games, it was surprising to find there was no correlation between MGL and wins, losses, and draws. Nevertheless, some teams like Seattle, had a -0.44 correlation between injuries and game performances, meaning that the more they were injured, the worse they performed. Injuries' effect on Seattle's performance was clearly seen on Tableau where they averaged 0.75 PPG when above their average injury rate while averaging 2 PPG when below their average injury rate. Another interesting takeaway from this study is that compared the league's distribution of minutes played, 23-year-olds were least likely to be injured while 28-year-olds were most likely, which raises the topic of age's effect on injury for future studies.



Jean M. Smolen
Department of Chemistry
Saint Joseph's University

Ph.D. Johns Hopkins University

Research Interests: Water Quality and
Global Access

My current research interests focus on water quality in naturally occurring surface waters and in water distribution systems. I am generally interested in the access and sustainability of water resources.

Access to sufficient quantities of clean water is and will continue to be one of the biggest challenges facing society well into the future. In the United States we are fortunate to have the expertise and the infrastructure to provide water free of chemical and biological impurities that is safe for human consumption. Unfortunately, in developing countries access to such clean water is limited by lack of adequate infrastructure and technology. Women travel long distances to collect water from a reliable source and subsequently spend a majority of their day completing this task. Oftentimes water that appears clean may actually be potentially deadly.

In recent years, lead (Pb) contaminated water has become an increasing concern. Along with my research students, we are evaluating the effectiveness of household water filters in removing toxic heavy metals including lead from drinking water. Due especially to the fact that some municipalities still experience dangerous levels of lead in distribution systems, it is important to understand whether common removal methods are reliable. In order to quantify concentration levels less than what are commonly detected, we are using a cloud point extraction technique and inductively coupled plasma (ICP) spectroscopy.

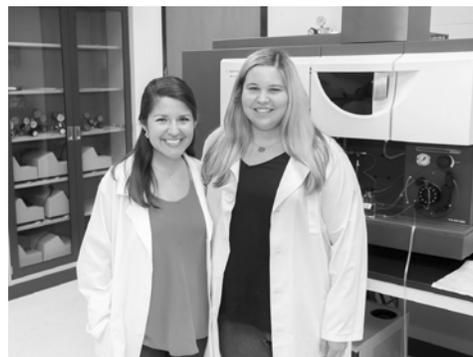
Micro Determination of Lead in Drinking Water Samples to Test the Efficacy of Point-of-Use Household Water Filters

Nathalia Benavides, '18

Kathryn Hyduchak, '18

Faculty Mentor: Jean M. Smolen

Department of Chemistry



Supported by the SJU Summer Scholars Program

Lead is a naturally occurring toxic heavy metal found in the Earth's crust. Its widespread use has resulted in an increased exposure to humans and has caused significant public health problems throughout the world. Specifically, lead is found in paint and piping, and was historically added to gasoline. Sources of possible contamination are found in homes and public buildings. This constant exposure can cause lead toxicity in the body. Although the full mechanism of lead's effect on the body is not understood, lead induced toxicity primarily affects the central nervous system and the vascular endothelium. It affects heme synthesis enzymes, thiol-containing antioxidants, and other necessary enzymes involved in oxidative stress. Lead accumulation occurs mostly in the bones and teeth, which can cause long term exposure. Young children are more vulnerable to lead toxicity because their organs are still being developed and this can lead to major learning deficiencies.

Elevated levels of lead can be found in drinking water that has been delivered by lead piping. Because of this occurrence, our project is focused on the efficacy of point-of-use household water filters such as Brita® and Zero Water® at removing lead. The United States Environmental Protection Agency (USEPA) published a regulation to control lead in drinking water that includes action levels of 0.015 mgL^{-1} . Due to analytically low levels of lead in water, a pre-concentration method is needed to detect this metal. Popular pre-concentration techniques that enhance analysis include solid phase extraction (SPE), cloud point extraction (CPE), and liquid phase micro extraction (LPME). Due to its precision, reliability, and simplicity, we chose to employ the liquid phase micro extraction technique.

This method uses a co-precipitation reaction of lead and zirconium hydroxide followed by analysis using inductively coupled plasma optical emission spectrometry (ICP-OES). For lead specifically, the detection limit is $50 \text{ (}\mu\text{g/L) ppb}$. A pre-concentration technique was needed to gain a lead product that can be analyzed by the ICP-OES. To each filtered water sample, zirconium oxychloride was added and the pH was adjusted to 9.0 by addition of ammonia solution. The samples were then heated to 65°C for 10 minutes. Supernatant water was removed and the precipitate was then centrifuged and dissolved in nitric acid. This aliquot is diluted up to 10 mL and then analyzed on the ICP-OES. By carrying out the LPME method, concentration factors of the lead were determined based on sample volume size and we can now detect much lower levels of lead in drinking water. This extraction method now allows us to concentrate the lead in the water samples by 2.5 to 10 times, thus allowing us to analyze the lead concentrations that would normally be below the detection limit. We will use this method to test the efficacy of point of use water filters in subsequent experiments.



Karen M. Snetselaar
Department of Biology
Saint Joseph's University

Ph.D. University of Georgia

Research Interests: Plant Biology, Plant Diseases

I am interested in plants and fungi, and especially in the interactions between these two groups of organisms. For many years the major focus of my lab has been a system involving corn (maize) and the plant pathogenic fungus *Ustilago maydis*. The disease caused by this fungus is known as corn smut, and it's generally known to people who grow corn all over the world. It has been fairly easy to breed smut-resistant corn plants, so our reasons for working on this fungus aren't so much about trying to stop this particular disease. Rather, we study corn smut because it is a very useful model system. Corn plants that are just a week old can be reliably inoculated with fungal cells that are easily grown in culture. We can study the progress of disease in many ways, using a variety of different kinds of microscopy. In addition, because the entire genome of *Ustilago maydis* has been sequenced, we have access to well-characterized mutants and other tools that can help us link form with function. One current project is characterizing mutants that can't begin the infection process properly.

Another area of research has involved experiments trying to figure out how the fungus overwinters in the soil, between times when the host plant is available. Students have carried out experiments to look at the survival of fungal cells in different types of soils, also varying temperature and moisture conditions. We are also

As a broadly-trained botanist, I also have some more general interests in the distribution of plants and fungi. Lately this has taken the form of studying the distribution of plants and microbes on the green roof that was planted on top of the science center several years ago.

Graduate and undergraduate students are involved in all of these projects.

The Infection Process of *Ustilago Maydis*

Megan Burke, '18

Faculty Mentor: Karen M. Snetselaar

Department of Biology

Supported by the SJU Summer Scholars Program
and the GeoKids LINKS Undergraduate Fellowship



Ustilago maydis is a fungus that infects corn and causes a disease called corn smut that can easily be seen by dark tumors that form on the host on the ears and the leaves. *Ustilago maydis* was studied because it is a good model organism to not only understand the infection process of *Ustilago maydis* itself, but other fungi as well. The life cycle of fungi is unique in that it includes a dikaryotic stage. In *U. maydis* haploid cells with unlike mating alleles can find each other and plasmogamy. This means that the plasma membranes fuse together. However, the nuclei stay intact and don't undergo karyogamy. This forms what is called a dikaryon. In this dikaryotic phase, the fungus will grow an infection filament. This infection filament is what will enter through cells in the plant in order to cause infection. Once fungal filaments reach the ear, the cells then undergo karyogamy and form diploid thick-walled teliospores. These diploid spores were thought to overwinter and start up new infections in the spring. However, it was found that when a plant was inoculated with the diploid sporidia, infection in the plant would not occur. Inoculation with complementary haploid cells readily results in disease.

The purpose of this research project was to determine whether the haploid cells of *Ustilago maydis* had the ability to not only enter the plant on their own, but also to survive once they were in the plant. Through the use of scanning electron microscopy and the use of confocal laser scanning microscopy, it was shown that haploid cells were able to enter mature leaves in corn plants. To test if the fungus was able to survive once in the plant, leaf pieces were removed from plants inoculated 24 hours earlier and placed on agar. The idea was that if the fungus was alive and in the leaf, growth would be seen out of the sides of the leaf. Leaves were surface sterilized with ethanol and bleach before being placed on the agar. This was done to ensure that nothing on the surface was alive and if anything grew, it had to come from inside of the leaf. The leaves were then placed on agar and allowed to incubate. After about forty-eight hours the fungus was beginning to grow out of the sides of the leaf. This test was done with two different haploid strains, and a charcoal test was used to confirm that the fungus growing had the same mating alleles as the one that was used to inoculate the plants. The charcoal test was positive, which means that what grew was the fungus that the plant was inoculated with.

Now that it is confirmed that the haploid cells are able to not only enter the plant on their own, but actually survive, the next step is to examine whether the fungus can reproduce asexually in the plant. Is *Ustilago maydis* an endophyte, with an important part of its life cycle occurring in plants that show no symptoms?

Microbial Community Analysis in Green Roof Soil Using Biolog EcoPlates to Assess Diversity

Connor Long, '19

Martin Ryan, '19



Faculty Mentor: Karen M. Snetselaar

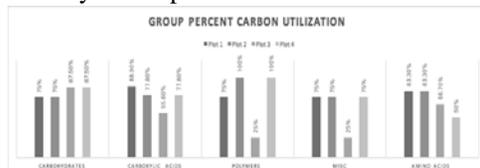
Department of Biology

Supported by the SJU Summer Scholars Program

Microbial communities are found in all environments and they can tell us a lot about environmental change. These organisms typically react first to both the chemical and physical changes in the environment. The place of interest for this community analysis is on the Science Center green roof. The green roof itself has a total of four plots. This is an educational green roof and the plots are equipped with different drainage systems. Plots 1, 2, and 4 have different types of plastic drainage layers, while Plot 3 has a stone drainage layer. These drainage layers were put in place in order to test the success of the plant life on the plots. We wanted to look at the microbial communities in the soil of the plots to see if there were any differences based on the different drainage systems and areas of the plots. A useful tool for understanding the diversity is the Biolog Ecoplate. This Biolog Ecoplate contains 31 carbon sources, and a control well, that are repeated three times each. These carbon sources were specifically chosen because their utilization can be linked to different types of microbes. When a particular carbon source is utilized, a purple dye is activated in the well.

Before we used the Ecoplate, we had to figure out the cfu/g of the green roof soil in order to properly inoculate the Ecoplates. We figured out the cfu by plating a dilution series. In order to use the Biolog Ecoplates, soil samples were collected in a 50mL sterile tube, and the soil was filled to the 25mL mark. Then distilled water was filled to the 50mL line. This tube was then placed in a shaking incubator at 25°C for 20 minutes, followed by 30 minutes in the refrigerator. Then, 100 uL of the sample was inoculated into each one of the 96 wells for each Ecoplate. Next, we placed the Ecoplates into a plate reader in order to get an absorbance reading. These absorbance readings were then averaged and placed into ANOVA testing to be compared to the control well.

Over the course of the Summer Scholars Program, we did eight total experiments using the Ecoplates. These experiments involved sampling soil on the 4 plots from on-plot and off-plot areas. We noticed that there weren't too many differences between the 4 plots regarding carbon source utilization. We then grouped the carbon sources in to five main guilds: Carbohydrates, Carboxylic Acids, Polymers, Amino Acids, and Miscellaneous. The results showed that the carbohydrate and the carboxylic acid groups were utilized the most. To look further into this, we split up the groups into the four plots, and interestingly enough Plot 3 utilized the least amount of the polymers and the miscellaneous groups compared to the other 3 plots. We thought that this result might have had something to do with the fact that plot 3 is the only plot without a plastic drainage layer. We then happened to have previous data collected from an off-plot 2 sampling which has the same drainage type as plot 3. By comparing the results, it was clear that the off-plot sample used every carbon source except for one. We therefore concluded that this difference could not have been attributed to the drainage systems of the plots. We are now looking into the micro locations within each plot, because we were not able to find any major differences between the plots. In addition, we are looking more closely into the specific carbon sources to see why these specific carbon sources are being utilized.





Suzanne Sorkin

Department of Music, Theatre and
Film

Saint Joseph's University

Ph.D. University of Chicago

Research Interests: Music
Composition

One significant aspect of my approach to music composition is the use of timbre as a variation procedure and as a structural device. I am interested in applying the traditional understanding of harmonic progression (forward motion, tension and release) to timbre, in order to create an overall sensation of timbre progression in my works. Central to my methodology is the use of orchestration, instrumentation, and changes in coloration of a constant musical object (a single chord, short harmonic progression, melodic motive, or collection of pitches) to provide timbre progression as well as an overall cohesive form. Although this fixed musical object remains a constant throughout the composition, the sound world into which the object is placed is continually changing. In addition to providing my work with a sense of unity, timbre variations of a constant musical object also help to create formal structure. Each fresh re-orchestration of the musical object becomes a signpost to the listener for a new formal section.

I have received awards, commissions, and grants for my compositions from national and international organizations including the Fromm Music Foundation at Harvard University, Meet the Composer, American Composers Forum, Earplay, and American Society of Composers, Authors, and Publishers (ASCAP). My compositions have been performed throughout the United States and abroad by such ensembles and soloists as counter)induction, Mannes Trio, Chamber Music Now, Third Angle, Third Millennium Ensemble, Washington Square Chamber Players, and Amy Briggs Dissanayake.

Beethoven as a Blueprint: Using a Theoretical Analysis of a Beethoven Sonata as the Framework for Piano Composition

Austin Sbarra, '18

Faculty Mentor: Suzanne Sorkin
Department of Music, Theatre and Film

Supported by the SJU Summer Scholars Program



Ludwig van Beethoven is undoubtedly one of the most prolific composers in the history of Western music. His work shows an unparalleled level of compositional innovation; Beethoven repeatedly went against musical convention of the period to catch the listener off-guard. The first facet of the project was a theoretical analysis of the first movement of Beethoven's Piano Sonata No. 8 in C Minor, Op. 13, referred to as "Sonata Pathetique" or simply "Pathetique." A theoretical analysis is a way to determine the harmonic, melodic, and formal structures of a given piece of music. The easiest way to do this is by marking each harmony, significant melodic content, and part of form on a copy of the musical score. This is the exact method I used to analyze the Pathetique. I also created a spreadsheet that charted the piece's larger sections so I could organize observations on paper away from the score. The second facet of my project was a study the compositional techniques Beethoven used to write the Pathetique in order to construct my own composition. The analysis told me what Beethoven put on the page and the study of compositional techniques gave me the how and why of the notes Beethoven chose. The compositional study also gave me a method or framework to go about my own composition.

Beethoven's piece was constructed using the "germinal cell" approach. This means that Beethoven carefully crafted motives, short musical phrases with a distinctive melody using multiple different note durations, and fit them onto a larger sonata form, all the while developing the motives to create harmonic and melodic content. Beethoven's piece also teaches that in certain instances, the direction of the note movement is more important than having theoretically proper harmonic structure. In essence, the composer's intentions override than the conventions of musical styles in the composer's period. Beethoven rejected tradition in regard to sonata form as well. For example, a typical minor key sonata changes to a related major key. Beethoven, however, changed to another minor key, defying the listeners' expectations.

I began my composition with the germinal cell method presented in the Pathetique. I developed short motives, picked out the ones I thought were the best, revised them, then composed variations on the original motives. I used a sonata form very similar to the one in the first movement of Beethoven's Pathetique. I mapped my finalized motives onto this sonata framework like Beethoven's. The form is not set in stone as I realize my composition may change and evolve away from the guidelines I set for myself but I have used it as a rough outline. The composition is not finished yet but I will finish and perfect it with the hope of performing it in the Spring of '18 as part of my capstone Senior Project to complete my Music Major.



Jennifer Spinner
Department of English
Saint Joseph's University

Ph.D. University of Connecticut

Research Interests: Creative Nonfiction, History of the Essay, Women Essayists, Writing Theory and Pedagogy, Journalism

For the last several years, members of the Writing Center staff at Saint Joseph's have been talking about ways in which we might serve writers beyond our own university community. Our talk became action after several students, including Kasie Bourque, attended a national peer tutoring conference last year in Tacoma, Washington. A fellow conference attendee, after hearing Kasie and her peers talk about our writing center's partnership with Saint Joseph's Office of Undergraduate Admissions, asked if we had ever considered establishing a partnership with an organization even farther outside the confines of our writing center. As we always do during our time away at these conferences, we jotted the idea down in our collaborative conference journal, and then I tucked the journal in my suitcase and we flew home. But Kasie didn't stop thinking about the conference attendee's suggestion that we consider starting a community writing center. "What if?" she wondered to herself. And then to me one day in my office: "What if?" Kasie proposed that we host a writing center satellite for the community at the Wynnefield Branch of The Philadelphia Free Library. The location made sense logistically. It borders St. Joe's campus. It almost made sense in terms of the needs of its patrons. It would have been easy for us to invent what we thought was an ideal project for the library, that is, to dream up what we could offer based on what we thought the library needed. Kasie and I talked, however, about the importance of employing best practices of community engagement and do less talking and more listening. In our initial conversations with the library staff, that is exactly what we did, and, in fact, it took numerous meetings for us to negotiate programming that they needed, that we felt qualified to offer, and that we could sustain beyond the summer—and beyond Kasie's tenure at St. Joe's. We piloted our programming this past summer, with great success, especially a weekly teen writing group that Kasie and a group of fellow tutors hosted. Given the positive feedback, we hope to sponsor such a group in future summers as well continue resume and cover letter writing workshops. One of our challenges in maintaining our community writing center during the academic year is having enough tutors available to volunteer their time for weekly open writing center hours at the library. To that end, this fall we reached beyond our own staff and recruited volunteers from Sigma Tau Delta, the English honorary society. In addition to weekly hours, we also are offering monthly workshops in resume and cover letter writing and college admissions essays—all workshops that the library identified as needs for their patrons. Perhaps one of the most telling comments we heard when we began our service at the library came from one of the librarians who said, "Welcome, St. Joe's! We've been waiting for you." In some way, they seemed to have been waiting for us to notice that they were there. Now, we are visible to each other in ways that benefit all of us.

Building a Writing Community Beyond Our University Writing Center

Kasie Bourque, '18

Faculty Mentor: Jennifer Spinner
Department of English

Supported by the SJU Summer Scholars Program



University writing centers often focus on their immediate educational communities, particularly what those communities are writing about and whom those communities include. What can go overlooked, though, is the larger writing community that encompasses people outside of campus fences. The Wynnefield Branch of the Free Library of Philadelphia, located right across the street from Hagan Arena on 54th Street, offered the perfect place for the SJU Writing Center to expand its writing community.

My initial plan was to open a satellite branch of the SJU Writing Center at the Wynnefield library, hosting open hours there not unlike what the writing center does on campus. During initial conversations with the branch manager and adult and teen librarian, however, I quickly learned that what the Wynnefield library needed was more teen and adult programming. I listened, and shifted gears—as is vital when establishing effective community partnerships. I proposed instead that the SJU Writing Center host at the library a teen writing group as well as two workshops, a college essay writing workshop and a resume writing workshop. These events took place during the six weeks that the library offers summer programming.

Over the course of these weeks, with the assistance of three other writing center tutors, I led Wynnefield Teens Write, a teen writing group aimed at showing students that writing can be engaging and entertaining and not solely for academic purposes. What began with four students attending the first week grew to eight to ten students attending regularly. One week, nearly thirty students attended. We focused on poetry writing and fictional storytelling, but by week five, students were asking to work on writing that they had done in previous weeks or work on their own writing. One of the students noted in her exit survey distributed at the final meeting: “Please come more frequently!!!! I love you guys!”

Going forward, the SJU Writing Center will maintain its relationship with the Wynnefield Library by hosting open writing hours and monthly workshops during the academic year. During the summers, we hope to return with our popular teen writing group. As we continue to adapt to what the library needs and what our tutors can provide, we welcome the chance for our writing center to engage with the larger community.



A. J. Stagliano
Department of Accounting
Saint Joseph's University

Ph.D. University of Illinois

**Research Interests: Disclosures
Regarding Environmental and
Cybercrime Costs, Social Accounting
and Accountability, Sustainability
Accounting**

Although threats to our physical health and financial well-being might not seem to be closely related to disclosures in reports of business firms, the surprising fact is that they are closely associated. Disclosures, both the quantity and quality, made by companies about the financial impacts of both climate change and cybercrime pose a significant subject worthy of study. This is an area in which empirical investigation can lead to interesting outcomes.

Cybercrime and other data breaches are authentic threats to our financial health. Similar to physical well-being risks, there is a real chance for major harm from this illicit activity. Financial market participants have a keen interest in knowing if firms have had intrusions that compromise company data. And, they



need to know what the economic cost to the firm might be. An essential element in any public firm's annual financial reporting relates to risks of loss from having been victimized by cyber criminals. The ultimate research question here, which I have been studying for seven years, is whether full and fair disclosure has been made to stakeholders. Transparent reporting concerning all the effects of operations are needed if there is to be a serious

assessment of corporate accountability.

Global warming, just one facet of overall climate change, is created largely by human activity. There is incontrovertible evidence that this phenomenon will have as significant a financial impact on the *next* generation as the extraordinary run-up in costs for energy and healthcare has had on the current one. This, together with corporate social responsibility and environmental disclosure issues, has been a focus for much of my empirical research over the past 35 years. Holders of scarce financial resources want to be informed—as *decision makers*—regarding the actual and expected outcomes of their investment choices. If climate change risk creates significant negative economic consequences, investors and creditors should be fully informed about the impact that enterprise managers expect. Consumers, too, want to know more about products than just the price and availability; they want to know the lasting effects of choosing to buy and consume.



Examining the Promulgation of Sustainability Accounting of Registrants in the SEC Pharmaceutical Industry and the Impact of SEC Guidance Regarding Cybercrime on Financial Disclosures of SEC Registrants in the Retail Trade Sector

Margaret McGuire, '18



Faculty Mentor: A.J. Stagliano
Department of Accounting

Supported by the SJU Summer Scholars Program

Today, there is no relationship more vital in the business world than that between the corporation and its stockholders. Because of financialization, corporations are precise and often cautious in their calculations of whether or not business ventures will be profitable for shareholders.

Exactly how clear are corporations in their reports to their shareholders, especially when it comes to issues such as cybercrime and environmental sustainability?

Our first task was rooted in the pharmaceutical industry, specifically those corporations that adhere to the Sustainability Accounting Standards Board's disclosure standards, formally established in 2011. These standards promote transparency between the corporation and the stockholder on non-financial issues of the corporation that would have an effect on the environment, society, or economic performance. We narrowed down the sample corporations by high sales and Form 10-K and 20-F availability, then searched each SEC report and will search all available Corporate Social Responsibility or Sustainability reports for the mention of the SASB. So far, no corporation has mentioned the SASB in its 10-K or 20-F. Just two mention sustainability at all. The next step in the project is to search for mention of the SASB or sustainability in Annual Corporate Reports, Corporate Social Responsibility reports, and Sustainability reports. Our hypothesis is that few, if any, will publicly report their adherence to the SASB regulations. This may be because many investors seek immediate profit which sustainability measures often do not provide.

Financialization is a process that is hindered just as much as it is aided by new technology. Practices are more efficient, profits increase, yet an entire sector of corporations has been left vulnerable: information security. Data, sales, consumer sensitive information, are improperly protected against thieves of today, resulting in billions of dollars in losses. In 2011, the SEC promulgated encouragement to corporations to disclose such data on cybersecurity and breaches in annual reports to increase financial transparency. However, whether this encouragement has appropriately effected institutions' reports at all is what we wish to answer.

Using a similar system as before, we have narrowed a list of corporations registered in the SEC retail trade sector by sales. Each Form 10-K from the years 2008-2016 will be searched for various terms of cybercrime. Our hypothesis is that most corporations will not mention cybercrime, even those that have been publicly compromised. Theoretically, this may be due to a fear of distrust among shareholders, and thus decreased investment.



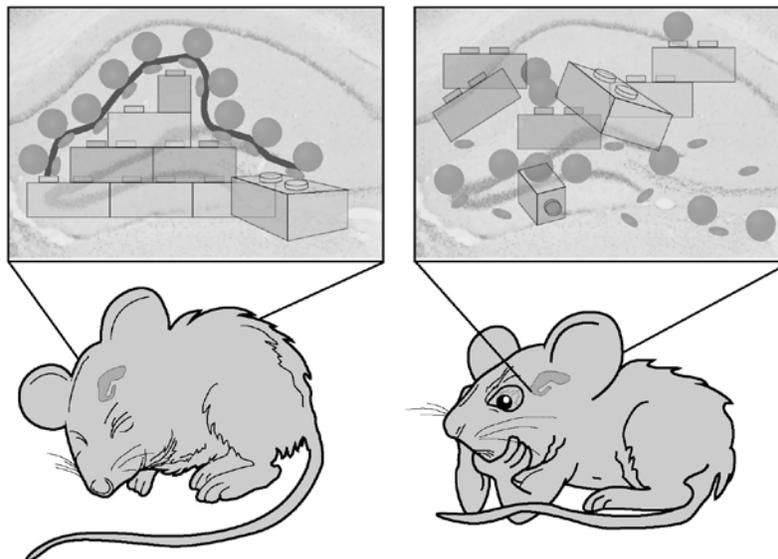
Jennifer C. Tudor
Department of Biology
Saint Joseph's University

Ph.D. New York University

Research Interests: Molecular Mechanisms of Memory, Neurodevelopmental and Neurodegenerative Disorders, and Sleep

Sleep deprivation is a public health crisis with more than a third of American adults not receiving enough sleep. Even short periods of sleep deprivation are detrimental to cognition. More specifically, lack of adequate sleep can affect attention, mood, judgement, and memory. I have previously described that sleep deprivation impairs memory by attenuating the production of proteins in the brain required for memory formation. This is due to reduced activity in the insulin signaling pathway in a region of the brain called the hippocampus, which is particularly important for memory. My students and I are investigating how this signaling pathway affects memory formation and the role of sleep in memory.

The insulin signaling pathway has also been implicated in several neurodevelopmental and neurodegenerative disorders, such as autism and Alzheimer's disease. My lab is focused on understanding how changes in the insulin signaling pathway in the brain cause the behavioral deficits associated with these disorders. Interestingly, problems with sleep have also been associated with many neurodegenerative diseases. Therefore, we are interested in examining the interrelationship between the behavioral and cognitive deficits associated with these disorders and sleep dysfunction.



Sleep deprivation impairs the production of proteins required for memory formation.

Determining the Effect of Fear Conditioning on Adenosine_{2A} Receptor Expression in Hippocampal Mouse Samples

Lilianna DeFalcis, '18



Faculty Mentor: Jennifer C. Tudor
Department of Biology

Supported by the SJU Summers Scholars Program

Memory is imperative for day to day life functionality. Memory formation requires the brain. It is made up of billions of cells called neurons and astrocytes. Neurons function as messenger cells, sending information to each other across synapses, the space between neighboring neurons. Astrocytes function as maintenance cells, regulating the conditions surrounding neurons and their synapses. Particularly, an area in the brain called the hippocampus has been shown to play an essential role in the acquisition, storage, and retrieval of memories. The storage of memory, also known as consolidation, is associated with waves of gene expression occurring approximately four hours after memory acquisition. This gene expression modifies the strength of synapses by either increasing or decreasing the number of receptors on the surface of neurons. It is believed that memories are formed through the strengthening of the synapses between neurons. Scientists are exploring various combinations of neurotransmitters and receptors and how they affect successful memory acquisition, consolidation, and retrieval.

One receptor thought to play a key role in memory consolidation is the adenosine_A receptor. This receptor responds to the molecule adenosine, an inhibitory neurotransmitter that acts as a central nervous system depressant important for promoting sleep. Past experiments have shown that deactivation of this receptor has resulted in decreased memory impairment, while activation of this receptor results in increased memory impairments. Receptors also interact with each other. There is evidence for an antagonistic relationship between adenosine_A receptors and GLT-1 receptors, also known as glutamate transporter 1 receptors. GLT-1 receptors exist on the cell surface of astrocytes and are responsible for the uptake of glutamate, an excitatory neurotransmitter. The uptake of glutamate into astrocytes functions to prevent excitotoxicity, harmful accumulation of glutamate in the synapse, during memory formation.

In conjunction with the University of Pennsylvania, an experiment was designed and conducted to test the hypothesis that memory consolidation results in decreased adenosine_A receptor expression and increased GLT-1 receptor expression. Mice experienced foot shocks to create a fear memory. This is a process known as fear conditioning. Four hours later, the mice were sacrificed and their hippocampi were extracted. I measured protein levels of adenosine_A and GLT-1 receptors using western blotting. Quantitative polymerase chain reaction (qPCR) analyses will be done in the fall.

Manipulating the Insulin Signaling Pathway in a Mouse Model of Fragile X Syndrome

Angelo d'Antonio-Bertagnolli, '18

Lakshmi Narayanam, '19



Faculty Mentor: Jennifer C. Tudor

Department of Biology

Supported by the SJU Summer Scholars Program and the John P. McNulty Scholars Program

Fragile X Syndrome (FXS) is a known cause of autism spectrum disorder (ASD) and one of the leading sources of developmental intellectual disabilities. Affected individuals often experience delayed speech development, cognitive impairment, ASD, attention deficit disorder, seizures, and characteristic physical features. FXS is caused by mutations in the fragile X mental retardation 1 gene (*Fmr1*), which hampers the production of its corresponding protein, fragile X mental retardation protein. This loss of protein function gives rise to the neurodevelopmental delays and behavioral deficits typified by FXS.

Abnormal activity in insulin-signaling pathway has been associated with a wide variety of health issues, including diabetes, other metabolic disorders, and impaired cognition. Decreased activity of the insulin signaling pathway has been noted in the fragile X fly model. Adenosine monophosphate-activated protein kinase (AMPK) is a key protein in the insulin-signaling pathway, and decreased AMPK activity is associated with FXS. Thus, substances that modify this AMPK signaling may have therapeutic potential. Metformin, a drug commonly used in Type II diabetes patients, might ameliorate features of FXS by increasing AMPK activity. Researchers have had successful results with FXS fly models, rescuing the abnormal activity of the pathway and treating cognitive impairments with metformin. Therefore, dosing FXS mice with metformin may yield similar results.

The aim of this research was to discern whether treating FXS mice with metformin might rescue abnormal AMPK activity and in turn alleviate the abnormal behavioral and phenotypical features of FXS. FXS is a developmental syndrome, and so we were also interested in whether chronic drug dosages, from early development (3 weeks) to adulthood, would produce results similar to acute treatments, which began in adulthood (9 weeks). As such, two separate experiments were conducted. Four different brain regions were homogenized and analyzed for protein levels by western blotting techniques. Western blotting began with sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE), which separated proteins on a gel using an electric field. The proteins were then transferred to a membrane and antibodies were applied to identify specific proteins. The membrane was subsequently imaged using chemiluminescence to measure protein abundance. The manuscript describing our findings is currently in preparation.

Moving forward, we will apply similar procedures to examine the effects of AMPK-modulating drugs on the cognitive impairments caused by sleep deprivation, which has been shown to alter the same signaling pathways.



C. Ken Weidner
Department of Management
Saint Joseph's University

Ph.D. University of Illinois at Chicago

Research Interests: Social Justice in Organizations;
Ethics in Academe, Business, and the Professions;
Change and Change Agents; Learning and Teaching,
and the Subjects My Students Are Interested in
Exploring for Themselves

The public response to President Trump's decision to withdraw from the Paris Climate Accord ignited a worldwide response of criticism across the world. Around the world, people and their governments were stunned that the United States would back out of an agreement that included every country except two: (1) Syria, consumed by current man-made crises, and (2) Nicaragua, which felt the Paris Accord didn't go far enough in protecting the environment and our collective future. This announcement to withdraw came at the significant cost of foreign leaders' confidence in (federal) U.S. leadership on the world stage, on a range of issues beyond climate alone. Fortunately, since the announcement, state and municipal leaders across the U.S. have expressed their continued commitment to addressing the causes and effects of climate change.

The consistent expressions of outrage about this decision on social media mirror the scientific consensus that climate change is the result of human activity. The issue animates discussion because time is relatively short to address the threats of climate change, and America consumes a disproportionate amount of the world's energy and contributes a more than its share of pollution. Unaddressed, climate change will likely have a negative impact on the vulnerable future generations who cannot speak for themselves today – and will profoundly impact the most vulnerable individuals in the world, who will feel the effects of climate change first – and most deeply.

Karleigh Lopez's research project explores the depth, breadth, and emotion behind publicly expressed reaction to this watershed announcement. While her study began as an exploration of incivility on social media, an issue as unique – and serious – as withdrawing from the Paris Accord appears to have brought out reasoned anger and strong negative sentiments, but perhaps not as much incivility as might have been portrayed in the mass media. Although at this writing only preliminary results are available, it may well be the case that the most sensational, uncivil memes and other social media posts capture our attention in a way that makes us think that such incivility is ubiquitous and inevitable – when in fact neither may be the case at all.

Karleigh's research may raise questions about whether incivility is on the rise, and about the extent to which aggressive or anti-social behavior online is pervasive and/or inevitable. Perhaps acts of incivility receive more than their share of mass media coverage reports and social media re-posts. Her study is as much about how we pursue others' attention, and how we freely we give our attention to that which is sensational, or reports of the same.

An Exploration of Incivility Among Social Media Responses to the U.S. Announcement to Withdraw From the Paris Climate Accord

Karleigh Lopez, '20



Faculty Mentor: C. Ken Weidner
Department of Management

Supported by the SJU Summer Scholars Program

The power of language is ubiquitous. Our world, our news and our media are shaped by the language that we use. The sentences we form and the interpretations we create all reflect our inherent bias or attitudes. Social networking sites have created a platform where voicing one's political discontent or dissent is not only common, but is encouraged and normative. However, not everyone voices their opinions with civility or decorum. The most recent election cycle manifested this tendency. However, notable events or policies that sparked controversy occurred so frequently that within the arena of social media, it became difficult to understand and react to our politicians' incivility, much less our own.

To conduct my study, I used Dedoose and other applications to analyze Twitter responses to the announcement on June 1 by the White House to withdraw from Paris Climate Accord. This decision made the U.S. only the third country to not be a party to the Paris agreement. I selected public response to this event because while it represented a political issue, it is not a partisan issue – it was met with instant disapproval across the political spectrum among Americans and also throughout the world. The sample Twitter responses I surveyed ranged from high-profile, verified, Twitter accounts such as the POTUS account and various news outlet accounts, to the tweets of average Americans. Using sentiment analysis, I was able to code the language of the tweets: very positive, positive, neutral, very negative, and negative. Although I am still investigating the data, my early analyses suggest some unexpected preliminary results. I had expected to find what I saw on my own daily Twitter timeline: tweets that went viral for their crude and humorous language, political memes, and disparaging comments directed at President Trump. However, my preliminary findings indicate that the most common Twitter responses were not comical or uncivil, but instead reflected the worldwide disapproval of President Trump's actions.

I will be continuing my research with the support of Dr. Weidner throughout the coming academic year. At the summation of my study, I intended to submit the results to a journal for publication.

