

# Undergraduate Research & Engagement Symposium



**April 20, 2013**

Loyola University Chicago | Mundelein Center



*Preparing people to lead extraordinary lives*

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## WELCOME TO LOYOLA'S 2013 UNDERGRADUATE RESEARCH & ENGAGEMENT SYMPOSIUM

On behalf of Loyola's Undergraduate Research Opportunities Program (LUROP) and the Center for Experiential Learning, we are pleased to welcome you to the 7<sup>n</sup>-annual Undergraduate Research & Engagement Symposium, celebrating Loyola's mission of "putting knowledge in service to humanity."

Loyola's Weekend of Excellence, of which this Symposium is a part, is meant to "celebrate transformative education," and we believe no event captures this objective better than the symposium. These undergraduate students, from all disciplines across the university, spend hours outside of their classes to conduct hands-on, original research and community-engaged projects that not only escalate their own educations but also impact both research advances in their disciplines and the communities with whom they have worked.

We continue to be impressed with ever-growing interest and participation in this event from students who are advancing knowledge through fellowships, capstone projects, internships, and service-learning positions at Loyola and across Chicago. We are responding to this growth, in part, by expanding our offerings of oral presentations this year, as well as by integrating, for the first time, the third Community Engagement Forum into this event. We encourage you to take advantage of the wide array of student presentations in all three Symposium sessions, which this year are all located throughout the historic and recently restored Mundelein Center.

We would like to thank the Office of the Provost and the College of Arts and Sciences for their support of this event. In addition, we are very grateful to the faculty, alumni, staff, and graduate students who are serving as evaluators this year and ensuring an enriching experience for our undergraduate students. And of course we would like to thank all of the faculty, staff, and community partners who mentored and advised the impressive undergraduate students whose work is showcased here.

To learn more about the undergraduate research program or the funded fellowships through LUROP, please visit [www.luc.edu/lurop](http://www.luc.edu/lurop). For more information about Loyola's Center for Experiential Learning, which sponsors high-impact, engaged learning opportunities for students across the curriculum, visit us at [www.luc.edu/experiential](http://www.luc.edu/experiential).



Patrick Green, Ed.D.  
Director, Center for Experiential Learning



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## 2013 SYMPOSIUM SCHEDULE

Oral Presentations..... 12:30-1:30 PM  
(Mundelein Center, floors 2-5)

Poster Presentations ..... 1:30-3:30 PM  
(Mundelein Auditorium)

Community Engagement Forum..... 1:30-3:30 PM  
(Mundelein Lounge)

Awards Ceremony and Reception..... 3:30 PM  
(Sullivan Center, Galvin Auditorium/Lobby)

- ◆ *Hayes Award for Advising and Mentoring*
- ◆ *Experiential Learning Co-Educator Award*
- ◆ *Langerbeck Award for Undergraduate Research Mentoring*
- ◆ *Loyola University Libraries Research Paper Award*
- ◆ *Outstanding Loyola Undergraduate Researcher Award*

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## The Loyola Undergraduate Research Opportunities Program (LUROP)

*Most undergraduate researchers fall under the umbrella of the Loyola Undergraduate Research Opportunities Program (LUROP), which encompasses a variety of disciplines and experiences. The LUROP fellowships and opportunities are described below; for more information on the program, go to [www.luc.edu/lurop](http://www.luc.edu/lurop). Undergraduates also work with individual faculty members on research projects that fall outside the realm of LUROP fellowships.*

### **Biology Research Fellows Program**

The Biology Research Fellows Program funds long-term independent research projects under the direction of a faculty mentor in the Department of Biology. Students work for 2-3 years on their respective projects both during the academic year and in the intervening summers. At least a 10 week time commitment on the project is expected during the summers.

### **Biology Summer Research Fellowship Program**

The Biology Summer Research Fellowship funds research projects with Department of Biology faculty. A ten-week time commitment is required, and specific dates are negotiated with the faculty mentor.

### **Carbon Undergraduate Research Fellowship Program**

The Carbon Fellowship offers a full two-year, interdisciplinary research opportunity for science and math majors to work closely with faculty mentors. This program is designed for students who plan to pursue research in graduate or professional schools.

### **Carroll and Adelaide Johnson Scholarship**

The Carroll and Adelaide Johnson Scholarship offers rising juniors opportunities to conduct interdisciplinary research, under the mentorship of a Loyola faculty, which is focused on women and leadership. Research should be related to a social justice issue and its impact on women.

### **Center for Urban Environmental Research and Policy (CUERP) Undergraduate Research Fellows Program**

The focus of the CUERP Fellowship is for students to conduct interdisciplinary research on issues related to unsustainable natural resource uses in the greater Chicago land region. The Center encourages research projects to combine elements of ecosystem structure and function, impacts on human health, public policy, behaviors, and other environmental factors.

### **Center for Urban Research and Learning (CURL) Fellowship Program**

The CURL Fellowship is intended to facilitate involvement of students in collaborative research projects with community-based organizations, social service agencies, health care providers, businesses, and government. Fellows are active participants in efforts to improve the quality of life of all members of the Chicago metropolitan community.

### **The Joan and Bill Hank Center for the Catholic Intellectual Heritage (CCH) Undergraduate Research Fellowship**

The Joan and Bill Hank Center for the Catholic Intellectual Heritage (CCH), in support of the

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Catholic Studies minor, offers a research fellowship to undergraduate students who are currently enrolled in the Catholic Studies minor program. This fellowship is dedicated to support for CCIH-funded faculty research projects, as well as CCIH's international research projects.

### **Molecular & Computational Biology Summer Research Fellowship**

Our newest fellowship, students in this program will study a special class of viruses, called bacteriophages, that preys on bacterial hosts in Lake Michigan. These students will look into the impact that these viruses have on the bacterial levels in the lake. This effort combines both molecular and computational biology.

### **Mulcahy Scholars Program**

The Mulcahy Scholars Program is designed for College of Arts and Sciences majors in the hard sciences, who are interested in working on an individual project with a faculty mentor, serving as a research assistant, or engaging as a member of a collaborative research team to support ongoing faculty projects throughout the academic year.

### **Provost Fellowship for Undergraduate Research**

The Provost Fellowship is designed for undergraduate students in any academic discipline who are interested in either establishing an individual project with faculty mentorship or working with a faculty member on their ongoing research as a research assistant.

### **Research Mentoring Program (RMP)**

RMP is designed to partner graduate students who are working on their dissertation research with undergraduates who are interested in participating in research. This summer program is designed to support doctoral students in their dissertation research while providing an opportunity for undergraduates to learn more about graduate studies and graduate-level research.

### **Ricci Scholars Program**

The Ricci Scholars Program is an innovative research and cultural immersion program organized around the theme of the meeting of East and West. The program awards selected students with scholarships for travel, research and exploration during a junior year of study divided between two of the world's most important cities: Rome, Italy, and Beijing, China.

### **Rudis Fellowship Program**

The Anthony and Mary Rudis Fellowship provides scholarships to students whose research focuses on the comparative study of constitutions. Recipients of the scholarship will write a 20-25 page research paper during the academic year under the guidance of a faculty member in the Department of History or the Department of Political Science.

### **Women in Science Enabling Research (WISER)**

WISER is designed for undergraduate women seeking to explore research science, work closely with faculty, learn how laboratory work is conducted, and build a sense of community.

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# Oral Presentation Abstracts

MUNDELEIN 203

*We are the People: An Ethnography on Occupy Chicago*

**Tieg Alexander**, International Studies, Religious Studies (2012)

Provost Fellowship

Mentored by Tracy Pintchman, International Studies

Despite vast media coverage of the Occupy movement, little sociological ethnographic research on Occupy Chicago has been conducted. Through data collection and analysis of literature, participant observation, and fifteen in-depth interviews, this qualitative research aims to illustrate why individuals joined Occupy Chicago and why these individuals continued their participation in the movement. Anticipated results emphasize themes of oppression, disillusionment, empathy, identity, and empowerment. These themes correlate with the diminished activity of the Occupy movement, ultimately resulting in expanded implications as to how and why the social movement's momentum waxed and waned.

*Urban Agriculture and the Loyola Community: Rooftop Gardening on the Mertz Hall Terrace*

**Charles Gallagher**, Biology (2013)

**Stephanie Fraga**, Psychology (2013)

Mentored by Tania Schusler, Environmental Science

Our Environmental Sustainability class has been working on a plan to expand and redesign the Mertz terrace rooftop garden. We have researched and compiled data about the many benefits of rooftop gardening, gardening on a collegiate campus, and urban agriculture. Dividing into three groups to focus attention is allowing us to achieve our main goals of improving the garden's aesthetics, implementing a system of vertical gardening, and raising funds for the Grower's Guild to continued future expansion. An event is being planned for late April to unveil the refurbished garden and excite the Loyola and surrounding community.

*Uses of Tax Increment Financing*

**Paul Mack**, Economics (2013)

Provost Fellowship

Mentored by Twyla Blackmond Larnell, Political Science

The project will be an overview of some of the uses of Tax Increment Financing by local municipalities with a concentration on Chicago and Illinois law. The presentation will briefly cover the history of Tax Increment Financing and the rationale for its use as well as its perceived benefits and costs. Finally, the project will examine some attempts at Tax Increment Financing reform.

MUNDELEIN 204

*The Importance of Social Media Proficiency from a Millennial Student Intern*

**Victoria Guerrero**, Communications & History (2013)

Mentored by KC Greene, Social Media Manager at GrubHub Inc.

This semester, I am a social media intern at both a large company and a public relations agency. From my work there, as well as several other social media internships, I have learned that no public relations or marketing effort is complete without social media. In my presentation, I will demonstrate how social media can be used efficiently for any company, even if one is still in their intern phase as a student.

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MUND 204 (continued)

*The Role Corporate Social Responsibility Plays in Relation to the Meaning of Work*

**Kristen McCormack**, International Business, Finance (2013)

**Monja Keime, Kayla McGonagle, Riti Patel**, International Studies, Finance (2014)

Mentored by Linda Tuncay-Zayer, Marketing

The goal of our research was to evaluate the role corporate social responsibility initiatives affect, if at all, the meaning of work for employees in a for-profit company versus a not-for-profit company. We conducted interviews at Loyola University Chicago, our not-for-profit institution along with Morningstar, our for-profit institution. We then evaluated and analyzed the data to come up with several conclusions. Our study was limited to solely female respondents.

*Perceptions of Identity*

**Darshan Thakkar**, Accounting, Finance (2013)

**Nicole Christiano**, Accounting (2013); **Taylor Corsten**, Finance, Management (2014);

**Katie Hynan**, Economics (2013)

Mentored by Linda Tuncay Zayer and Mary Malliaris, Quinlan School of Business

The research study we conducted attempts to better understand student perceptions of their identities here at Loyola University Chicago. We interviewed students of varying backgrounds from the Quinlan School of Business and asked them a series of questions related to their perceptions of the Loyola identity, the Quinlan identity, and their perceptions of identity related to someone's major.

MUNDELEIN 205

*Music of the Jesuit Missions*

**Mario Cuttone**, Accounting (2013)

Joan and Bill Hank Center for the Catholic Intellectual Heritage (CCIH) Research Fellowship

Mentored by Gustavo Leone, Fine and Performing Arts

The focus of this research is the Jesuit pursuit of musical education in the missions of Chiquitania, Bolivia during colonial times. The missions of the Chiquitos are unique because they are the last remaining Jesuit settlements in Bolivia and the associated culture, including musical scores, has survived largely intact. Professor Gustavo Leone has restored some of the manuscripts archived in Chiquitos that were left behind after the Jesuit expulsion of 1767, bringing to light music which had been forgotten for over 200 years.

*Alternative processes through the history of photography*

**Clara Duran**

Mentored by Jennifer Murray, Fine Arts, Photography

Photography is one of the most recent forms of Art.

There are several processes that had taken place through the history of photography, many of them still used by professional photographers. Nowadays, we have reached a very advanced point in the field of photography, but its essence cannot be understood without going through its history. The project reinforces the hand-made, as the principal machinery to produce fine art photography. I experimented with: dichromate gum, cyanotype, kallitype, Van Dyke, salted print, liquid light, replacement of tintype, replacement of ambrotype, and gelatin silver print.

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MUND 205 (continued)

*'When God Intends a Man to Work': Seventeenth Century Puritan Self-Fashioning and the Atlantic Lineage of Modern Individuality*

**Dylan LeBlanc**, History, Philosophy (2014)

Provost Fellowship

Mentored by John Donoghue, Kyle Roberts, History

This paper strives to contribute to an understanding of the origins of modern individuality in the West through an examination of Puritan self-fashioning in the seventeenth century English Atlantic. Its central claim is that Puritan self-fashioning played a considerable role in the development of a modern idea of self: a self more directly connected to its own agency and less defined by the coercive prerogatives of community. Through an examination of the writings of Samuel Ward, John Winthrop, and the Massachusetts Bay Colony judicial proceedings against Anne Hutchinson, a paradigm of Atlantic identity formation is illustrated, within which distinct elements of a pre-modern individualism may be detected.

*Religious Legislation in the Reign of Theodosius the Great: Evidence for Christian-Pagan Relations*

**Ryan Pilipow**, Latin and Classical Civilizations (2013)

Provost Fellowship

Mentored by Alexander Evers, Jacqueline Long, Leslie Dossey, Classical Studies and History

The Theodosian Code contains the laws from the emperors Constantine through Theodosius II. By examining the laws from Theodosius I, I hope to prove that there is no evidence that unequivocally supports the view that a state sponsored persecution of pagans occurred in his reign. This study intends to augment the historical perception of Theodosius to view him as an emperor concerned more with state affairs than religious.

MUNDELEIN 303

*Tutoring vs. Coaching: A New Model for Academic Mentoring*

**Emily Barry**, Political Science (2012)

Mentored by Mary Charles, Education

Academic coaching is a hybrid tutoring and mentoring combination that pairs high achieving college students with at-risk students in under-performing urban high schools. While tutoring helps a student complete assignments and improve skills, Academic Coaching moves that same experience to another level by helping a student focus on “process” – the how and why of solving problems. The academic pairing of high school students and committed college coaches creates a relationship that is fueled by “near-peer” guidance. The college student can offer an adolescent counsel that is often more readily accepted than that of a teacher, counselor, or parent because of the close proximity of age of the students.

*Seeking Literacy through Jumpstart*

**Taylor Kiely**, Psychology, Sociology (2013)

**Jacqueline Dulude**, English (2013)

Mentored by Romero, Krogh, Psychology, Sociology

Through our experiences in a Jumpstart site classroom, we track the progress of four children. Our analysis focuses on literacy acquirement in four children who are at various levels of development. We measure children by tracking their progress in learning how to write their names, recognize letters, and other relevant evaluations. The study hopes to open up the field of research for the Jump Start program, as it is presently rather limited. Jumpstart is a program that we believe can have a positive impact on children of all backgrounds, and we seek to prove this through our observations.

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MUND 303 (continued)

*Discovery Education's Evolution of the Textbook*

**Jordan Porter-Woodruff**, English Literature (2013)

Mentored by Maria Fragnoli Salvat, Project Manager, Basal Digital Content, Discovery Education

Currently an evolutionary way of teaching and learning is changing America's classrooms. Discovery Education is proud to present the digital textbook, Techbook. Techbook is innovative in the way it teaches, engages and challenges students to learn. Featuring hands-on activities, video segments, downloadable primary and secondary sources and interactive glossaries. Techbook achieves a stimulating work environment like never before. Available for grades K – 12, Techbook is currently offered in the science and social studies subjects. This presentation will explain why and how Techbook will soon be in every classroom around the world.

MUNDELEIN 304

*Finding Happiness Through Nonviolence in a New Home*

**Kenneth Camacho**, Psychology (2013)

Mentored by Elizabeth Lozano, Communications

This project is a study of nonviolent communication and practice conducted at the Bhutanese Community Association of Illinois (BCAI). The purpose of the study is to better understand how nonviolence is exemplified (or not exemplified) in a nonprofit organization such as the BCAI. In order to do so we have conducted observations and interviews with members of the organization to attain a deeper understanding of the organization's mission and practices. Preliminary findings, conclusions and suggestions will be discussed at the symposium.

*Promoting Nonviolence between Hands and Paws*

**Mary Heissner**, English/Creative Writing (2014)

**Lauren Brandt, Tyler Peterson**

Mentored by Elizabeth Lozano, Communications

This class has focused on the nonviolent concepts and strategies of well-known figures such as Gandhi and Martin Luther King Jr., but since their strategies are not universal, we would like to take this opportunity to explore how others have created their own policies of nonviolence. We are interested to learn how PAWS formulated their goals and beliefs – who or what influenced them and why. The interviews we conduct will answer these questions. Through our observations, we wish to see how the members of PAWS effectively promote nonviolence, and why their ways of doing so are effective. Understanding these concepts and experiencing a working strategy of nonviolence in action will further our knowledge of nonviolent communication.

*Centro Romero: Developing Community Leadership and Self Reliance Among Marginalized Immigrants and Refugees*

**Tania Velazquez**, Political Science, Advocacy & Social Change (2015)

**Malvika Bhatti, Rita Cardenas**

Mentored by Elizabeth Lozano, Communication

Centro Romero is an organization focused on helping the immigrant community, more specifically, marginalized groups such as the impoverished Latino community, undocumented immigrants and refugees. The center provides an array of services to the community such as legal immigration assistance, family services, domestic violence preventative services, youth programs, and adult education courses. The organization's mission to provide immigrants with the opportunities to lead better lives is highly important and relates to nonviolent communication greatly. Centro Romero practices nonviolence and positive peace through its work. The center's dedication to this is demonstrated through the programs and assistance they provide to the immigrant community.

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MUNDELEIN 307

*The Impact of Early Childhood Education Programs in Low-Income Communities: The Jumpstart Perspective*

**Julia Kopcienski**, Psychology, Philosophy (2013)

**Jennifer Burghard**, Elementary Education (2015)

Mentored by Jessica Young, Jumpstart Site Manager, Loyola University Chicago

Early childhood programs provide crucial opportunities for learning and development for preschool-aged children. Effective programs facilitate cognitive and socioemotional advancement and transformation, particularly among children from low-income communities. These programs have recently garnered national attention for their potential to elevate children out of a cycle of poverty. Our project serves to provide evidence for the positive benefits of early childhood education programs from three perspectives. We will provide a broad overview of the long-term financial benefits of early childhood education programs, analyze research conducted on the AmeriCorps preschool program Jumpstart, and discuss our own experiences in the Jumpstart classroom.

*The CCRT is Here for the Loyola*

**Lauren Lapinski**, Communication Studies and International Studies (2013)

**Maureen Sullivan**, Advocacy and Social Change and International Studies (2013)

Mentored by Elizabeth Lozano, School of Communication, Latin American Studies

This project examines how the Coordinated Community Response Team (CCRT) is working to create a culture of nonviolence and respect on Loyola's campuses. The CCRT is a collaborative effort between all dimensions of the University (staff, faculty, administrators, students) to support survivors of sexual assault, stalking, and dating violence and to raise awareness of these issues to try and prevent them from occurring. We studied the methods the CCRT uses to communicate and promote its mission within the Loyola community through the lens of theories on peace and nonviolence.

*You're Not Alone: Amnesty International at the Collegiate Level*

**Curtis Schuelke**, Journalism and English (2015)

**Renee Howarth**, Environmental Studies (2015)

Mentored by Elizabeth Lozano, Communications

We will be discussing how Amnesty International and its work are relevant to students on college campuses, how they can become involved, and what Amnesty International does to support nonviolence throughout the world. We will be looking specifically at AI's work on Loyola University Chicago's campus, what the group focuses on, and how much progress it has made.

*America's Drop Out Crisis: Loyola's Response*

**Emily Taft**, Communication (Advocacy & Social Change), French (2014)

Mentored by Mary Charles, School of Education

Every 26 seconds, a student drops out of a U. S. high school and is eight times as likely to end up in jail as someone with at least a high school diploma. Currently, high school dropouts cost the country \$1.8 billion in lost tax revenue. While the financial losses are staggering, they pale in comparison to the societal toll the dropout crisis takes on communities. Loyola's Target New Transitions, an academic outreach initiative, is a proven response to this crisis here in Chicago.

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MUNDELEIN 403

*Federalism in Nigeria and India*

**Harmanjeet Gill**, Philosophy, Political Science (2013)

Rudis Fellowship

Mentored by Vincent Mahler, Political Science

Federalism is common feature of heterogeneous states because it allows for recognition of plural voices while maintaining unity. Examples such states are United State, Belgium, Malaysia, Nigeria, India among many others. In my research, I examine federalism in India and Nigeria, in particular how these geographical vast and expansively diverse countries have accommodated minority demands for greater autonomy.

*Democratic? Public Opinion and the Development of the European Parliament*

**Peter Kobak**, Political Science (2013)

Provost Fellowship

Mentored by Alexandru Grigorescu, Political Science

My research tracks the major institutional changes in the European Parliament (EP) over its sixty year history. It explains what led to the major shifts in the Parliament's decision-making rules and powers. One body of literature has noted that throughout the EP's history, both advocates of strengthening the Parliament and their opponents used the language of democracy invoking the relevance of the public's role in the European institutions. Yet another body of literature studied the actual degree to which the public supported the EP and saw it as a reflection of popular will. Surprisingly, there are no studies that try to bring the two bodies of literature together, explaining how major decisions to empower the EP altered public opinion and, conversely, whether changes in public opinion regarding the EP were followed by important institutional reforms.

*Brazil: The Bourgeoisie and the Burdened*

**Vincent Nguyen**, International Studies, Political Science (2013)

Rudis Fellowship

Mentored by Ayana Karanja, Sociology

As the future host country of the 2014 World Cup and the 2016 Olympics, the global community looks to Brazil to essentially "prove itself" as Brazil is expected to become a major actor in world affairs. Unfortunately, in the undertaking to construct the necessary World Cup stadium and Olympic event grounds, the Brazilian government has forced impoverished individuals and communities out of their homes who currently occupy such a space. The objective of this research is to not only examine the constitutionality of this act but also note the possible ramifications Brazil.

MUNDELEIN 404

*Monte Carlo Based Radiation Treatment Planning in Lung Cancer Patients*

**Christopher Kabat**, Physics, Biochemistry (2012)

Mentored by Anil Sethi, Radiation Oncology

High energy X-rays are useful in treating cancer patients. To ensure accuracy, radiation therapy is first simulated using a computer-based dose algorithm before patient treatment begins. However, current treatment planning systems (TPS) fail to account for tissue density differences (tissue, air, and bone) particularly in lung patients. We investigate results of a novel Monte-Carlo (MC) based dose algorithm in several heterogeneous density phantoms. Using a variety of radiation detectors (radiographic films, and ion-chambers) we show that MC dose algorithm provides significantly more accurate and reliable treatment of lung cancer patients leading to better outcomes.

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MUND 404 (continued)

*Magnet traveling through a conducting pipe: a variation on the analytical approach*

**Matthew Kemnetz**, Physics, Math, Computer Science (2013)

Mulcahy Scholars Program

Mentored by Asim Gangopadhyaya, Thomas Ruubel, Physics

We present an analytical study of magnetic damping. In particular, we investigate the dynamics of a cylindrical neodymium magnet as it moves through a conducting tube. Owing to the very high degree of uniformity of the magnetization for neodymium magnets, we are able to provide completely analytical results for the EMF generated in the pipe, and the consequent retarding force. Our analytical expressions are shown to have excellent agreement with experimental observations.

*Shocks and patterns in continuum simulations of vertically shaken granular layers*

**Stefanie Moertl**, Physics (2013)

Mulcahy Scholars Program, Provost Fellowship

Mentored by Jon Bougie, Physics

We use continuum “granular hydrodynamic” equations to describe the vertical oscillation of granular layers. With each oscillation of the layer, shocks propagate through the media and prompt the formation of standing-wave patterns. We investigate the relationship between the shocks and pattern formation using computer simulations of our continuum equations. We graphically compare non-dimensionalized variables to determine how these relationships scale with layer depth. We empirically determine scaling factors that generalize the relationships for all investigated layer depths.

MUNDELEIN 406

*Research of Distal Triceps Tendon Ruptures*

**Naem Mufarreh**, Economics (2016)

Mentored by Bree Sines, Biology, with Anton Fakhouri, James Moravek Jr., and Beverlee Brisbin, MidAmerica Orthopaedics

This research was conducted through MidAmerica Orthopaedics as part of a professional internship. Highlighting the function of the Distal Triceps Tendon, while identifying common causes of ruptures, The anatomy, examination, diagnostic imaging, repair, and function of the distal triceps tendon are also examined. This is still ongoing research and is updated as progress is made.

*Encouraging Hydration among the Most Vulnerable: Evaluating Interventions by Student Nurses Companioning People with Developmental and Physical Disabilities.*

**Claire O'Halloran, Mariel Cruz, Leah Arof**, Nursing (2016)

Mentored by P. Ann Solari-Twadell, Nursing

Body function depends on intake of water. Adequate hydration is used for muscle function, energy production, cell, tissue and organ-function. This project focuses on hydration of a vulnerable population: those with developmental and physical disabilities. Freshman nursing students from the Wellness Learning Community companioning adults with developmental and physical disabilities employ interventions to increase hydration among this population. This presentation discusses the importance of hydration, interventions employed by the student nurses to increase hydration among this population and the evaluation process used to determine if the interventions employed by the student nurses impacted the amount of water the clients ingested.

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MUND 406 (continued)

*Chicago Metropolitan Battered Women's Network: Outcome Measures Research*

**Maureen Sullivan**, Communication Studies: Advocacy and Social Change & International Studies (2013)

Center for Urban Research and Learning (CURL) Fellowship

Mentored by the staff of the Center for Urban Research and Learning, Loyola University Chicago

Loyola's Center for Urban Research & Learning (CURL) is working as a consultant for the Chicago Metropolitan Battered Women's Network (CMBWN) implementing a study that measures the outcome of individuals who receive domestic violence services from a CMBWN agency. The project is being conducted so that CMBWN agencies will be able to provide the best possible services to their clients. Outcome measures research has become vital for programs seeking grant funding. In the past, domestic violence agencies haven't done such research because of the sensitive nature of their work. CURL is designing the study based on the success of similar past projects.

MUNDELEIN 407

*"The fate of binaural information that is irretrievable when responses are based on one of two successive pulses."*

**Michael Dienstbach**, Psychology (2013)

Provost Fellowship

Mentored by Raymond Dye, Psychology

This study measured listeners' ability to detect interaural level differences (ILDs) when conveyed by the first (source) vs. second (echo) pulse as a function of the frequency (1500, 3000, and 5000 Hz) and the time between the pulses (echo delay). The pulse containing the ILD was randomly chosen to be the source or echo, with the ILD chosen from a Gaussian distribution  $[(\mu, \sigma) = (0, 4 \text{ dB})]$ . It was found that performance improved with increasing echo delay and decreasing frequency, but performance was comparable when ILD was presented in the source vs. echo pulse.

*Religiosity and Body Image in Catholic, Muslim, and Amish Women*

**Martha Ligas**, Psychology, Sociology (2013)

Joan and Bill Hank Center for the Catholic Intellectual Heritage (CCIH) Research Fellowship

Mentored by Denise Davidson, Psychology

Throughout the school year, Denise Davidson and her research team have compiled a collection of surveys to measure how degree of religiosity, modesty of dress and exposure to Western media affect body satisfaction and life satisfaction in women. Religiosity and modesty of dress are expected to be protective factors, whereas exposure to media is not. These groups of women were chosen because of how these variables are related to their life experiences. This presentation will discuss the process of survey compilation, participant recruitment and testing, as well as give a brief overview of current results and expected future findings.

*Beyond the Border: Assessing the Social Impact of Depression and Anxiety in Rural Honduras*

**Jacob Marshall**, Biology, Psychology (2013)

Mentored by Amy Bohnert, Psychology

Researchers in the last decade have turned their attention to the mental health needs of developing countries. Before appropriate forms of aid can be developed, a better understanding of the mental health conditions must be gained. This study seeks to contribute to the growing body of research in low- and middle-income countries by observing the social implications of depression and anxiety in a rural Honduran setting.

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MUND 407 (continued)

*Grand Theft Loyola: The Frequency and Amount of Violent Video Game Play by Undergraduate College Students*

**Callie Short**, Psychology (2014)

Carroll and Adelaide Johnson Scholarship

Mentored by Robert Morrison, Psychology

Emerging adults today could very well be labeled as victims of media overload, with the average adolescent spending 30 minutes per day playing video games. However, recent research suggests there is great variability in these numbers. Likewise, research has shown that the content as well as the amount of time are important factors to consider when examining the effect of video game play. Therefore, the goal of the current study is to examine the amount of time spent playing video games per week while taking into account whether the games are violent or nonviolent in undergraduate students.

MUNDELEIN 503

*What are the attitudes of Catholic high school administrators in Uganda toward addressing the needs of LGBTQ students?*

**Gerard (James) Luisi**, Philosophy, Political Science (2013)

Joan and Bill Hank Center for the Catholic Intellectual Heritage (CCIH) Research Fellowship

Mentored by Maher, School of Education

In Uganda, there was recently a bill proposed that would criminalize all homosexual activity with the penalty of death. The Catholic Church, however, teaches a consistent ethic of the preservation of life from conception to natural death, and recognizes the basic human dignity of all persons regardless of sexuality. This project seeks to determine how the tension between these two positions plays out, specifically in the context of Catholic high schools in Uganda and the approaches their faculty and staff take toward addressing homosexual students.

*Addressing the Social Perception of Transgender Persons: The Call for a New Schema*

**Dakota Neff**, Biology (2014)

Carroll and Adelaide Johnson Scholarship, Provost Fellowship

Mentored by Jennifer Parks, Philosophy

In this modern day and age it is known that many genetic precursors define a person's gender. However, society has its own preconceived notions of gender identity, and with that features that may not be in correlation with the gender an individual identifies with. These people, defined as being transgender, are discriminated by society when the only crime they are guilty of is trying to live with a body they do not feel comfortable in. The goal of this work is for others to gain a better understanding of individuals identifying as transgender, as well as those in close relationships with them.

*LGBT Students' College Experiences and Leadership Development: Inspiring a More Intentional Approach*

**Travis Olson**, Environmental Science (2015)

Provost Fellowship

Mentored by John Dugan, School of Education

LGBT students' experiences and development in college are often absent in quantitative studies which continue to resist asking about sexual orientation or fail to capture sufficient numbers of LGBT respondents. This recent research by the Multi-Institutional Study of Leadership builds on previous work and explores the environmental and institutional factors that play a role in LGBT students' collegiate experiences and leadership development.

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MUNDELEIN 504

*The AiiB Metalloenzyme as a Potential Antimicrobial Agent Against Pseudomonas aeruginosa*

**Susan Duyar**, Biology (2014)

Biology Research Fellows Program

Mentored by Domenic Castignetti, Dali Liu, Biology, Chemistry and Biochemistry

*Pseudomonas aeruginosa* is a highly resistant opportunistic pathogen involved in hospitals acquired infections especially among immunocompromised individuals. *P. aeruginosa* regulates many virulence genes, including genes for extracellular proteases, using a cell-density dependent signaling system called quorum sensing. We are investigating the ability of a metalloenzyme, AiiB, to degrade quorum-sensing signals (termed quorum quenching) as a potential antimicrobial method. Using a series of protease and quorum sensor assays, we are examining the effects of AiiB on growth, virulence, and quorum sensing in *P. aeruginosa*. We determined that AiiB affects the growth of *P. aeruginosa* and are now studying effects on protease activity.

*Developing and Characterizing a Novel Photodynamic Therapy Agent*

**Marco Palomo**, Chemistry (2013)

Mulcahy Scholars Program

Mentored by Kenneth Olsen, Rodney Dale, Chemistry, Biology

Photodynamic therapy (PDT) relies on photosensitizers to use light and excite oxygen to a reactive oxygen species (ROS). This ROS can oxidatively damage the cancer cells and cause death. My project involves characterizing a PDT agent that uses chlorin e6 (Ce6) as a photosensitizer, folate (FA) as a targeting moiety, and bovine serum albumin (BSA) as a protein base. Using heme extraction procedures we were able to quantify the amount of covalently bound Ce6 and FA on the PDT agent. Further experiments are being done to characterize BSA based agents and to show a proof of principle in cell cultures.

*Detecting the Source of Infections Past*

**Michael Shaffer**, Bioinformatics, Biology (2013)

Biology Summer Research Fellowship, Mulcahy Scholars Program

Mentored by Catherine Putonti, Biology, Computer Science

The CRISPR system is a defense mechanism various bacteria and archaea have developed to protect against bacteriophages. These prokaryotes are able to recognize nucleic acid sequences from invading viruses and then incorporate them into their own genome between repeats as spacers which are expressed and incorporated into proteins which utilize them to defend against invaders. We have developed software to examine virus and CRISPR sequence data, search for similarity, and then check the functionality of subsequences in viruses associated with CRISPR sequences. Using this software, we have analyzed numerous bacterial CRISPR sequences identifying possible viral sources suggesting previous infection(s).

MUND 506

*Idealist Naivety or Contrarian Courage: the Stoicism of Evangelization in Shusaku Endo's Silence"*

**Andrew Kletzien**, Political Science, Philosophy (2015)

Mentored by William Myatt, Theology

Using a distinction of Vaclav Havel's "Power of the Powerless" and Christopher Hitchens' subsequent discussion, this paper examines the nature of proselytizing motives in Shusaku Endo's novel "Silence," specifically with regard to a comparison of Buddhist and Christian doctrines.

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MUND 506 (continued)

*Drawing on Experience: Female Memoirists and Comics*

**Angelica Krajewski**, English, International Studies (2013)

Provost Fellowship

Mentored by Suzanne Bost, English

Memoir's collision with comics has been transformative. These texts are dominated by male writers, artists, editors, and perspectives; however, DC Comics, Inc.'s Vertigo has recently published two graphic memoirs that challenge this standard. *Cuba: My Revolution* features main character Sonya as an avatar for writer Inverna Lopez during the Cuban Revolution and *Marzi*, by Marzena Sowa, tells the story of Sowa as a girl while communism crumbled in Poland during the 1980's. In both cases, readers are left to reconcile two bodies: the actual physical body of the writer and the imagined body as drawn and described in the text.

*Humors, the Body, and Emotion in Shakespeare's Othello*

**Josh Terry**, Psychology (2013)

Research Mentoring Program

Mentored by Devon Wallace, English Graduate Student

Throughout Shakespeare's *Othello*, the title character is driven by his passions. Ultimately, his volatile emotions devour him as well as those around him. These emotions change his physical state, causing him to be unable to control his body and therefore his mind. By focusing on Galenic Humoralism and the ways that the Early Moderns perceived medicine, the mind, emotions and the body, I will contextualize Iago's manipulation, Othello's emotional journey and his epileptic fit. Understanding these relationships between Galenic Humoralism and the Early Moderns highlights the text.

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## Community Engagement Forum Abstracts

*Spring 2013: Service Learning and Community Engagement of Loyola Students with Refugees*

**Samicchya Adhikari**, Psychology (2013), **Samantha Ropski**

Loyola Refugee Outreach and the Catholic Charities Refugee Resettlement Program

Mentored by Daniel Amick, Anthropology

Through the ANTH 301 (Refugee Resettlement) course and the student organization, Loyola Refugee Outreach (LRO), Loyola student do an enormous amount of work with refugees resettled in Rogers Park as well as doing assistance and fundraising projects for the local resettlement agencies. Students spend anywhere from 4-12 hours per week engaging with refugees-- visiting refugee families, tutoring English, teaching ESL, promoting awareness and helping with cultural adjustment. Their donation of time and material goods are valued at over \$100,000.

*Biodiesel Feedstocks*

**Keshiha Bathani**, Environmental Science (2013), **Sam Osborne**, English and Sociology (2013); **Erik Reynolds**, Environmental Science (2014); **Mohammed Qurashi**, Biology (2014)

Center for Urban Environmental Research & Policy (CUERP)

Mentored by Tania Schusler, Environmental Science, and Zach Waickman, CUERP

As a fuel, biodiesel is attractive for many reasons. Made from a wide range of plant and renewable sources, it is a crop-derived liquid fuel. These sources can be substituted for normal petroleum-based diesel fuel. Biodiesel feedstock's, such as brown grease, algae, and weeds like Camelina, are all environmentally sustainable substitutes that can be used in production. The current state of technology for producing biodiesel from feedstocks has the potential to reduce the need for foreign oil dependence. As a result, feedstocks used in biodiesel are cleaner-burning, are more environmentally sustainable, and provide a better alternative to regular diesel.

*Greenhouse Effect: Season Extension Techniques for Temperate Climates*

**Kevin Bautista**, Environmental Studies (2015), **Molly Olson**, Environmental Science (2015); |

**Dmitriy Peresada**, Biology (2014)

Center for Urban Environmental Research & Policy (CUERP)

Mentored by Lane Vail, Environmental Science

Loyola University Chicago seeks to expand its repertoire of sustainable agricultural techniques to reduce its carbon footprint and increase awareness of the importance of the local and regional levels of the agricultural economy. One type of agricultural technique that can be particularly helpful for urban settings includes season extension. Season extension increases seasonal productivity and allows for a longer time frame for planting and harvesting. Our research project aimed to determine the best form of season extension for use at the various gardens on Loyola's Lake Shore Campus. We constructed and experimented with several row cover materials to determine which would be best for growing Romaine lettuce. With the knowledge gained from the project, urban agriculture can be sustained and improved on campus as well as in the local community.

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*Feeding Refugee Families: A Project to Increase Refugee Food Security through Urban Gardening*

**Emily Braun**, Environmental Science (2014), **Katelyn Coghlan, Jane Kim**, Environmental Studies (2014)  
Center for Urban Environmental Research & Policy (CUERP)

Mentored by Daniel Amick, Anthropology, and Lane Vail, Center for Urban Environmental Research & Policy (CUERP)

Our group piloted a refugee gardening project at Loyola University's Urban Agriculture Demonstration Site. We worked with Dr. Daniel Amick, faculty in the Anthropology Department, and a group of his students to aid three refugee families in gardening fruits and vegetables in three different plots. We created educational materials about urban gardening and Chicago's growing seasons into the project to ensure success of the refugee's plots. With this project, we plan to strengthen connections between Loyola University and local refugee families and support refugees in their diet, wellbeing, and financial situation.

*Growing Change: Calculating the Percentage of Local, Fair, Ecologically Sound, and Humane Foods at Loyola Dining*

**Rose Brickley**, Anthropology (2013), **Jacqueline Gorman**, Communications: Advocacy and Social Change, Environmental Studies (2015); **Haley Keegan, Sarah Naiman**, Environmental Science (2014)  
Real Food Challenge

Mentored by Lane Vail, Center for Urban Environmental Research & Policy (CUERP)

Our project focuses on sourcing the food served by Loyola Dining. We are working to calculate a percentage of "Real Food" by analyzing the amount of money spent on local, fair, ecologically sound, and humane food. Our project also involves meeting with stakeholder groups on campus in order to gain access to information, communicate progress to student organizations, and present results to Loyola students, faculty and staff. Through our project we aim to understand the current percentage of "Real Food" so we can move forward in working with students and administration to set a goal to increase the amount of sustainable and ethical food served at Loyola.

*Got Drip Irrigation?: Students install a drip irrigation system at the Loyola University Urban Agriculture Demonstration Garden*

**Mary Buttitta**, Economics (2014), **Grace Hotz**, Political Science, Environmental Studies (2013); **Marthe Lekina**  
Mentored by Lane Vail, Center for Urban Environmental Research & Policy (CUERP)

As part of our course Solutions To Environmental Problems: Food Systems, we installed a drip irrigation system for the raised beds at the Urban Agriculture Demonstration Garden on Loyola's Lake Shore Campus. The system will allow the garden to conserve water in the process of providing organic produce to the community. Specifically, the drip system uses a timer, filter, pressure regulator, tubing, and valves to reduce the garden's water usage.

*Reduce, Reuse, Upcycle*

**Andrew Clayton**, English (2013), **Joseph Kamberos**, Environmental Science, Physics (2015); **Andrew McKeever** (2014)

Mentored by Lane Vail, Center for Urban Environmental Research & Policy (CUERP)

Our project is to transform what would otherwise become landfill waste into useable, effective structure for use in urban gardening. By gathering waste from local business and other community members and assembling it into infrastructure for Loyola's Winthrop demonstration lot, we hope to showcase the potential for new levels of innovation and sustainability within an urban setting, while simultaneously increasing the effectiveness of Loyola's existing urban garden. We aim to tackle the problems of waste and overflowing landfills, food deserts, excessive food miles, and the average urban individual's detachment from their food by utilizing the Winthrop demonstration garden. We plan on recycling waste from local area businesses to create the structures we build, which will include: raised beds, and vertical garden hangers. Once we build these structures, we hope to grow a diverse selec-

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tion of vegetables, flowers, and plants along the outside fence of the lot in hopes of making the area more beautiful and noticeable to the Loyola and Rogers Park community. The final product will be a garden that attracts attention of passersby, that can be used as an example to others of what can be done with materials that would otherwise go in a landfill, and will serve as a model to local areas to thwart food deserts and bring a stronger sense of community.

*Loyola4Chicago: The Impact of On-Going Service on the Community*

**Jose Castellanos, Emily Cybulla**, Biochemistry (2015); **Maura Rocks**, Political Science, Theology (2016)  
Loyola4Chicago program, in cooperation with Big Brothers Big Sisters; Centro Romero; Chicago HOPES for Kids; Chicago Jesuit Academy; Howard Area Community Center; Jordan Community School; Misericordia; Neumann Family Services; North Side Housing and Supportive Services; and Sarah's Circle  
Mentored by Alicia Ferraris, Community Outreach Coordinator, Office of Community Service & Action

Loyola4Chicago volunteers commit to weekly service with an organization for the entire semester. Through volunteering in the 2012-2013 school year volunteers were able to serve populations including individuals experiencing homelessness, adults with developmental disabilities, immigrants and at-risk youth. Through a commitment to service and opportunities for reflection, volunteers witnessed many issues of social justice and learned about the impact of their service in the Rogers Park, Edgewater and Uptown communities. This presentation will provide a look at the service work these 150+ volunteers have done, and the impact they are making on the populations they serve.

*Memoirs of Contemporary Women Religious*

**All students from Maturity & Aging (PSYC 349)**, Spring 2013  
PSYC 349 class in partnership with various Women's Religious Orders  
Mentored by Jennifer Fiebig, Psychology

During the spring 2013 semester, 44 students enrolled and participated in an experiential learning project as part of their Maturity and Aging Class (PSYC 349). 44 Sisters from multiple orders were interviewed either in person or over the phone. Students transcribed these interviews and wrote memoirs based on the Sisters' lives. Through this intergenerational and hands-on learning project, the students were able to apply theories of aging and explore how a contemporary Catholic woman religious nurtures her relationship with God over her lifetime. This experience encouraged students to contemplate their place within the world, to step outside their comfort zone, and to process what it means to be "human" as an adult within America and ultimately as a global citizen.

*Understanding and Fighting Poverty in Chicago*

**Hannah Green**, Social Work (2013), **Jessica Snype**, Social Work (2015)  
LIFT-Chicago

LIFT-Chicago is a non-profit resource and referral center located in Uptown and staffed almost entirely by student volunteers. LIFT is also a Registered Student Organization, and works to engage the greater Loyola community in helping community members achieve economic stability and well-being. Poverty Awareness Week is an annual event on campus that brings this mission to life through five events: Food/Toiletries Drive, Monologue Readings about clients' experiences, Panel Discussion surrounding food disparities, Obstacle Course showing challenges of obtaining services, and LIFTopolis, a simulation of experiencing poverty in an urban metropolis. Join us to learn about how LIFT is creating change!

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*Loyola Community Literacy Center*

**Marleah Cellitti-Nissenbaum, Christian Gillespie**, English (2013); **David Lancelle**, Music (2013); **Monica Randall**, International Studies (2015); **Cara Ray**, Psychology (2013)

Mentored by Jacqueline Heckman, Loyola Community Literacy Center Director, English

The Loyola Community Literacy Center offers free tutoring to those adults in the Rogers Park community who are interested in learning English, in developing their English or literacy skills, or in working for their GED. Many of our learners are recent immigrants or international visitors, but we also have native speakers who come to us for assistance. We provide one-on-one tutoring in a supportive, welcoming environment, with Loyola students serving as tutors, staff, and managers. We are completing our 21st year of service to the community. Our Center is located in Rooms 05 and 06 in Dumbach Hall on the Lake Shore Campus. We are open for tutoring on Monday, Tuesday, Wednesday, and Thursday evenings from 7-9:30 pm during the fall and spring semesters.

*Finding Ways to Apply Broad Principals to Community Based Work*

**Hannah Helbert**, International Studies (2013)

It's easy to identify causes and principals you believe in on a broad, theoretical scale, but It can often be challenging to try to see these large concepts in local service work and internships. I have tried to tackle this challenge while working at various locations, especially seeking to identify ways universal human rights are protected through the work of diverse non-profit organizations on a personal level. I'll share ways I have learned to identify universal human rights protection through work as a Loyola Social Justice Intern at Misericordia, an intern at the Hotel Rwanda Rusesabagina Foundation and DANK Haus German Cultural Organization, and an alternative break immersion leader, in the hopes that it will create discourse on what is important to you, and how to work towards on a local level.

*The Hands-Off Intervention: Working with Youth in a Non-Clinical Setting*

**Colleen Kelley**, Social Work (2013)

Chicago Lights Tutoring

Mentored by Alex Cornwell and Meghan Jane Stegemann, Chicago Lights Tutoring

Throughout my time at Chicago Lights Tutoring I have seen a different side of social work. Many times social work is seen as a clinical, one-on-one field, but I have found this is not always true. I found my co-workers were using an intervention called milieu therapy when working with the youth at the program.

*The Impact of Early Childhood Education Programs in Low-Income Communities: The Jumpstart Perspective*

**Julia Kopcienski**, Psychology, Philosophy (2013), **Jennifer Burghard**, Elementary Education (2015)

Jumpstart Chicago, AmeriCorps, and Gale Math and Science Academy (CPS)

Mentored by Jessica Young, Jumpstart Site Manager, Loyola University Chicago

Early childhood programs provide crucial opportunities for learning and development for preschool-aged children. Effective programs facilitate cognitive and socioemotional advancement and transformation, particularly among children from low-income communities. These programs have recently garnered national attention for their potential to elevate children out of a cycle of poverty. Our project serves to provide evidence for the positive benefits of early childhood education programs from three perspectives. We will provide a broad overview of the long-term financial benefits of early childhood education programs, analyze research conducted on the AmeriCorps preschool program Jumpstart, and discuss our own experiences in the Jumpstart classroom.

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*Electronic Waste Reduction*

**Meghan Maloy**, Mathematics (2013), **Mateusz Gornisiewicz**, Biology (2013); **Anne Hanrahan**, Business Management (2013); **Delia Hornik**, **Bernardo Simon Jr.**, Psychology (2013); **Joseph Page**, Philosophy (2013)  
Mentored by Tania Schusler, Environmental Sciences

Electronic waste has incredibly detrimental effects on the environment and, more immediately, on the communities it is outsourced to. Our research highlights the dangers of e-waste and encourages people to reduce their consumption of electronics and responsibly dispose of e-waste.

*Jumpstarting Children's Futures*

**Kelli McCallum**, Science Elementary Education (2016), **Alexandra Blassberg**, Human Services (2016); **Sharlton Jelks**, Biochemistry (2016); **Laura Sinclair**, Human Services (2016); **Cynthia Thomas**  
Jumpstart Chicago  
Mentored by Adam Serafin, Loyola Site Manager 2012; Jessica Young, Loyola Site Manager 2013; Jennifer Swezey, Jumpstart Program Director

Jumpstart is an Americorps program that implements sessions about literacy into existing preschool classrooms through reading, songs, poems and hands-on activities. In the beginning of the school year, the classroom teacher was asked to fill out a "Student Checklist" where different aspects of a child were scored from their mental capacity to their social ability. These scores were then translated onto a 5-point scale with 5 being the highest. In the beginning of the year, there were quite a few students with scores less than 2. Now that we are halfway through the program this school year, a midyear "Student Checklist" was done to see how each of the children's scores differed from the first one. Also, corps member stories and pictures will be used to illustrate the difference Jumpstart has had that a paper score is unable to see.

*Fall 2012: Service-Learning and Community Engagement of Loyola Students with Refugees*

**Gillian McGhee**, Journalism and Anthropology (2014), **Greer Campbell**, Anthropology (2014); **Muzit Gebretensae**, **Iva Golemi**, **Nick Kulas**, **Nick Short**, **Maya Wilkens**  
Catholic Charities Refugee Resettlement Program  
Mentored by Daniel Amick, Anthropology

Students in Anth 301: Refugee Resettlement along with members of the Loyola Refugee Outreach service organization participated in various engaged learning activities including partnering with refugee families, a winter clothing drive, special events for refugee children and Loyola students, research on community gardening opportunities, producing a video series on financial literacy (with the Students In Free Enterprise service organization), creating a culturally competent webpage describing our work, and making and distributing 300 health/hygiene kits for refugee families. This poster describes our multiple efforts in support of resettled refugees and why we pursued these projects.

*STARS Computing Corps Outreach: School Assistance*

**Jonathan Nepomuceno**, Computer Science (2013), **Gabriel Burgess**, Computer Science (2013)  
STARS Computing Corps  
Mentored by Dr. Ronald Greenberg, Computer Science

We present a snapshot of the current state of education in computer science and STEM fields in general (Science, Technology, Engineering, and Mathematics), as we observed it through outreach work in local elementary and high schools in the Chicago area. We provide our personal stories, and relate our work with the wider challenges facing computing education. We also consider the potential career and academic benefits that come with such education – making the challenges worth it to provide to students economic empowerment, and to companies a multi-talented workforce for the 21st century. We will also promote the Loyola chapter of STARS Computing Corps,

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through which students (of any field) can get involved. Students can register their participation for class credit and for stipends.

*Spring 2013: Service Learning and Community Engagement of Loyola Students with Refugees*

**Samantha Ropski**, Psychology, Theology (2015), **Sammy Adhikari**, Psychology (2013);

**Sana Durrani**, Biology, Anthropology (2013); **Sarah Michaels, Jennifer To**

Loyola Refugee Outreach, Ethiopian Community Association of Chicago, and Catholic Charities Refugee Resettlement Program

Students in Anth 301: Refugee Resettlement along with members of the Loyola Refugee Outreach service organization participated in various engaged learning activities including partnering with refugee families, teaching ESL classes, involving Burmese refugees in community gardening, a refugee camp experience with discussion (partnering with Jesuit Refugee Services), raising funds for Goz Amer refugee school in Chad, presenting a talent show on campus with Loyola students and Bhutanese refugees as a fundraiser for the Bhutanese Community Association of Illinois, making and distributing 400 health/hygiene kits for refugee families, and organizing a job fair on campus for refugees and their sponsoring agencies.

*CeaseFire, Felons' Rights, and The Civic Engagement Curriculum*

**Josh Terry**, Psychology (2013)

Provost Fellowship

CeaseFire Chicago

Mentored by Maryse Richards, Psychology

This presentation will outline my role in adapting CeaseFire, an anti-violence organization into Dr. Maryse Richard's Civic Engagement Curriculum (CEC), an after school program aimed at kids exposed to chronic community violence. It will examine how CeaseFire staff assisted us in focus group sessions at Gresham Elementary and the obstacles some of CeaseFire's staff face as convicted felons. Additionally, I will talk about my experience in facilitating the focus groups as well as the contents of Civic Engagement Curriculum and the violence facing the youth of Chicago's south side.

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## Poster Presentation Abstracts

### ♦ 1 ♦

*Impacts of Nanomaterials on Microbial Communities in Aquatic Ecosystems*

**Erin Adams**, Biology (2014)

Mulcahy Scholars Program

Mentored by John Kelly, Biology

Nanomaterials are a class of commercial materials found in many products. A common example is nano-titanium dioxide (NTD), used in areas from medicine to food. It is inevitable NTD materials will enter the environment, where their effects are unknown. This project stems from an experiment to determine the effects of NTD materials on bacteria in model streams. The objective is to further examine the bacterial communities in the model streams, focusing on denitrifying bacteria. Using DNA samples archived from the stream experiment, I will quantify the number of denitrifying bacteria in the sediment and analyze the species composition of bacteria.

### ♦ 2 ♦

*Project Prepare: Preparing Youth to Successfully Age Out of Orphan Care in Ethiopia*

**Jacqueline Ader**, Social Work (2013)

Provost Fellowship

Mentored by Julia Pryce, Social Work

The millions of orphan youth living in alternative care in Ethiopia face incredible challenges in the transition to adult life, including lack of social networks and support, lack of job skills training, and psychological problems. The International Organization for Adolescents (IOFA), along with faculty and students from several Chicago universities recognize the lack of services preparing transitional orphan youth and urgency of addressing the issue. With a focus on youth-informed research, a 12-module, strengths-based and risk-targeting curriculum was developed to address the needs of these youth aging out of care. The curriculum was implemented in three groups of Ethiopian orphans ages 14-17. Data collected through post-implementation surveys, focus groups, and individual interviews has been systematically analyzed in an effort to understand the process and outcomes associated with this intervention. Findings will be presented, as well as implications creating a more effective and sustainable curriculum to assist orphans internationally in successfully transitioning into adulthood.

### ♦ 3 ♦

*Attribution of Responsibility to Sexual Assault Victims.*

**Michelle Ahmed**, Psychology (2013)

Mentored by Linda Heath, Psychology

The current study examined the effects of gender of the respondent, gender of the victim, type of rape, and narrative perspective on attribution of responsibility towards rape victims. Respondents read 1 of 8 vignettes, each depicting a rape victim (male or female) who had experienced a type of rape (stranger or acquaintance) that was presented in either first-person perspective or third-person perspective. Respondents then completed a self-report questionnaire assessing demographics, victim responsibility, perceived similarity to the victim, victim empathy, just world, and ambivalent sexism. Data collection is still in process.

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◆ 4 ◆

*Body Mass Index, Physical Activity and Social-Emotional Adjustment among Low-Income, Minority Girls.*

**Michelle Ahmed**, Psychology (2013)

Research Mentoring Program

Mentored by Amanda Ward, Psychology Graduate Student

This study examined relations between body mass index (BMI), body dissatisfaction (BD), perceived athletic competence (PAC), and physical activity (PA) among 43 low-income, minority girls. Participants had their BMI measured and completed surveys assessing BID, PAC, and PA. BMI was positively correlated with BID ( $r = .69$ ,  $p = .00$ ) and negatively correlated with PAC ( $r = -.401$ ,  $p = .04$ ). PAC was negatively correlated with PA ( $r = .36$ ,  $p = .02$ ). These findings suggest higher BMI is associated with poorer social-emotional adjustment including higher BID and less PAC, and indicates physical activity may positively influence frequency of PA.

◆ 5 ◆

*Predictors of Time between Inpatient Psychiatric Hospitalization Stays in Children and Adolescents Receiving Medicaid-Funded Health: Looking at Community, Individual/Family Characteristics, and Hospital Providers*

**Adelina Alkhatib**, Psychology (2013)

Mentored by Scott Leon and Daniel Dickson, Psychology

This study looks at DCFS and DHS children and adolescents receiving Medicaid funded healthcare. It includes patients from 29 different hospitals who were admitted within a 16 month time span (January 2005- May 2006). It is a survival analysis that will look at predictors of time between hospitalization. Our main research question is as follows: Can a hospital be held accountable for length of time between hospitalizations stays? This study will control for non-clinical (census data) and clinical (CSPI) variables, and it is hypothesized that even after controlling for those variables, the hospital will still be a predictor of length of time between hospitalization stays.

◆ 6 ◆

*Resolution and Rapid Racemization of Beckmann-derived CTV-Lactam Supramolecular Scaffold*

**Sameen Ansari**, Biology (2014)

Mulcahy Scholars Program, Provost Fellowship

Mentored by Daniel Becker, Organic Chemistry

Cyclotrimeratrylene (CTV) is a supramolecular scaffold with potential uses as a synthetic molecular receptor for biological sensors and in signaling due to its unique chiral bowl conformation, ability to act as a host for smaller guest molecules and its ability to mimic receptor-ligand interactions. To isolate the individual enantiomers of CTV lactam, I am using menthylxyacetic acid to form diastereomeric adducts with CTV-Lactam. I have conducted my research using various methods including purification of products via column chromatography, and analyzing the products formed using various analytical techniques including  $^1\text{H}$  NMR, and  $^{13}\text{C}$  NMR spectroscopy.

◆ 7 ◆

*Studying the Prominence of CRISPR/Cas systems in the Environment*

**David Baltrusaitis**, Bioinformatics, Biology (2014)

Carbon Undergraduate Research Fellowship Program

Mentored by Catherine Putonti and John Kelly, Bioinformatics

The CRISPR/Cas (clustered regularly interspaced short palindromic repeats and CRISPR-associated genes) system has been identified in the genomes of many bacterial and archaeal species. Previous studies have found that the

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CRISPR/Cas system serves as a rudimentary bacterial immune system against foreign genetic material such as bacteriophages and plasmids. The prevalence of the system in the environment and the impact it has on shaping microbial communities is largely unknown. In this study, algorithms were developed to identify the variance in the cas genes present within 300+ bacterial and archaeal genomes, a far greater number of species than had been considered in previous studies.

◆ 8 ◆

*Understanding Embryo Patterning: Fetal Alcohol Effects & the Roles and Regulation of the Gene raldh2*

**Miguel Barajas**, Biology (2013)

Carbon Undergraduate Research Fellowship Program

Mentored by F. Bryan Pickett and Catherine Putonti, Department of Biology

Fetal Alcohol Effects is a serious and costly public health issue caused by fetal exposure to ethanol. In model systems, ethanol's metabolites interfere with the production of retinoic acid (RA) by competing for the active site of the enzyme RALDH2, coded by the gene Raldh2. This lowers levels of RA and causes defects during development. In an attempt to better understand these processes, I will use tools of molecular biology, biochemistry, and bioinformatics to uncover possible epigenetic regulation (methylation) in the expression of Raldh2. This is suspected, because such modification has already been observed in this gene in cancer cells. Discovery of epigenetic modification would open doors to possible future work to prompt overexpression of Raldh2 by changing Raldh2 promoter methylation. This is important since overexpression has been shown to rescue embryos from ethanol's effects.

◆ 9 ◆

*Mapping & Characterizing the short arm of Human Chromosome 21*

**Nagarjun Batchu**, Biology (2013)

Mulcahy Scholars Program

Mentored by Jeffrey Doering, Biology

$\beta$ -satellite, a 68 bp repeat is found scattered in heterochromatic regions across the human genome. One locus for  $\beta$ -satellite is the short arm (p-arms) of the acrocentric chromosomes. Our lab's current goal is to map and characterize the heterochromatic regions on the short arm of human chromosome 21 (HC21p).

◆ 10 ◆

*Let's Take This One Step at a Time: The effect of presenting the brainstorming rules in stages on brainstorming effectiveness*

**Cassandra Batz**, Psychology (2014)

Provost Fellowship

Mentored by James Larson, Psychology

This research seeks to further our understanding of the way groups work together to generate ideas using a procedure called brainstorming. Brainstorming requires groups to follow four procedural rules while generating their ideas (Osborn 1957). An unexplored feature of these rules is the seemingly contradictory nature of two of them: (1) "free-wheeling is welcomed; the wilder the idea the better," and (2) "combine and build on the ideas already generated." The first rule asks the group to seek out new domains, while the second asks them to work within previously considered domains. Intuitively, it appears these rules call for opposite approaches to generating ideas. I examine the implication of this contradiction by presenting the rules to groups in two different ways. In one condition, groups receive both rules at once, which is the standard way the rules are usually presented (simultaneous presentation condition). In the other condition groups receive the "free-wheeling" instruction first, and then, after generating ideas for a set amount of time, they receive the "build-on" instruction (staged presentation condition). It is predicted that when groups are given the two contradictory rules/instructions in stages they will perform better than

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when they are given the rules simultaneously. Specifically, it is predicted that they will generate more ideas, generate more creative ideas, and generate ideas from more diverse domains. If these predictions are supported, it may suggest interventions that can be used with real-world groups to help improve their ability to generate ideas.

♦ 11 ♦

*Glutamate output from the infralimbic prefrontal cortex regulates behavioral responses to chronic stress*

**William Beischel**, Psychology (2014)

Mentored by James Herman, Director of the Laboratory of Stress Neurobiology at the University of Cincinnati; Brent Myers, Postdoctoral Fellow at the University of Cincinnati

The effectiveness of deep brain stimulation in the ventromedial prefrontal cortex (vmPFC) for alleviating treatment-resistant depression suggests that this area is important in the development of maladaptive mood disorders. To test this, we used lentiviral gene modification to reduce the glutamatergic output from the infralimbic prefrontal cortex (analogous to the vmPFC) in rats. After a chronic variable stress paradigm, which has been shown to induce anxiety-like and depressive-like effects, rats treated with the lentivirus displayed less of these effects when compared to controls. These results implicate the output from vmPFC in the development of mood disorders.

♦ 12 ♦

*Metamemory into memory: The neural correlates of adaptive encoding*

**William Beischel**, Psychology (2014)

Mentored by Robert Morrison, Psychology

Metamemory, the ability to judge one's own memory, may be important for maximizing study efforts. We used a face-name learning paradigm with EEG to identify neural correlates for effective memory and metamemory during recall and subsequent study. Participants learned face-name pairs while providing judgments of learning (JOL) intended to predict their future recall performance. Event-related potentials calculated from the EEG recordings indexed both recall success as well as encoding after making a JOL. We believe this paradigm may offer an effective way to study the contribution of metamemory to resilience during cognitive aging.

♦ 13 ♦

*Sterically Focused Polyamino Derivatives for Trivalent Actinide/Lanthanide Separation*

**Jon Bender**, Chemistry, Mathematics (2014)

Research Mentoring Program

Mentored by Daniel Kissel, Department of Chemistry and Biochemistry Graduate Student

Nuclear energy has recently regained popularity as an alternative energy source in the U.S.; however, waste storage and disposal remain a concern. An effective method for reprocessing spent nuclear fuel is being actively sought to minimize the amount of waste created. This research focuses on the binding properties of N,N'-bis(2-pyridylmethyl)-diaminopropane-N,N'-diacetic acid, which is a potential solvent extraction reagent. The ligand was synthesized by a unique procedure and investigated to determine the effect of backbone chain length on complex stability. These results were used to determine the viability of polyamino carboxylic acids as potential extraction reagents for spent nuclear fuel reprocessing.

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◆ 14 ◆

*Sequencing of the Opsin Genes in South American Convict cichlid, Amatitlania nigrofasciata*

**Eunice Brobby**, Biology (2013)

Mulcahy Scholars Program

Mentored by Schroeter, Pickett, Biology

In this particular research, we are interested in the visual system of the South American Convict cichlid, *A. nigrofasciata*. Since there is little to no information known about their opsin genes, this project will attempt to clone and sequence the opsin genes and compare their evolutionary relationships. Our work has resulted in cloning, sequencing and classifying of many unique opsin genes from the *A. nigrofasciata*. Of these we have selected the LWS gene to focus on and produce a complete cDNA sequence. Towards this goal we have determined 1009 bp of the mRNA, starting from the 5' end. We are currently attempting determine the estimated 300 bps left in the 3' end of the mRNA.

◆ 15 ◆

*Corruption and Economic Growth*

**Henry Brophy**, Economics (2016)

My project focuses on the connection between high levels of governmental corruption and poor economic performance. This is done through the usage of different sources including Transparency International's Corruption Perception Index, the Heritage Foundation's Economic Freedom Index, and also case studies from around the globe. While governmental transparency is not the only factor influencing economic growth, corruption hinders growth mainly in the sense that it creates an unpredictable business environment. This unnecessary volatility hurts all sectors of the economy and in the end hurts a nation's economic growth and prosperity.

◆ 16 ◆

*Women of Faith in Revolt: Exploring Catholic Women Activists in Late 20th-Century Chicago*

**Anne Burkhardt**, Women Studies and Gender Studies, Political Science (2013)

Provost Fellowship

Mentored by Beth Myers and Betsy Hemenway, History/WSGS

In this project, we explored how Catholic nuns correlated their civic engagement with their religious faith. Often times, there were real or potential conflicts with accepted Church norms of how women have or should participate as Catholics. These women at times, practiced and advocated defiance of male- and white-dominated Church hierarchy while simultaneously loving what the Church could be. This speaks to the strength of these women's faiths and strength in their willingness to address a massive institution, of which they were inextricably part.

◆ 17 ◆

*Surface Reactivity Analysis of Tetracene Single Crystals*

**Christopher Camarata**, Biophysics Major, Math and Psychology Minors (2014)

Research Mentoring Program

Mentored by Faculty: Jacob Cizek, Graduate Student; Brittini Qualizza, Chemistry Department Graduate Student

My presentation will be about the research process of analyzing the surface reactivity of tetracene single crystals. These have semiconducting properties and are useful as part of the emerging organic semiconductor technology.

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♦ 18 ♦

*Analysis and Dietary Reconstruction of the Peoria IL Population using Isotopic Palaeodietary Information*

**Christian Capanna**, Biology and Classical Civilizations (2014)

Mulcahy Scholars Program

Mentored by Anne Grauer, Anthropology

When studying the lives of previous populations, researchers often find themselves limited by the lack of materials that provide direct evidence of human behavior. Human skeletal remains are often the only evidence archeologists have when conducting such research. Thus, it has been discovered that chemical evidence from human bone can be used to draw inferences to human diet. Using this isotopic data, this study sought to investigate the diet of early settlers of the Peoria, Illinois region during the 19th century.

♦ 19 ♦

*Group Foraging Behavior in Neogobius melanostomus*

**Olivia Chan**, Biology (2013)

Biology Summer Research Fellowship, Mulcahy Scholars Program

Mentored by Meg Malone, Biology Graduate Student

*Neogobius melanostomus*, the round goby, is a highly successful invasive species in the Great Lakes region with known detrimental impacts on native fish and benthic communities. *N. melanostomus* is found in high density populations and have been observed as highly effective foragers in aggregates. We address the research question, “what aggregate size maximizes individual gain?” through the implementation of new methodology in fish ecology, patch use giving-up density (GUDs). GUDs quantify foraging behavior and video analysis provides information on patch residence time & aggressive behavior. We found that participating in larger aggregates is advantageous to individual large round gobies.

♦ 20 ♦

*The Enforcement of Intellectual Property Rights in the Pharmaceutical Industry.*

**Sam Chappelle**, Economics (2014)

**Alexandria Sherwood**, Biology & Economics (2014)

In order to facilitate trade between countries, the World Trade Organization (WTO) requires that all member countries adhere to a standard of intellectual property rights enforcement on all traded goods, including pharmaceuticals. Developing and least developed countries, however, face a dichotomy when enacting trade policy: IP protection induces domestic firms to research diseases that afflict their population, but the enforcement of IP rights will also increase costs in the short run, reducing patient access to pharmaceuticals. This research examines the degree to which IP enforcement spurs domestic R&D and analyzes the costs and benefits associated with each policy.

♦ 21 ♦

*Syntheses of Potential Inhibitors of DapE Enzymes*

**Mouneeb Choudry**, Biology (2014)

Carbon Undergraduate Research Fellowship Program

Mentored by Daniel Becker and Richard Holz, Chemistry and Biochemistry

The endpoint of this research is to create, synthesize, and test inhibitors of the dapE enzyme from *Haemophilus influenzae* with antibiotic activity. The main goal for this project: (I) To construct highly potent small molecule inhibitors of dapE enzymes. It has been proven that DapE's are vital for cell growth and proliferation. For this reason, deletion of this gene would cause cell death. The DapE gene has been identified in several pathogenic Gram-positive and Gram-negative bacteria such as *Mycobacterium tuberculosis*. In order to define inhibitor binding to the

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dapE, an interdisciplinary approach will be applied, uniting organic synthetic methods with biochemical, spectroscopic, and X-ray crystallographic methods. Advances are anticipated from the success of this work, since the creation of antibiotics that are effective against antibiotic resistant strains is a major health concern.

♦ 23 ♦

*Streptococcus mutans Acid production in the Presence of Fluoride*

**Julia Coppi**, Biology (2014)

Biology Summer Research Fellowship

Mentored by Domenic Castignetti, Biology

Dental caries, tooth decay, is a chronic disease affecting children and adults. *Streptococcus mutans* (*S. mutans*) is a common oral bacterium and is largely the cause of dental caries. Their high rate of acid production depends on the rate of metabolism. Diets high in sucrose increase *S. mutans* acid production, and therefore enamel decay. The *S. mutans* use sugar to grow and create extensive oral biofilms that house *S. mutans* and other bacteria. Without treatment, that network of bacteria can produce acid that attacks tooth enamel. Dental care companies use fluoride compounds in toothpastes, mouthwash, and foams to inhibit bacterial-caused decay. The fluoride molecules found in these products are traditionally either sodium fluoride (NaF) or monofluorophosphate (MFP). Monofluorophosphate forms a salt complex that react with the bacteria to reduce lactic acid concentrations. When added to *S. mutans* in a nutrient rich environment, each chemical works to decrease growth and acid production of *S. mutans*.

♦ 24 ♦

*Creation of a hemoglobin-based oxygen carrier using the novel approach of “inside-out” PEGylation*

**Dana Dahhan**, Biochemistry (2015)

Mentored by Kenneth Olsen, Chemistry and Biochemistry

The demand for blood transfusions has led researchers to investigate non-immunogenic and sterile hemoglobin-based oxygen carriers (HBOCs) made from modifications of whole bovine blood. To prevent dissociation of the extracted Hb tetramer into  $\alpha\beta$  dimers upon circulation in the human body, the HBOC is crosslinked with DBSF (3,5-dibromosalicylic fumarate) on the Hb's beta chains. The Olsen lab has developed a novel approach to increasing the size of the crosslinked Hb tetramer, reducing redox chemistry and vasoconstriction, by “inside-out” PEGylation, a method which binds up to eight Hb tetramers to one extension-arm facilitated polyethylene glycol backbone.

♦ 25 ♦

*Age Differences in Inattention in 2- and 3-year-old Children Born Pre- and Full-Term*

**Plamena Daskalova**, Psychology (2013)

Research Mentoring Program

Mentored by Nancy Wyss, Developmental Psychology Graduate Student

A fundamental skill is the ability to resist distraction while learning. Children routinely face competition for their attentional focus in their everyday lives. As part of a larger study conducted by Ms. Nancy Wyss, this data examines the age differences in inattention displayed by 2- and 3-year-old children who were born pre- and full-term. The results show a significant age difference in inattention, as well as a marginal effect of condition (with toddlers born pre-term having fewer episodes of inattention than toddlers born full-term). These results add to our knowledge of attentional patterns in pre- and full-term children.

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♦ 26 ♦

*Body Image and Friendship Networks Among Ethnic Minority Girls*

**Katherine D'Aunno**, Psychology (2013)

Mentored by Amy Bohnert and Kimberly Burdette, Psychology

There is accumulating evidence that how girls perceive their bodies has important consequences. Negative body image among adolescent girls puts girls at risk for developing psychological and health problems (Grabe & Hyde, 2006). Recent studies have established that friendship groups may play an important role in how girls perceive their bodies (Woelders, Larsen, Scholte, Cillessen, & Engels, 2010). However, friendship group influences on the body image of ethnic minority girls have largely been ignored. Utilizing a sample of low-income, ethnic minority girls, this study examined whether girls within reciprocal friendship networks share similar degrees of three aspects of body image: body dissatisfaction, self-objectification, and self-surveillance.

♦ 27 ♦

*Cell-attached and diffusible guidance molecules for sensory axons*

**Jessica Decker**, Biology (2014)

Mulcahy Scholars Program

Mentored by William Rochlin, Biology

We study axon guidance during embryonic development using the innervation of rat taste buds as a model system. Because taste and somatosensory axons terminate in neighboring parts of the gustatory papilla epithelium, they likely respond to repulsive and attractive molecules to ensure proper innervation and prevent improper innervation. I assisted with the studies of cell attached (Eph/ephrin) and diffusible (neurotrophins) guidance cues. RT-PCR results showed the expression of ephrin-B ligands in tongue tissue during targeting. Stripes of ephrin-B ligands repel both types of sensory axons. Beads that release neurotrophins NGF and to a lesser extent NT3 attract somatosensory axons.

♦ 28 ♦

*Uncertainties in Core Collapse Supernovae Simulations and the Impact on Cosmology Forecasts.*

**Jefferson Duggan**

Mulcahy Scholars Program

Mentored by Johnathon Cunningham, Physics

We present the results of a study of selection criteria to identify Type Ia supernovae photometrically in a simulated mixed sample of Type Ia supernovae and core collapse supernovae. The simulated sample is a mockup of the expected results of the Dark Energy Survey (DES) using the supernovae simulation and fitting package of SNANA [Kessler et al. arXiv:0908.4280]. This is an extension of a previous analysis, [Gjergo et al. arXiv:1205.1480], with updated core collapse templates that are used to simulate the supernovae. We have also studied how systematic variations in the input parameters of the core collapse supernovae, such as absolute brightness and brightness smearing, affect the measured purity of the Type Ia supernova sample.

♦ 29 ♦

*Bottom-up and top-down drivers of behavior in invasive Asian Clam, *Corbicula fluminea**  
(*fluminea* should be italicized please)

**Melaney Dunne**, Biology, Environmental Studies (2015)

Provost Fellowship

Mentored by Timothy Hoellein, Biology

The Asian Clam, *Corbicula fluminea*, has invaded lakes and streams worldwide, and affects ecosystems through feeding and borrowing behaviors. Other bivalves regulate behavior following disturbance to substrate or predator

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presence. However, effects of bottom-up (i.e., substrate) and top-down (i.e., predators) effects on *C. fluminea* behavior are unknown. We measured the effect of varying substrates and predator presence on *C. fluminea*. Overall, clam behavior was driven by sensing physical inhibitors and burial interruption by the predator or large substrata, not perceptions of predators, substrate choice, or lateral movement. Results may inform strategies to mitigate *C. fluminea*'s ecosystem effects.

♦ 30 ♦

*Hierarchical Intimidation and Abuse of Power: The Emotional Disturbances Experienced by Exploited Indentured Servants in Pennsylvania*

**Mary Dwyer**, English (2014)

Research Mentoring Program

Mentored by Peter Kotowski, History Graduate Student

Focusing on the relationships indentured servants had with their masters/owners in Pennsylvania from 1682-1776, this project intended to evaluate the correlations between misuse of authority and emotional disturbances. The goals of this project were to investigate the ways in which hierarchical intimidation and abuse of power can cause severe emotional issues in those being mistreated. Whereas past research has attempted to evaluate the humanity of such forms of labor, the purpose of this qualitative study was to evaluate the emotional effects of mistreatment and abuse in servitude.

♦ 31 ♦

*Site Directed Mutagenesis of a Thioredoxin-dependent Glutaredoxin-like protein in Plasmodium Berghei*

**Matthew Dybas**, Biology (2013)

Mulcahy Scholars Program, Provost Fellowship

Mentored by Stefan Kanzok, Biology

My project in the Kanzok lab involves investigating a redox-active protein hypothesized to act as a reactive oxygen specie sensor in the malaria parasite *Plasmodium*. This protein belongs to the thioredoxin superfamily and is a thioredoxin-dependent glutaredoxin-like protein. We have expressed the recombinant protein from the rodent malaria model parasite *Plasmodium berghei* and have obtained an antibody. The focus of my work has been further characterization of the protein's antioxidant mechanisms through site directed mutagenesis altering a cysteine residue in the protein we propose is necessary for function as well as expression for studies with other antioxidant proteins.

♦ 32 ♦

*Electrophysiological differences during rest in older adults with poor, normal or exceptional memory*

**Laura Endris**, Psychology (2013)

Mentored by Robert Morrison, Psychology

The Default-Mode Network (DMN) is a brain network active during rest believed to be important for forming new memories. A recent neuroimaging study showed that neurons firing in the theta band (4-8 Hz) may regulate the DMN. In this study, we measured resting-state EEG in older adults with poor (amnesic Mild Cognitive Impairment, aMCI), normal, or exceptional (SuperAgers) memory. We hypothesized that differences in theta would result in differences in DMN predicting individual memory performance. We found that SuperAgers showed lower theta than controls and aMCI patients and those theta-band levels correlated with memory performance as measured in neuropsychological tests.

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♦ 33 ♦

*Qualitative Study of a Refugee Resettlement Program:  
Evaluating the Experience of Refugee Families, Volunteers, and a Resettlement Organization*

**Jessy Fijak**, Anthropology, Sociology (2013)

Mentored by Daniel Amick and Anne Figert, Anthropology and Sociology

The challenges associated with refugee resettlement often leave newly resettled refugees socially, economically, and culturally vulnerable. Befriending programs, pairing student volunteers with refugee families, can help ease difficulties associated with the resettlement process. This study evaluates the different perspectives taken by students, refugee resettlement agencies, and their clients on such a program, which extends beyond formal tutoring relationships because it is based on the relational foundation of weekly home visits. The goal of this study is to explore the variation in expectations, limitations, and goals associated with the befriending experience among these three different stakeholder groups. In order to find these variations, semi-structured interviews were conducted with the three parties involved in the resettlement process. The results offer insight into where these gaps in expectations and experiences between and within the three sample populations exist. The implications of these findings express the need to further study the refugee resettlement process and attempt to improve the programs.

♦ 34 ♦

*Response of denitrifying bacteria in model stream sediments to a single addition of nano-titanium dioxide*

**Jennifer Finlayson**, Biology (2013)

Women in Science Enabling Research (WISER) Program

Mentored by John Kelly, Biology

Nano-titanium dioxide (nano-TiO<sub>2</sub>) is an engineered nanomaterial used in a wide array of products. The use of large amounts of nano-TiO<sub>2</sub> is resulting in the unintended release of this material to the environment; yet little is known about its ecological impacts. We used model streams to explore the effects of nano-TiO<sub>2</sub> on denitrifying bacteria, which play a critical role in nitrogen cycling. Our results indicate that nano-TiO<sub>2</sub> resulted in a rapid increase in the numbers and activity of denitrifying bacteria. We are currently using clone library sequencing to determine which species of denitrifying bacteria were most affected by the nano-TiO<sub>2</sub>.

♦ 36 ♦

*Structure-Function Relationship of Escherichia coli ADP-glucose pyrophosphorylase; Control of Glycogen Synthesis in Bacteria*

**Jeanne Frisby-Zedan**, Chemistry (2013)

**Jennifer Wong**, Biochemistry (2014)

Mulcahy Scholars Program

Mentored by Miguel Ballicora, Chemistry

ADP-glucose pyrophosphorylase determines the rate of glycogen synthesis in *Escherichia coli*. A loop in this enzyme (residues 103-115) is postulated to be involved in activation. Mutations at Trp113 revealed reduced activity of the ADP-glucose pyrophosphorylase. We propose that other amino acid residues in this loop play a similar role. Through site-directed mutagenesis, expression, purification, and kinetic characterization of the enzyme, we seek to investigate the importance of various amino acids in catalysis. This research brings us closer to knowing all of the essential structural elements for the activation of ADP-glucose pyrophosphorylase. With this knowledge, the field of applied science can develop antibiotics which target this metabolic pathway in order to decrease glycogen synthesis in *E. coli* causing reduced survival rates of the bacteria within the host.

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♦ 37 ♦

*Development of Neural Networks Responsible for Analogical Reasoning*

**Elise Gagnon**, Psychology (2014)

**Valerie Flores**

Carroll and Adelaide Johnson Scholarship

Mentored by Robert Morrison, Psychology/ Neuroscience

In this study, we intend to characterize how changes in neural networks in developing women's brains support the development of analogical reasoning during adolescence. Analogy is an important component of children's cognitive development, enabling them to use structure to learn about new things based on what they already know. Effective analogical reasoning is critical in both everyday and formal learning environments and has been shown to be particularly important for learning and discovery in math and science, two areas where women are frequently underrepresented. In this project, we bring together developmental and electrophysiological methods to help characterize how neural network changes manifests in changes in analogical reasoning. We hope that a better understanding of how women's brains change during development will help us build optimal strategies for improving analogical reasoning and its effective use in learning and discovery environments.

♦ 38 ♦

*Site-Directed Mutagenesis of Papain-Like Protease of SARS-CoV*

**Adam Garrison**, Biology (2014)

Research Mentoring Program

Mentored by Andrew Kilianski, Department of Microbiology and Immunology Graduate Student

For cells to survive, they must quickly recognize viruses and signal for the initiation of an antiviral state. Coronaviruses, such as SARS-CoV, have found ways to circumvent the host cell's defenses and prevent the upregulation of these antiviral actions. Ubiquitination of antiviral signaling protein has been shown to be important for the activation of the antiviral state. The Papain-like protease (PLpro), is critical to this process, as it can interact with innate immune signaling and cleave the ubiquitin chains. To determine if PLpro DUB activity is directly related to PLpro host antagonism, certain point mutants of PLpro were created to potentially increase the innate immune antagonism abilities of PLpro.

♦ 39 ♦

*Influence of childhood adversity and neighborhood violence on inflammatory risk in young adult men: Implications for disparity in disease risk*

**Nicole Gaseor**, Nursing (2014)

Provost Fellowship

Mentored by Linda Janusek, Nursing

Increased inflammatory risk for cardiovascular disease (CVD) in African Americans men (AAM) may be rooted in childhood adversity, characterized by abuse, neglect, and neighborhood violence. The purpose of this ongoing project is to determine whether exposure to childhood adversity results in a dysregulated stress response during adulthood, characterized by a greater proinflammatory cytokine and a reduced cortisol response to stress. Identification of aspects of early life adversity that increase inflammatory risk, as well as identification of protective factors that reduce risk, can guide approaches to improve well-being for those raised in disadvantaged environments.

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♦ 40 ♦

*Tandem Quadruple Mass Spectrometry for the Determination of Bromines and Glucuronide Found in Surface and Waste Water*

**Gergana Georgieva**, Molecular Biology (2013)

Mulcahy Scholars Program

Mentored by Paul Chiarelli, Chemistry

Water pollution is the contamination of water bodies, occurring when pollutants are discharged directly or indirectly into the environment without adequate treatment to remove harmful compounds. The goal of this research is to identify novel bromines and glucuronide containing water pollutants using analytical methods based on full scan tandem mass spectrometry. Potential pollutants containing bromine or glucuronide may be identified from their characteristic fragmentation pattern. The research is going to imply the survey of water samples from different sources, such as the Chicago River, Lake Michigan, and tap water, as well as water taken from local treatment plants in Stickney and Skokie. Chromatographic retention times, molecular weight and product ion spectra will be used to determine the identity of these pollutants. The identification of novel pollutants will encourage studies of their toxicity as well as the development of novel methods of water treatment.

♦ 41 ♦

*Characterizing the Structure and Function of L1s in a Heterochromatic Region*

**Danish Ghazali**, Bioinformatics and Biology (2013)

Mulcahy Scholars Program, Provost Fellowship

Mentored by Jeffrey Doering, Biology

The short arm of chromosome 21 (HC21p) can be used as a model to study heterochromatic regions of the genome. LINEs-1, or L1s, have not previously been studied in heterochromatin regions, while they are pivotal to fully understanding the structure of HC21p. I have worked to expand on our current understanding of these regions using various bioinformatical and molecular biology techniques. This research provides insights towards a larger goal of looking at how L1 activity alters between tissues of malignant and normal cells as well as insights into the characterization of structure and function of L1s in a heterochromatic region.

♦ 42 ♦

*Implications of International Invasive Species Spread for Environmental Justice*

**Bianca Grove**, Biology (2014)

**Andrew Shin, Reana Thomas**, Biology (2014)

Mentored by Reuben Keller, Environmental Sciences

As globalization proceeds the international movement of goods is causing higher introduction rates of invasive species. While developed countries have many resources available to address these species, underdeveloped countries generally do not have the same level of expertise, funding or institutional capacity. As invasive species spread throughout poor nations, they directly affect human welfare, and we show that these effects are an international environmental justice issue because poorer societies are more affected by the problem than wealthier societies. Options are available to correct this issue, for example through sharing of resources and expertise among countries of different development levels.

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◆ 43 ◆

*The Accuracy of Lie Detection*

**Nicholas Guerrero**, Psychology (2013)

**Nehal K. Sheth**, Psychology, Biology (2013)

Provost Fellowship

Mentored by Linda Heath, Psychology

You have probably been lied to today, but have you caught it? While people have always been trying to detect lies, modern research has shown that humans are no better at lie detection than chance (DePaulo, Stone, & Lasiter, 1985). However, it has been shown that there is a difference in accurately detecting lies through audio compared to video means (Bond and DePaulo, 2006). This study aims to create a real lie and test participants in both audio and visual conditions in detecting lies by studying how one's personality, intuition, and gender influences lie detection.

◆ 44 ◆

*Physics Pedagogy in High School*

**David Haberkorn**

**Melissa M. Nemeth**

Mulcahy Scholars Program, Provost Fellowship

Mentored by Gordon Ramsey, Physics

This research aims to compare the effectiveness of different high school physics pedagogies and map their use across different demographics. Over ninety secondary school physics instructors were surveyed on a variety of demographic, pedagogical, and assessment topics. From their responses, a few metrics were established to assess the participants. The number of assessment techniques employed by the teachers and their use of technology were two of the more significant metrics constructed. This poster highlights the key factors affected by an instructor's assessment and technology-use rating. Instructors utilizing more assessment techniques and more technology tended to rate higher on a number of other metrics.

◆ 45 ◆

*Development of a Green Industrial Cleaning Agent from Glycerin.*

**Adam Hage**, Biology (2013)

Mentored by Zach Waickman, Center for Urban Environmental Research & Policy

My research has consisted of converting a by-product of the Biodiesel reaction, glycerin, into an industrial cleaning agent. My intention is to bring the Biodiesel Lab closer to its goal of becoming a zero waste laboratory while producing a viable green cleaner.

◆ 46 ◆

*Understanding the activator protein's role in assembly of the NHase active site*

**Natalia Hajnas**

Mulcahy Scholars Program, Provost Fellowship

Mentored by Richard C. Holz, Chemistry

Nitrile hydratases (NHases) are enzymes that catalyze the hydration of nitriles to amides under gentle conditions compared to traditional industrial methods. Activator proteins are required for full catalytic activity of most NHases. They are widely thought to function as metallochaperones but may also be involved in cysteine oxidation of the active site, which is required for activity. It is unknown how the maturation mechanism works for NHase (i.e. how the activator functions to bring the metal ion to the active site). Current literature lacks proposals of tentative metal binding sites for Co-type activators. I propose to investigate the activator's function by studying

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activator and NHase alpha protein complexes. The knowledge gained from research on this enzyme and its activator will have applications across several fields such as medicine and advancing green chemistry. My research will be supported by Richard C. Holz in the Chemistry Department.

◆ 47 ◆

*Synthesizing a Photosensitizer for Photodynamic Therapy*

**Yara Hamwi**, Chemistry (2013)

Mulcahy Scholars Program, Provost Fellowship

Mentored by David Crumrine, Chemistry

Photosensitizing agents are specialized drugs that are used in photodynamic therapy, also known as PDT. The goal is to synthesize a photosensitizing agent that can efficiently target cancer cells with the highest amount of conjugation, using highly substituted and arylated agents. We worked with phenothiazine-based sensitizers and are still working to produce a variety of them to find the most efficient photosensitizer. I worked on finding a reaction that can place an acetyl-protecting group on the nitrogen on the phenothiazine ring. This allows the para positions on the ring open for the next step, which would be bromination

◆ 48 ◆

*Spatial and temporal variation reveals environmental drivers of ecosystem metabolism in a subtropical estuary (Guana Tolomato Matanzas, FL)*

**Spyridon Hasiakos**

Biology Summer Research Fellowship, Mulcahy Scholars Program

Mentored by Timothy Hoellein, Biology (Ecology)

We quantified spatial and temporal patterns in gross primary production (GPP), community respiration (CR), and net ecosystem metabolism at 4 sites in Guana Tolomato Matanzas-FL using data from the National Estuarine Research Reserve System database. Few studies have examined controls on metabolism from an annual perspective. Physiochemical and meteorological data were used to determine drivers of metabolism. GPP and CR were highest in summer. Relationships between GPP, CR, and chlorophyll-a indicated CR was driven by water column GPP. On a monthly basis, phosphate was positively related to GPP. Results contrast the accepted model that N limits production in coastal environments.

◆ 49 ◆

*Characterization of Satellite III Histone Modifications in Human Cancer Cells*

**James Hays**, Biology (2013)

**Neil Kuehnle**

Mulcahy Scholars Program

Mentored by Jeffrey Doering, Biology

Recent work shows that normally repressed satellite repeat families are transcribed at high levels in cancer cells, with satellite III (SatIII) showing the greatest fold-increase between normal and cancer cells. Which subfamilies of Sat III become overexpressed in cancer cells is currently unknown. Our work aims to characterize the chromatin structure in several SatIII subfamilies using chromatin immunoprecipitation on a cancer cell line and quantitative PCR. We hypothesize that SatIII subfamilies will contain euchromatic chromatin modifications and only certain subfamilies will be activated in cancer cells. Discovery of differently activated subfamilies in cancers may lead to biomarkers for cancer diagnosis.

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♦ 50 ♦

*Change Grown from Within:*

*How the Nourishment of Non-Violence Can Coax Growth from Faltering Food Systems - Loyola's Grower's Guild and the Potential for Non-Violent Practices in the Grow Change Campaign*

**Graham Henderson**, Communications (2013)

**Jacqueline Gorman**

Mentored by Elizabeth Lozano, Communication, Latin American Studies

The Grow Change campaign is an initiative by the Loyola University Growers' Guild which intends to get the University's food provider – Aramark – to agree to commit to purchase 20% real food – that is, locally grown, fair trade, ecologically sound, and humane – by the year 2020. In this research project we examine how Real Food Challenge's mission and action have transcended into appropriate nonviolent action by the Grow Change Campaign at Loyola University Chicago, and how the non-violent practices utilized are effective in achieving the mission of the Grow Change Campaign.

♦ 51 ♦

*Scanning Tunneling Microscopy Study of Subsurface Species on Metal Surfaces*

**Stacy Heslop**, Chemistry (2013)

Mulcahy Scholars Program, Provost Fellowship

Mentored by Daniel R. Killelea, Department of Chemistry & Biochemistry

Metal surfaces are widely employed in heterogeneously catalysis of chemicals. Subsurface species are atoms that are embedded in the near-surface, or selvedge, region of a metal. Subsurface atoms are chemically distinct from bulk-absorbed atoms in that they retain sufficient mobility to re-emerge and undergo reactions with adsorbed molecules. They are often metastable with respect to surface adsorbed atoms, and may be significantly more reactive. The goal of this study is to use the capabilities of an ultra-high vacuum scanning tunneling microscope to obtain atomically-resolved images of silver surfaces to probe the dynamics of surface / subsurface migration of oxygen.

♦ 52 ♦

*The Preservation of Shape Invariance under Point-Canonical Transformations*

**Joseph HLevyack**, Physics, Theoretical Physics/Applied Mathematics (2013)

Mulcahy Scholars Program, Provost Fellowship

Mentored by Asim Gangopadhyaya, Physics

Point-canonical transformations of the time-independent Schroedinger equation have revealed an interesting property of shape-invariant potentials in Supersymmetric Quantum Mechanics (SUSYQM). If the transformed equation is an eigenvalue equation, and if the initial potential is shape-invariant, then the new differential equation's potential is also shape-invariant. At the present moment, there is no proof showing why this occurs. We will survey the results of point-canonical transformations as well as present explanations of why shape-invariance is preserved.

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♦ 53 ♦

*Attention Transition: Age differences in attention during infancy at 12- and 18-months.*

**Ariel Horvitz**, Psychology (2013)

Mentored by Kathleen Kannass and Jennifer Fiebig, Psychology and Psychology

When infants are young their attention is dependent on outside factors and vulnerable to distracting events. After 12-months, infants have more ability to control their attention internally. Because older infants have better control of their attention they show more episodes of focused attention which is corresponded with learning, as oppose to casual attention which is more superficial. The current study examines the attention of 12-month and 18-month olds by measuring the different attention episodes that take place over a trial. I predicted that the 18-month olds will exhibit more focused attention due to their internal ability to control attention.

♦ 54 ♦

*A Hemoglobin Nanoparticle as a Potential Blood Substitute*

**Sheena Hussain**, Biochemistry, English (2013)

Carbon Undergraduate Research Fellowship Program

Mentored by Kenneth Olsen, Chemistry

Researchers have been searching for a usable blood substitute for decades. Ideally, a blood substitute requires: low autoxidation rates, high structural stability, prolonged circulatory retention, an absence of vasoconstriction, an absence of immunological response, low damage of oxygen-deprived tissues, and high capacity for oxygen delivery to tissues. A blood substitute that fulfills all these requirements is being produced by attaching antioxidants Cat and SOD to cross-linked hemoglobin using complementary chemistry of maleimides and sulfhydryls. Further, by controlling the amount of maleimides and sulfhydryls in the reaction, a controlled and layered nanoparticle can be produced.

♦ 55 ♦

*The Immigration Experiences of Central American Women*

**Eva Huzieran**, Psychology (2013)

Research Mentoring Program

Mentored by Cecelia Quinn, Social Work Graduate Student

Using semi-structured interviews, this exploratory qualitative study looks at the immigration experiences of Central American women from Guatemala, El Salvador, Honduras, and Nicaragua who have migrated overland without documentation. Specifically, this study is looking at the women's experiences with trauma during immigration, as well as the coping mechanisms used on their journeys. Analyzing the experiences of Central American women is valuable in assessing the needs of this disadvantaged population. It is also beneficial in developing ethical programs for this population.

♦ 56 ♦

*Corporate Communication, Culture, Sustainability and Social Media*

**Katherine Hynan**, Economics (2013)

Mentored by Anne Reilly, Business- Management

This empirical research explores how a sample of 12 global corporations from the retail, technology equipment, and food/beverage/tobacco industries use social media and CSR reports to communicate about sustainability. The sample is divided into two subsamples (Green and Not Green), using Newsweek's Greenest Company 2012 rankings, and compared for differential use of social media and company reports. Facebook, Twitter, CEO letters from annual reports and CSR/sustainability reports were examined to compare the content and scope of their communication. Firm culture was explored in terms of board size and diversity, as well as the firms' underlying values.

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♦ 57 ♦

*Environmental factors influencing the abundance and activity of denitrifying bacteria in freshwater wetlands*

**Sana Iqbal**, Biology and History (2015)

Women in Science Enabling Research (WISER) Program

Mentored by John Kelly, Biology

Denitrification is a bacterial process that removes nitrogen from surface waters. Understanding factors that control denitrification is vital because this process can be used to ameliorate nitrogen pollution. We examined the effects of environmental factors on denitrifying bacteria in freshwater wetlands in Illinois and Indiana. We measured the abundance of denitrifying bacteria via quantitative PCR of *nirS*, a critical gene in the denitrification pathway, and found that *nirS* copy numbers were positively correlated with nitrate concentrations and denitrification rates, and were negatively correlated with pH and temperature. These results provide valuable insight into environmental factors influencing denitrification in freshwater wetlands.

♦ 58 ♦

*Coping Mechanisms Effectiveness versus Use: Examining the Implications of Race*

**Megan Jackson**, Psychology and Sociology (2013)

Research Mentoring Program

Mentored by Stephanie Grunewald, Psychology Graduate Student

This study aimed to analyze and determine, by information gathered via a survey, the coping mechanisms found to be most widely used as well as those found to be most effective. The survey, distributed to middle school aged children, sought to find the forms of bullying most often experienced, the coping mechanisms most frequently utilized when an instance of bullying had occurred, the proposed reasons as to why they had fallen victim to bullying, and the location where they felt the most safe from their bullies. It was hypothesized that the coping mechanisms found to be most widely used as well as those to be found most effective would differ across ethnicities.

♦ 59 ♦

*Food Identities Across Generations*

**Michael Janusek**, Economics, Anthropology, Urban Studies (2014)

Provost Fellowship

Mentored by Mary Dominiak, Health Systems Management, Niehoff School of Nursing

Childhood obesity is a well-established public health concern. To combat childhood obesity, researchers are paying close attention to how children are being fed, by whom, and for what reasons. Food choice research suggests that eaters make decisions according to personal food identities, which are influenced by food upbringing, but can change over one's lifetime. Generally, food choice studies separate family food choice from personal food choice. Yet, potential for a connection between how parents think about food for themselves and how they feed their children exists. This study seeks to understand how food identities function across generations within a family.

♦ 60 ♦

*Black Sea Fishing Harvests, Fishers and Risk*

**Joseph Johnson**, Economics, Mathematics, Statistics (2014), **Andrew Palmer**, Economics, Mathematics (2014)

Mentored by Mine Cinar, Economics

This paper explores empirical evidence and a theoretical model for how fisheries in the Black Sea have become depleted as a result of environmental degradation and overfishing. The theoretical model uses a statistical model of

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the maximum sustainable yield to determine optimal fish catch and uses it to derive evolutionary stable strategies from a game theory perspective by using risk profiles. We explain how risk-averse fishers choose to fish at unsustainable levels even though this reduces their overall catch in the long run. The study also explores how social norms between fishers can encourage cooperation in fishing at sustainable levels.

♦ 61 ♦

*Generation of two antioxidant protein knock-out lines of the malaria parasite Plasmodium*

**Blair Jones**, Biology (2013)

Mulcahy Scholars Program

Mentored by Stefan Kanzok, Biology

The Plasmodium parasite causes malaria, the vector borne infectious disease, which is transmitted between humans by mosquitoes. The Plasmodium parasite has a complex life cycle in which it must constantly adapt to the differing environments within and between its two hosts: human and mosquito. We have previously found that a novel thioredoxin-like protein, tlp-418, is upregulated during parasites' development in the mosquito and may therefore play important roles during this particular developmental stage of the malaria parasite. Another thioredoxin-like glutaredoxin gene (TPxGI) is hypothesized to play a role in sensing hydrogen peroxide, a harmful oxidant, and so help to protect the parasite from oxidative stress. My project has been to design, generate and verify two knock-out DNA constructs for tlp418 and TPxGI, which will be used to disrupt each of these genes in the mouse malaria model parasite Plasmodium berghei. Completed and verified products will be sent to our collaborators who will transfect Plasmodium parasites to generate the KO-lines. The products of this project will be the first step to characterize the function of these genes.

♦ 62 ♦

*A Longitudinal Study of the Effects of Parental Support and Stress on Disordered Eating in Sorority Women*

**Rupal Joshi**, Biology (2013)

**Angie Arreola**, Psychology (2013)

Provost Fellowship

Mentored by Scott Leon and Ashley Rolnik, Psychology

Some women may be at a higher risk of developing disordered eating due to unrealistic norms of thinness/beauty in their social groups. Current literature suggests that involvement in sororities can increase the risk of disordered eating. The present study examined sorority women and the effect of thinness norms on disordered eating during a typical academic year. In particular, this research investigated the relationships with women's parents and the impact of college stress as factors in disordered eating behaviors.

♦ 63 ♦

*The Physics of Stringed Instruments*

**Joe Kamberos**, Environmental Science and Physics (2015)

**Richard Galbo**, Theoretical Physics and Applied Mathematics (2016); **Zoya Momin**; **Katarzyna Pomian**, Physics and Spanish (2016); **Thomas Predey**, Physics (2016)

Mentored by Gordon Ramsey, Physics

We are studying the properties of stringed instruments that contribute to their unique sounds and yet, set them apart. The goal is to understand how stringed instruments function and what sets the different instruments apart in sound and function. The procedure will include analyzing the string resonances and properties of the bodies of guitars, violins and possibly dulcimers, and compare these to cello data obtained in a former research project at Loyola. Sound data will be taken and analyzed for each instrument under different initial conditions. High-speed photography will be used to show the string and body resonances in real time. We will create reproduction of the sounds for each stringed instrument with an electronic synthesizer. This project provides a comprehensive analysis of stringed instruments.

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♦ 64 ♦

*The synthetic peptide SPK111 effectively inhibits leukemogenesis in MOLM13 leukemia cells in vitro*

**Dean Karahalios**, Biology (2014)

Research Mentoring Program

Mentored by Nisha Barretto, Cellular and Molecular Biochemistry Graduate Student

MLL-rearranged leukemias, the most common pediatric leukemias, resist conventional chemotherapies. This study evaluated the effectiveness of the peptide SPK111 as a treatment for MLL leukemia in vitro and in vivo, using the MLL-AF9 fusion-carrying cell line MOLM13. For in vitro studies, cell viability assays were performed. In vivo studies included two parts. In the first, mice were xenografted with SPK111-treated MOLM13 cells. In the second, eukemic mice were treated with SPK111. By periodically weighing the mice to determine disease progression, survival curves were generated. Ultimately, SPK111 reduced MOLM13 viability in vitro, but did not extend mouse survival, suggesting that further kinetic studies of SPK111 are required.

♦ 66 ♦

*Blood Substitutes: Development of Oxygen Based Hemoglobin Carriers*

**Muhammed Khan**, Biochemistry, Molecular Biology (2014)

Mulcahy Scholars Program, Provost Fellowship

Mentored by Kenneth Olsen, Chemistry and Biochemistry

To address the need of efficient, safe and large amounts of blood donations, hemoglobin based oxygen carriers to be used as blood substitutes will be synthesized. For effective blood substitutes, a number of qualities must be present: being a universal blood substitute, quick access to large volumes of blood, efficient oxygen and carbon dioxide transfer, ability to metabolize ROS and minimize vasoconstriction. These issues will be addressed, respectively, by developing a nanoparticle without surface antigens, not be donation based, be dependent on ions already present in the body, include oxidative enzymes (catalase and SOD) and have an increased size using sulfhydryls and maleimides to sequester interactions with vasoconstrictors. The final nanoparticle will be tested in mice.

♦ 67 ♦

*Feeding Refugee Families: A Project to Increase Refugee Food Security through Urban Gardening*

**Jane Kim**, Environmental Studies (2014)

**Emily Braun; Katelyn Coghlan**, International Studies (2015)

Mentored by Lane Vail and Daniel Amick, Institute of Environmental Sustainability, Anthropology

Our group will pilot a refugee gardening project at Loyola University's Urban Agriculture Demonstration Site. We will work with Dr. Amick, faculty in the Anthropology Department, and a group of his students to aid three refugee families in gardening fruits and vegetables in three different plots. We will incorporate educational elements about urban gardening and Chicago's growing seasons into the project to ensure the success of the refugee's plots. With this project, we plan to strengthen connections between Loyola University and the local refugee families and to aid refugees in bettering their diet, wellbeing, and financial situation.

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♦ 68 ♦

*Semantic Distance in Verbal Analogical Reasoning Modulates the N400 Event-Related Potential*

**Matthew Kmiecik**, Psychology (2013)

**Ryan Brisson**, Biology and Psychology (2014)

Mulcahy Scholars Program, Provost Fellowship

Mentored by Robert Morrison, Psychology

Computational accounts have traditionally focused on mapping between structured representations as fundamental to analogical processing. However, a recent connectionist model argues structured representations may not be necessary to solve verbal analogies. Herein, we had participants verify verbal analogies characterized for semantic distance while we monitored their brain waves using EEG. Participants' N400, an event related potential (ERP) indexing semantic congruity, was more negative for far than near analogies. However, N400 mean amplitude correlated with accuracy for near, but not far analogies, suggesting the mechanism of analogy may shift from semantic priming to analogical mapping as analogies become more distant.

♦ 69 ♦

*Determining the Importance of Internal Letters in Word Recognition Through Examination of Transposed-Letter Effects*

**Sonal Kumar**, Molecular Biology and Psychology (2013)

Mentored by Anne Sutter, Psychology

Many of our daily tasks require us to be able to identify different letters and words quickly and efficiently. The present study examined the effects of different letter transpositions within a word to determine whether such manipulations affect the activation of the word's representation in memory during reading. The purpose of this study was to test a split-processing model, which predicts that as long as the internal letters of a word are projected initially to the correct hemisphere, the word's memory representation can be activated regardless of the order of those letters. To test this hypothesis we employed a task in which participants decided whether a "target" letter-string formed a word or not. Each letter string was preceded by a "prime" that was either semantically related to the target and which was either spelled correctly or had two letters transposed. We hypothesized that if the split-processing model was accurate, then the cross-hemisphere transposition (letter switches that cross the fixation line) word condition should have little or no semantic priming compared to the within-hemisphere transposition (letters are switched within one side of fixation) word condition. The results and their implications on this word recognition model are discussed.

♦ 70 ♦

*Characterization of Beta Satellite Core in Relation to the D4Z4 Array*

**Elena Kurudza**, Molecular Biology (2014)

Biology Research Fellows Program

Mentored by Jeffrey Doering, Biology

The Human Genome Project was completed in 2003. However, deliberately excluded from this project were heterochromatic repetitive genome sequences. Using human chromosome 21 as a model, our research focuses on characterizing these repetitive sequences, Beta Satellite in particular. Found between beta satellite repeats are core elements. These core elements contain 84.23% sequence identity to both each other and to the 3.3kb D4Z4 repeat unit. Our research aims to establish a characterization of the sequences and chromatin structure at these regions through the use of PCR, Cloning, Sequencing, ChIP, qPCR and methylation experiments. Studying the chromatin structure of beta-satellite core and the regions that differ between core and D4Z4 can provide insight into the regulatory effects these regions may possess.

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◆ 71 ◆

*How the Development and Adoption of Technologies Affect the Health Care Industry: an Application to the Case of Drug-Eluting Stents*

**Michael Lauer**, Economics (2013)

Provost Fellowship

Mentored by Timothy Classen, Economics

My research examines how the adoption of new technologies increases the quality of care within the health care industry, but also greatly increases medical costs. I have reviewed the economic literature on technological adoption theories and have examined the diffusion of the drug-eluting stent as a case study. I have examined the history of its development as well as how cost-effective studies on this device have impacted physician adoption decisions. I outline the reimbursement rate and pricing changes that occurred and consider the financial balancing act that needs to be addressed in the future.

◆ 72 ◆

*Humanizing Cardiac Troponins of Zebrafish*

**Chelsey Leffel**, Biology (2014)

Biology Research Fellows Program, Mulcahy Scholars Program

Mentored by F. Bryan Pickett, Biology

We created transgenic zebrafish by inserting human cardiac troponin genes into the zebrafish genome. The zebrafish contractile proteins, the troponins, will be altered to determine if Length Dependent Activation is altered. If LDA is changed by introducing mutant troponins, it will provide strong supporting evidence that troponin is one site of LDA regulation, and will provide more insight into the regulation of this important aspect of heart physiology.

◆ 73 ◆

*Teaching Culture: Integrating Culture Training with the Second Step Bullying Prevention Program*

**Britt Logan**, Psychology and Criminal Justice & Criminology (2013)

Research Mentoring Program

Mentored by Megan Polanin, Counseling Psychology Program Graduate Student

Recently, the problem of bullying has been at the forefront of discussions in schools and social media. It is a critical issue that must be addressed early in childhood. While many bullying prevention programs have been implemented in schools, there is limited empirical support for these programs. Further, cultural training has not been utilized as a mechanism to decrease bullying behaviors. This research focuses on integrating cultural training with Second Step, an established bullying prevention program, in a local elementary school. Researchers measured the effectiveness of Second Step and whether or not cultural training contributed to the program's effectiveness.

◆ 74 ◆

*Modeling Reassortment in Bacteriophage Phi 8*

**Jordyn Lucas**

Biology Research Fellows Program

Mentored by Catherine Putonti, Biology

The reassortment of segments in RNA viruses has proved to be a common pathway in the change of viruses. Various reassortment-modelling techniques have shown to be innovative in predicting certain RNA reassortment patterns. With the help of these models, viruses can be further understood and more easily predictable. By comparing

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one strain's lineage with another, a lot can be inferred about the environment's effect on the virus. While most models have been developed for reassortment events in viruses infecting humans, reassortment does occur within viruses infecting other animals, plants and bacteria. Due to different lifestyles of the host, different parameters must be considered. The goal of this research project is to design a model for reassortment within viruses infecting bacteria, also called bacteriophages, which are model laboratory systems for studying infection, transmission, and evolution of viral pathogens. We have developed a mathematical model implemented as a software solution to simulate reassortment within viral species. Coupled with empirical results, we can improve our understanding of how these species reassort and the impact of reassortment on viral fitness.

◆ 75 ◆

*Abundance and condition of invasive Asian clams (*Corbicula fluminea*) in an urban watershed*

**Ricardo Magallon**, Biology, Environmental Science (2013)

Center for Urban Environmental Research and Policy (CUERP) Undergraduate Research Fellows Program

Mentored by Timothy Hoellein, Biology

Invasive species are a significant environmental concern globally. We quantified the abundance and condition of *Corbicula fluminea*, an invasive freshwater clam, and its effect on nitrogen cycling in an urban and rural stream. In June 2012, we sampled 100 m reaches of each stream using a modified Hess Sampler approach. Samples were preserved in ethanol and macroinvertebrates sorted by hand. We identified each organism to family and measured organic carbon (as ash-free dry mass) for each family in each sample. The urban stream had more clams, less macroinvertebrate biodiversity, and a greater impact on denitrification than the rural stream.

◆ 76 ◆

*The Development of Folate-Targeted Photodynamic Therapy Agents*

**Katherine Mathewson**, Biochemistry (2015)

Women in Science Enabling Research (WISER) Program

Mentored by Kenneth Olsen, Chemistry and Biochemistry

The goal of the project is to develop new photodynamic therapy (PDT) agents that specifically target the rapidly dividing cells found in cancers. PDT utilizes light to excite a photosensitizer to produce reactive singlet oxygen species to kill the cancer cells. There is an over-expression of folate receptors in cancer cells. Our proposed agent will show a double selectivity in that it will specifically target cells that over-express folate receptors and it will have limited-area light exposure. The proposed research will test these hypotheses: (1) that using hemoglobin in the PDT complex can increase singlet oxygen production, (2) and that HeLa cervical cancer cell studies can be used to determine the effectiveness of the PDT agents.

◆ 77 ◆

*A Comparative Report of Residence Hall Sustainability at Loyola University Chicago*

**Allyson Matvey**, Political Science and Psychology (2013)

**Richelle Navarro**

Mentored by Ping Jing, Environmental Science

To analyze the sustainability of Residence Halls on campus, we randomly selected Marquette Hall and Campion Hall. Energy audits were compiled and energy intensities calculated in order to compare the energy efficiencies of the buildings. Researchers included suggested improvements for energy sustainability in their report.

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♦ 78 ♦

*From Pollution to Possibility: A Sustainable and Interdisciplinary Solution to Biodiesel Production Wastewater*

**Sarah McDowell**, Physics and Mechanical Engineering (2015)

**Katelyn Coghlan**, **Alex Dixon**, **Erin Ebbesmeyer**, Chemistry (2015); **Joseph Kamberos**, Environmental Science and Physics (2015); **Jennifer Kelso**, Biology/Environmental Studies (2015); **Dylan Kerr**, **Timothy Seed**, Environmental Science (2013); **Amber White**, Biology & C

Biodiesel waste water is currently being poured down the drain with many salts and free fatty acids, consequently at a very basic pH. This is dangerous to our environment and water management system. Therefore, we are finding ways in which we could neutralize and filter the biodiesel waste water through a sustainable system, making it safe to dispose down the drain. We propose using methods that include: recycled Carbon Dioxide, Salicornia (a salt-loving plant), a sand filter, and a few others. We plan on enlarging this sustainable system to be used in collaboration with the Biodiesel Lab at Loyola.

♦ 79 ♦

*Household Consumption and Living Standards in China*

**Tyler McWilliam**

Provost Fellowship

Mentored by Mine Cinar, Economics

Although China has experienced rapid growth in the past decade, macroeconomic indicators fail to identify if this has translated into an improvement in human well-being. Additionally, they fail to show whether this well-being has been uniform among different cities. This paper proposes that a survey of households in Beijing and Qingdao be conducted in order to help answer these questions. This would be conducted through qualitative interviews with a sample of households from May to August of 2012. The conclusions drawn from this research would help address the question of relative household welfare, as well as help to settle the dispute over whether income levels or expenditures are better indicators of general well-being.

♦ 80 ♦

*Identity Formation of Latino Immigrant Youth in a Community-School Partnership*

**Natalia Medrecki**, Psychology & Sociology (2013)

Research Mentoring Program

Mentored by Sophia Rodriguez, Cultural and Educational Policy Studies Graduate Student

This ethnographic study, a graduate student's dissertation, examines the identity formation process of Latino immigrant youth students in relation to community belonging, based on their engagement in school programs that are partnered with a community organization in Chicago. A part of this study involved a review of literature to establish a gap in previous research. Data that was examined in the initial stages of the research included: teacher surveys as part of a program evaluation for the schools. The results indicated students' overall performance improved based on their attendance. The results of this study will contribute to research on Latino immigrant youth and their layered identities, and the impact of participation in community-school partnerships on their identity formation.

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♦ 81 ♦

*Characterizing the ecology of bacterial biofilms within municipal drinking water distribution systems*

**Nicole Minalt**, (2015)

Mentored by John Kelly, Biology

Biofilms are complex communities of microorganisms attached to solid surfaces that are present in most aquatic habitats, including within the pipes that comprise municipal drinking water distribution systems. These pipes are not ideal habitats for bacteria, but municipalities in the United States regularly monitor their drinking water distribution systems for the presence of pathogenic microorganisms. Understanding the composition and function of these biofilm communities is important because recent research has shown that non-pathogenic biofilms may contribute to pathogen persistence by providing pathogens with protection from chemical disinfectant.

♦ 82 ♦

*Continuum simulations of oscillated granular layers: shocks and patterns*

**Stefanie Moertl**, Physics (2013)

**Alex Gilman**, Physics, Mathematics and Theoretical Physics (2015)

Mulcahy Scholars Program, Provost Fellowship

Mentored by Jon Bougie, Physics

We investigate vertically shaken granular systems using numerical solutions of continuum equations to Navier-Stokes order. We study the influence of shocks on pattern formation and propose a mechanism by which a non-uniform shock front drives standing-wave configurations. For a given layer depth and accelerational amplitude, varying driving frequency alters the shock strength as well as pattern wavelength; increasing layer depth produces stronger shocks and longer wavelengths for a given frequency. In this study, we express the proposed mechanism in terms of dimensionless variables and demonstrate empirically that these relationships can be successfully non-dimensionalized by layer depth and driving frequency.

♦ 83 ♦

*Homelessness in Chicago: A Study of Homeless Single Women*

**Iqra Mushtaq**, Economics and Anthropology (2014)

Center for Urban Research and Learning (CURL) Fellowship

About 5,000 people are homeless in Chicago each night. The City of Chicago's 10-Year Plan to End Homelessness aims to transform Chicago's homeless system from one that manages homelessness to one that ends homelessness. Our project seeks to understand how Chicago's Plan has affected Chicago's homeless single women. Methods included evaluation of data from Chicago's Plan: a qualitative study of homeless clients, a longitudinal client survey, and a program service inventory. Participants included single women (n=114) and single men (n=316). Analyses included descriptive statistics and frequencies of demographic traits, etiology of homelessness, and program services. Results indicated that there are differences pointing to a need for separate housing facilities for women.

♦ 84 ♦

*Nitrogen Removal in Jamaica Bay, New York Sediments*

**Bhavishya Narotam**, Biology (2013)

Mulcahy Scholars Program

Mentored by Domenic Castignetti and Timothy Hoellein, Biology,

Phytoplankton blooms from nitrogenous waste and consumes oxygen in aquatic ecosystems causing dead-zones. Oysters filter-feed plankton, convert  $\text{NH}_4^+$  into  $\text{NO}_3^-$ , which is reduced by denitrifying bacteria into  $\text{N}_2\text{O}$  or  $\text{N}_2$

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gas. This study examines denitrification in sediments from Mott's Basin, Jamaica Bay (NY) under four experimental conditions by screening for nirS or nirK genes that encode nitrite reductases and examine its relationship to oysters and clams. DNA was isolated from samples, amplified via PCR, analyzed through gel electrophoresis, and compared to controls. Denitrifying bacteria operate independently of oysters or clams and are an essential component of nitrogen pollution control.

♦ 85 ♦

*The Effectiveness of Irrigation Containers for Vegetable Gardening in an Urban Environment*

**Timothy Nickels**, Molecular Biology (2013)

Center for Urban Environmental Research and Policy (CUERP) Undergraduate Research Fellows Program

Mentored by Bree Sines, Biology

This study was designed to determine the impact of irrigation containers on plant productivity and water retention on the Mertz Terrace at Loyola University Chicago. Two types of reservoir bins were designed, built, and tested with three different vegetables at three different watering frequencies in the summer of 2012. We found that all vegetable bins were most productive when watered every four days, and the irrigation bins were superior in water retention and vegetable biomass production compared to the control at all three watering frequencies. These irrigation bins allow for drought-resistant urban gardens and provide a more aesthetically pleasing and productive terrace.

♦ 86 ♦

*Determining Correlation of the Production of Quorum Sensors and Siderophores in M. Loti*

**Jack Norris**, Biology (2014)

Mulcahy Scholars Program

Mentored by Domenic Castignetti, Biology

Quorum sensors are signaling molecules that function to communicate between bacteria and initiated population activities. Siderophores are compounds produced by bacteria, such as *Mesorhizobium loti*, in order to acquire iron from an environment that is iron limited. Our hypothesis is that siderophores may be regulated by quorum sensors causing the bacterial community to release them all at once in an iron gathering surge. Through various assays such as Chrome Azurol S assay, Thin Layer Chromatography assay, and O-nitrophenyl-beta-D-galactopyranoside assay we plan to track the behavior of *M. loti* in their production of QS related to their release of siderophores.

♦ 87 ♦

*Carbohydrate Microarray Synthesis for Pathogen Detection and Capture*

**Caleb Norton**, Biology (2013)

Mulcahy Scholars Program

Mentored by Becker, Daniel, Chemistry

The ability to determine the specificity of certain bacteria binding to cells in the human body is critical in understanding the development of pathogenic infection in a human host and specific interactions can be employed for detecting harmful bacteria to ensure food safety. Specific synthetic carbohydrates can be plated onto a gold surface. We create these microscopic assays with aligned carbohydrates on the gold surface utilizing a technique called dip-pen nanolithography (DPN). They are called Self-Assembled Monolayers (SAMs). These carbohydrate SAMs provide the opportunity to detect and image specific binding patterns of different types of bacteria with specific carbohydrates.

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♦ 88 ♦

*A Political & Economic Overview Of The Dutch Disease In Canada*

**Austin Nugent**, Finance, Economics, and International Business (2013)

Mentored by Marc Hayford, Economics

We often hear nations being called “blessed” due to their vast amount of natural resources. However, natural resources can be a double edged sword, capable of wreaking havoc on a country’s traditional exporting industries through what is called the Dutch Disease. Many believe our northerly neighbors to show signs of this ailment, since over the last ten to fifteen years the Canadian dollar appreciated, resource development is on the rise, and scores of manufacturing workers have faced unemployment. This research endeavor examines whether Canada has in fact contracted the Dutch Disease, and if so, how to remedy the situation.

♦ 89 ♦

*Nitrogen Metabolism and Bioremediation Potential of C. Pauculus*

**Jennifer Obrzydowski**, Biology (2013)

Mulcahy Scholars Program

Mentored by Domenic Castignetti, Biology

*C. pauculus* belongs to a metal-resistant genus able to degrade pollutants and could be used as a bioremediation agent. However, *C. pauculus* is also a heterotrophic denitrifier and may release harmful intermediates such as nitrous oxide gas (N<sub>2</sub>O). We conducted several experiments to monitor NO<sub>2</sub><sup>-</sup>, N<sub>2</sub> gas, and N<sub>2</sub>O gas production of *C. pauculus*. A second set of experiments was designed to determine if *C. pauculus* can metabolize pyruvic oxime in the presence of Ni<sup>2+</sup> and Cu<sup>2+</sup>. We are now working on devising an experiment in which we closely monitor *C. pauculus* strain P2’s degradation of the harmful insecticide metabolite, TCP.

♦ 90 ♦

*Diminishing Relationship Insecurities: Narcissism, Acceptance, and Implicit Self and Partner Evaluations.*

**Melissa Orozco**, Psychology (2013)

Provost Fellowship

Mentored by Tracy DeHart, Psychology

High levels of narcissism have been associated with negative relationship outcomes, including lower levels of commitment. The purpose of the current study is to explore whether activating feelings of acceptance (vs. control condition) within a romantic relationship will increase implicit (i.e., unconscious) self evaluations and evaluations of romantic partners for people with high levels of narcissism. We predict that after acceptance those higher in narcissism will implicitly evaluate their partners and the self more positively than those with lower narcissism. However, in the control condition, we predict that people who are higher on narcissism will report more negative implicit evaluations of their partner and the self. Because an unsatisfactory romantic relationship may negatively impact people’s overall health, this study seeks to explore ways to improve relationship functioning for people with high levels of narcissism.

♦ 91 ♦

*Creating a Hemoglobin-Based Blood Substitute Using a PEG Multi-linker*

**Abigail Otto**, French (2014)

Mulcahy Scholars Program

Mentored by Kenneth Olsen, Chemistry

The proposed research will produce a potential hemoglobin-based nanoparticle blood substitute. The proposed procedure will first produce a cross-linked bovine hemoglobin tetramer using methods previously developed in the

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Olsen laboratory. Up to eight of these XLHb molecules will then be linked together with a maleimide-PEG polymer via the thiol groups, which will increase the chain's size and its affinity to oxygen. The increase in size should prevent the vasoconstriction that is observed with smaller hemoglobin-based blood substitutes. Since both the initial cross-linking and the modification of the thiol group produce high oxygen affinity hemoglobin, the proposed hemoglobin nanoparticle should only deliver oxygen to hypoxic tissues.

♦ 92 ♦

*Evaluating Early Childhood Education: The Economic Impacts of the Federal Head Start Initiative*

**Andrew Palmer**, Economics and Mathematics (2014)

**Joseph Johnson**

Mentored by Timothy Classen, Economics

Project Head Start is a federal initiative that provides early childhood education and other associated services to low-income children and their families. Given Head Start's \$7 billion annual budget serving almost 1 million children, questions of the effectiveness of this program is vital to the success of future generations of students. Our paper evaluates the long-term life outcomes of children in Head Start to identify any positive effects of the program. We use the National Longitudinal Survey of Youth as our sample population, controlling for various factors including race, gender, socioeconomic status, neighborhood demographics, and parental education.

♦ 93 ♦

*Hydrodynamic Simulations of Density Inversion in Granular Layers*

**Joshua Panfil**, Physics, Theoretical Physics and Applied Mathematics (2013)

**Farheen Syeda**, Physics (2014)

Mulcahy Scholars Program, Provost Fellowship

Mentored by Jon Bougie, Physics

We model density inversion, in which a higher density region sits atop a lower density, gas-like region below, in vertically shaken granular layers using a set of three-dimensional, time-dependent granular hydrodynamics equations. For a range of shaking amplitudes and frequencies, we numerically solve these time-dependent differential equations for mono-disperse, frictionless, nearly elastic particles. Steady-state density inversion occurs for high accelerational amplitudes of the plate. For lower accelerational amplitudes, we observe time-dependent motion correlated to the movement of the plate. We investigate the transition from cyclic time-dependence to steady-state density inversion and compare results from these simulations to molecular dynamics simulations.

♦ 94 ♦

*Preliminary characterization of inflammasome inhibitor POP1 mouse model*

**Rajul Patel**, Biology (2013)

Mentored by Jeanine Seitz-Partridge, Biology

Inflammasomes are multi-protein complexes in macrophages that modulate innate immune responses through production of the inflammatory cytokines IL-1, IL-18 and HMGB1 via caspase-1. POP1 has emerged as an inflammasome-regulatory candidate. POP1 belongs to the PYD-only proteins (POPs) that can function as inflammasome inhibitors in vitro by disrupting inflammasome assembly. POP1 is encoded in humans but is lacking from the mouse genome. Therefore we generated macrophage-specific POP1 expressing transgenic and our data demonstrate that POP1 is a specific inhibitor of inflammasome-mediated activation of caspase-1 and subsequent processing and secretion of IL-1 in vivo.

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♦ 95 ♦

*From Invasives to Energy: Methane Production Potential of Invasive Plant Species and Food Waste*  
**Tapas Patel**, Biology (2014)

Great Lakes coastal wetlands have become dominated by invasive plant species resulting in declining biodiversity. Burning and herbicide are common management techniques for invasives, however burns release CO<sub>2</sub> into the air while herbicide treatments recycle nutrients into overloaded systems. The objectives are to harvest invasive plants and test each species' methane production potential. Produced methane can be used as renewable energy. Plant material, placed in anaerobic flasks containing sludge, will be digested for 28 days, when gas production levels will be recorded and samples collected for analysis. This research seeks to find methods to produce energy while restoring invaded wetlands.

♦ 96 ♦

*Conflict Monitoring in Political Liberals and Conservatives*  
**Nirav Patel**, Social Psychology (2013)  
Mulcahy Scholars Program, Provost Fellowship  
Mentored by Robert Morrison, Dane Wendell, Psychology, Political Science

Cognitive neuroscientists have begun to investigate neural differences in cognitive processing that may help explain differences in political ideology. A previous study involving college students suggested that conflict monitoring, as regulated by the anterior cingulate cortex, may differ based on self-identified political ideology. In this study we identified non-student adults who were strong liberals or conservatives based on several different self-report measures. These individuals completed a Go-NoGo task in the laboratory while we monitored their brain waves using EEG. Preliminary results show that political liberals and conservatives differ in patterns of conflict monitoring during response inhibition.

♦ 97 ♦

*Manipulating TAK1: Understanding bone marrow failure with genetic tools*  
**Christian Perez**, Molecular Biology (2013)  
Research Mentoring Program  
Mentored by Andrew Volk, Oncology Department Graduate Student

Leukemia is a blood cancer that affects 1 in 254 Americans. Most available treatments for leukemia take significant tolls on healthy blood tissues. Our goal in this project was to understand what factors are required for the survival of healthy blood tissue in order to develop better anti-leukemia therapies. We determined that a gene called TAK1 is critical for healthy blood tissue survival, and that enhancing TAK1 levels in blood cells makes them susceptible to inflammation-mediated killing. We conclude that future leukemia treatments must be able to kill malignant cells while preserving the TAK1 signaling pathway in healthy blood cells.

♦ 98 ♦

*The Effects of the Civic Engagement Curriculum on Urban Youth:  
The Moderating Role of Ethnic Identity*  
**Andrew Perrotte**  
Provost Fellowship  
Mentored by Maryse Richards, Dakari Quimbui, Psychology

African-American adolescents living in low-income, urban communities experience life stressors, requiring the need to develop protective factors to better cope with their environment (Grant et al., 2000). Ethnic identity development has been associated with African-American youth's development of positive coping strategies, self-esteem,

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and a sense of belonging in the community (Mandara, Gaylord-Harden, Richards, & Ragsdale, 2009; McMahon & Watts, 2002). This study examined the moderating effects of ethnic identity on youth outcomes of leadership, self-esteem, initiative, and coping for adolescent students participating in the Civic Engagement Curriculum (CEC). The CEC aims to increase identity development and empowerment in youth, resulting in positive community changes/involvement (Richards, Sanderson, Celio, Deane, Choi, & Grant, 2013). These results demonstrate that participants high in assimilation, and those high in nationalism were more strongly affected by the CEC intervention.

◆ 99 ◆

*Say What!?: Content Analysis of Men's Responses to Confrontation for Sexism Over Instant Message*

**Rachael Peterson**, Psychology (2014)

Research Mentoring Program

Dana E. Wagner, Psychology Graduate Student

When imagining being confronted, men often expect to react harshly. However, men's responses to actual confrontation are not fully understood. In this study, men discussed moral dilemmas over instant message with a female research assistant. At the end of the dilemmas, men were either confronted for sexism or a gender-neutral offense (generating an uninformed idea). Researchers found that men were equally likely to respond to her regardless of confrontation-type. In terms of response content, men demonstrated both positive and negative reactions. Interestingly, men who were confronted as sexist explained themselves and apologized more than men confronted in a gender-neutral manner.

◆ 100 ◆

*Developing a Sense of Place at LUREC by Investigating Its Past*

**Alexandria Peterson**, Anthropology (BS) and Classical Civilizations (BA) (2014)

**Julia Lechowicz, Jasmine Lanton, Blessy Samuel**

Mentored by Daniel Amick, Anthropology

In the summer of 2012, Dr. Daniel Amick of the anthropology department conducted an archaeological field school at Loyola University's Retreat and Ecology Campus (LUREC). The field school was designed to teach students archaeological excavation techniques as well as to develop a sense of understanding about the site in historical, environmental, and archaeological senses.

◆ 101 ◆

*Family Visits for Children and Families in Foster Care*

**Baltazar Pizano**, Accounting and Finance (2015)

**Tania Velazquez**

Provost Fellowship

Mentored by Lina Muñoz, School of Social Work Graduate Student

The foster care system was designed to be a temporary placement while children wait to return to their parents. A permanency plan must be established for all children in care, stating clear goals for a permanent living arrangement to facilitate a child's reunification with their family. This research intends to explore family visitation services, particularly how decisions are made by caseworkers regarding the place, frequency, length of time, supervision, and intervention when planning and implementing parent-child mandated contact. A qualitative study, it includes in-depth interviews with caseworkers as well as surveys completed by their supervisors at state welfare agencies.

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◆ 102 ◆

*Development and Validation of the Critical Processing of the Media Scale*

**Jori Rappaport**, Psychology (2015)

Provost Fellowship

Mentored by Scott Leon, Ashley Rolnik, Psychology

This study aims to develop a scale to quantitatively assess women's critical processing of the media. Initially, we conducted a focus group with seven women to develop scale questions, also consulting the literature and experts in the field. For the first two waves, participants were recruited from the Introduction to Psychology pool. In the first wave, 132 participants were given a set of 47 questions. A factor analysis was conducted to shorten the item pool. For the second wave, participants were given a refined set of twenty questions. A final wave of data will be collected to validate this measure.

◆ 103 ◆

*Recognizing Prefixes and Suffixes in Reading.*

**Jordan Rashid**, Psychology (2013)

Mentored by Anne Sutter, Psychology

This word-recognition experiment is an investigation of how information about prefixes and suffixes are processed when we read. The topic of interest is how and when the processing of prefixes and suffixes is affected by syntactic or semantic information. We used a two-experiment investigation into the effects of semantically and syntactically priming verbs and nouns in a forced-choice lexical decision task. Participants were exposed to target letter strings preceded by a syntactic or semantic prime and were then asked to decide if the letters formed a word. The target words differed in grammatical class (noun or verb) and whether each contained an affix or not.

◆ 104 ◆

*The Impact of Mood on the Conjunction Fallacy*

**Cara Ray**, Psychology (2013)

Provost Fellowship

Mentored by Jeffrey Huntsinger, Psychology

Past research apparently showed that happy moods promote superficial, heuristic processing, thus increasing susceptibility to cognitive errors in decision-making, while sad moods promote systematic processing. More recent research indicates that moods merely signal the value of accessible processing styles. The current project examined flexibility in the link between emotion and decision-making, particularly the extent to which people fall prey to the conjunction fallacy. Consistent with predictions, happy participants were more likely than sad participants to commit this fallacy when heuristic processing was primed. When systematic processing was primed, happy participants were less likely than sad participants to commit this fallacy.

◆ 105 ◆

*Technology: The Information Medium of Choice of Today's American Pregnant Woman*

**Betsy Redelman**, International Studies (2013)

Mentored by Benjamin Penglase, Anthropology

Modern technology like the internet and medical ultrasonography has become integrated into the pregnancy practices of nearly all American women, reshaping the experience of childbirth. By interviewing women (currently or previously pregnant), I sought to answer the following questions: how is technology impacting the modern-day

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American woman's pregnancy? What sorts of resources are women using to gather information about birth and motherhood while pregnant? And, how are women using ultrasound technology today? I show that American women are utilizing online resources and forums about pregnancy at a correlative rate with their access to the internet. I examine how the role of the ultra-sound has changed from only being used in high-risk births to being perceived as a routinely scheduled procedure in order to determine the sex of the fetus. I conclude that technology is altering the social context of childbirth, as online resources are often replacing the knowledge previously obtained orally by female relatives or friends, and as receiving a sonogram has become a part of the ritual of being pregnant in America.

◆ 106 ◆

*Evolution of Molecular Compatibility and Virulence in Novel Hosts*

**Krista Reiling**, Biology (2013)

Carbon Undergraduate Research Fellowship Program

Mentored by Cather Putonti, Biology, Computer Science

Because viruses with smaller genomes lack tRNAs, they rely on their host for protein synthesis and often utilize codons preferred by their host species to increase translational efficiency. Previous work shows attenuated viruses are under strong selection to incorporate more host-preferred codons. However, the exact process by which such adaptations are initiated is not well understood. An attenuated bacteriophage  $\Phi$ X174 has been engineered, replacing several host-preferred codons with synonymous codons having a lower preference and tRNA abundance within the host. This interaction between  $\Phi$ X174 and its host, *Escherichia coli* C, serves as a model and is applicable to a wider range of virus-host systems.

◆ 107 ◆

*A Phylogenetic Analysis of HIV-1*

Catherine Putonti<sup>1,2,3</sup>, Steven Reisman<sup>1,2</sup>, George Thiruvathukal<sup>3</sup>

<sup>1</sup> Department of Biology, <sup>2</sup> Bioinformatics, <sup>3</sup> Computer Science, Loyola University Chicago, Chicago, IL

**Steven Reisman**, Bioinformatics/Biology (2013)

Mentored by Catherine Putonti and George Thiruvathukal, Bioinformatics, Biology, Computer Science

RNA-interference has potential therapeutic use against HIV-1 by targeting highly-functional mRNA sequences that contribute to the virulence of the virus. Empirical work has shown that within cell lines, all of the HIV-1 genes are affected by RNAi-induced gene silencing. While promising, inherent in this treatment is the fact that RNAi sequences must be highly specific. HIV, however, mutates rapidly, leading to the evolution of viral escape mutants. In fact, such strains are under strong selection to include mutations within the targeted region, evading the RNAi therapy and thus increasing the virus' fitness in the host. Taking a phylogenetic approach, we have examined 3000+ HIV-1 strains obtained from NCBI'S database for each of the HIV genes, identifying conserved regions at each hypothetical and operational taxonomical unit within the tree. Integrating the wealth of information available from each genome's record, we are able to observe how conserved regions vary with respect to their distribution throughout the world. This was made possible through the development of a new software tool, developed such that similar analyses can be conducted for any species or gene of interest, not just HIV-1. In addition to the phylogenetic signal which we can recognize from the HIV-1 genomes examined, we can also identify how selection varies across the genome. Taking this evolutionary approach, we have detected regions ideal for targeting by RNAi treatment.

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◆ 108 ◆

*Threats to Belonging Influence the Motivations to be Respected and Liked following Sexist Questions*

**Lenel Reuther**, Psychology (2013)

Provost Fellowship

Mentored by Robyn Mallett, Psychology

According to United States law, "reasonable" people filing discrimination complaints are expected to respond assertively when confronted with sexism. However, assertive responses are rare, and failure to conform to the "reasonable person" standard can lead others to believe that sexism didn't occur or that it was welcomed. This study investigates the impact that threatening or affirming belonging has on the assertiveness of a woman's response to sexist or surprising questions in a mock interview. We found that when belonging was affirmed (vs. threatened), women who viewed sexist questions were more motivated to seek respect than those who viewed surprising questions.

◆ 109 ◆

*The Effect of Attachment on Implicit and Explicit Self-Esteem*

**Tracey Riley**, Psychology (2014)

Mentored by Scott Leon, Psychology

Attachment to mothers and fathers and their interaction with participant gender was used to predict implicit self-esteem and explicit self-esteem. Attachment to both parents was positively associated with explicit self-esteem, but only father attachment was associated with implicit self-esteem, moderated by gender; attached males had the highest levels of implicit self-esteem. Implications are discussed.

◆ 110 ◆

*The Correlation Between the Production of Siderophores and Quorum Sensors in M. loti*

**Sylwia Rychtarczyk**, Biology (2013)

**Jeremy Guerrero**, Molecular Biology (2013)

Mulcahy Scholars Program

Mentored by Domenic Castignetti, Biology

Siderophores are small, high-affinity iron chelating agents secreted by bacteria and fungi when grown under iron stress. Quorum sensing is a way bacteria use to control certain responses. Siderophores, and one class of quorum sensors (QS), N-acyl homoserine lactones (AHLs), are suggested to play roles as chemical signals for communication. Our hypothesis is that both QS and siderophores are produced in an iron starved environment by our bacterium (*Mesorhizobium loti*). If this study confirms that bacteria in iron deficient environments communicate with each other via QSs to produce siderophores, this will allow for a possible way to control bacteria.

◆ 111 ◆

*Behavioral and Electrophysiological Predictors for Alzheimer's Disease*

**Izabelle Rymut**, Biology (2014)

Mentored by Robert Morrison, Department of Psychology and Neuroscience Institute

Amnesic Mild Cognitive Impairment (aMCI) is a diagnostic category used to identify people at risk for developing Alzheimer's disease (AD). In past studies, executive function tasks have been useful in predicting which aMCI patients go on to develop AD. In this study we used rule-based category learning, a task dependent on executive functions and areas of the brain implicated in AD, to test neuropsychologically typical older adults and aMCI

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patients. Preliminary results suggest that the ability to task switch may predict success on the category learning task for aMCI patients, but not normal older adults.

◆ 112 ◆

*Social Networking Sites and Social Comparison Processes*

**Michael Ryva**, Psychology (2013)

Mentored by Linda Heath, Psychology

The purpose of this study is to examine social comparison processes as they occur on social networking sites (SNSs). Social comparison theory is a process in which people seek others as targets for feedback in situations of uncertainty. Downward comparison involves comparison with less fortunate others. As a result, one can boost his or her self-evaluations. Upward comparison involves comparison with a better individual and can be threatening to self-evaluations. SNS Profiles will be fabricated to elicit comparisons. This study investigates whether or not social networking sites elicit social comparisons and what the possible consequences of making comparisons.

◆ 113 ◆

*Hispanic and Latino Caller Statistics at a National Youth Crisis Hotline*

**Michael Ryva**, Psychology (2013)

Mentored by Michelle Vos, Volunteer Coordinator at the National Runaway Safeline

The National Runaway Safeline (NRS) is a national phone hotline for runaway, homeless, and at risk youth. Each incoming call is carefully documented for demographics and details of what was discussed in the conversation. This data allows NRS to compile annual statistics on all of their callers. However, NRS has not yet examined differences in call statistics between races/ethnicities. The purpose of this project is to examine call statistics of Hispanic/Latino callers in comparison to African American, European American (Caucasian), Multi-racial, and Other callers. Several variables will be compared and discrepancies between the groups will be addressed.

◆ 114 ◆

*The Synthesis of Phenothiazine Based Photosensitizers: A Possible Cure for Cancer*

**Shermin Sayani**, Chemistry (2013)

Mulcahy Scholars Program, Provost Fellowship

Mentored by David Crumrine, Chemistry

Photodynamic therapy is a cancer treatment that involves the administration of a photosensitizer that localizes in tumor cells. When the photosensitizer is exposed to a specific wavelength of light in the presence of ground state oxygen, it produces activated oxygen that kills nearby cells. Currently, most photosensitizers tested collect with some selectivity in tumors cells, but they also amass to some degree in normal tissues. A possible way to increase selectivity involves the use of heavily substituted photosensitizing agents. The synthesis of such an agent is the objective of this experiment. This synthesized photosensitizer will attach to a linker group with folic acid that will together attack the folate receptors overexpressed in cancer cells. A reaction scheme to synthesize the substituted photosensitizer has been developed and is currently in progress.

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♦ 115 ♦

*Expression of thioredoxin-like proteins in gametocytes of the human malaria parasite Plasmodium falciparum*

**Ashley Schon**, Molecular Biology (2013)

Carbon Undergraduate Research Fellowship Program

Mentored by Stefan Kanzok, Catherine Putonti, Biology

*Plasmodium falciparum* is parasitic pathogen that causes the onset of Malaria in humans. Research has focused on the asexual stages of development throughout the parasite's lifecycle. However, little is known about the process of gametocytogenesis, which produces mature, sexually competent gametocytes. These gametocytes then proceed from human host to mosquito where they continue reproduction and thus further transmission of the disease. Our research focuses on the process of gametocytogenesis in *P. falciparum*, and the antioxidant proteins it uses to survive against an oxidative and stressful environment to see how survival for further transmission is achieved. Current investigations are centered around Thioredoxin (Trx-1) and a novel protein candidate 1-cys Prx (600). Laser assisted confocal microscopy is being used with protein specific antibodies to establish the location and association of these systems in *P. falciparum*.

♦ 116 ♦

*Diagram Algebras: Combinatorics and Representations*

**George Seelinger**, Mathematics and Computer Science (2015)

Mulcahy Scholars Program

Mentored by Stephen Doty, Aaron Lauve, Jointly in Mathematics & Statistics and in Computer Science, Mathematics & Statistics

This presentation will provide a brief overview of the background behind Brauer algebras and other diagram algebras. These form a vast extension of the notion of a symmetric group and include the algebra of Temperley–Lieb (a powerful tool in thermodynamics in physics). We conclude by introducing the objects we are studying, the “permutation modules” of Brauer algebras. We are looking for their basic building blocks (indecomposable submodules) to better understand their structure.

♦ 117 ♦

*Investigation into G Protein Folding*

**Colin Senfelds**

Mulcahy Scholars Program

Mentored by Duarte Freitas, Chemistry

The protein  $G_{i\alpha 1}$  is an inhibitory guanine nucleotide binding protein (G-protein), a type of protein found in cell membranes that are essential to many signal transduction pathways within the cell. The inactive form of  $G_{i\alpha 1}$  is bound to guanosine 5'-diphosphate (GDP). Upon activation, GDP dissociates and is replaced by guanosine 5'-triphosphate, which inhibits the production of cyclic adenosine monophosphate and leads to deactivation of protein kinase A, a promoter of many cellular functions. Alteration of the G-proteins' folding in such a way as to stabilize either the active or inactive form leads to cancer, pertussis, and other many diseases. Thus this study has been focused on investigating the folding  $G_{i\alpha 1}$ .

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♦ 118 ♦

*Finding Desferrioxamine B Producing Genes from Mesorhizobium loti Mutants*

**Jhanvi Shah**, Biology (2013)

Mulcahy Scholars Program

Mentored by Domenic Castignetti, Biology

Bacterium *Mesorhizobium loti* uses desferrioxamine B (DFB), a type of siderophore, as its sole source of carbon. In low iron environments, microbes release siderophores to search for iron that can be obtained through active transport. Without these siderophores, bacteria cease growth. The insertion of a transposon, Tn5:OT182, disrupted the growth of DFB production in the wild-type *M. loti*, creating mutants 42 and 34, which are unable to use DFB as the source of carbon. The goal is to determine the genes that were disrupted by the insertion of Tn5. This experiment is useful for future experiments regarding siderophores in pathogenic bacteria.

♦ 119 ♦

*Analysis of hexavalent chromium in serum and lacrimal fluid by anion chromatography*

**Reena Shah**, Biology (2014)

Mentored by Katrina Binaku, Chemistry Graduate Student

Analysis of hexavalent chromium, or Cr(VI) was completed to detect Cr(VI) in body fluids, such as blood serum or lacrimal fluid. Hexavalent chromium is a carcinogen to the human body; for example, direct eye contact with chromic acid or chromic dusts can cause permanent eye damage. To detect and quantify chromium (as the chromate anion) present in samples, ion chromatography was used. This technique separates ions based on their charges and size. An ion chromatograph (IC) detects chromate levels in a specific sample using a conductivity detector. We analyzed several standard solutions of known concentrations of Cr(VI) on the IC and constructed a calibration curve, which can be used to determine the concentrations of chromium in unknown substances, such as blood serum or lacrimal fluid.

♦ 121 ♦

*The Birefringent Properties of Cells*

**Adem Shuaipaj**, Biology, Psychology (2014), **Indre Aleksaite**, **Jamie Chin**, Biophysics (2013); **Ayub Mohiuddin**, **Parita Patel**, Biology (2014); **Rushal Patel**, Biology & Psychology (2013); **Monika Singh**, Psychology (2013)

Mentored by Robert Polak, Physics, Biology

Eukaryotes as well as parallel plant cells display birefringent properties in their microtubules, spindles, secondary cell walls and overall in plant cells due to cellulose. Eukaryotes show similar birefringent patterns as do prokaryotes. The cells walls of plant cells are curved in such a way forming a similar figure as a liquid crystal. We have examined the structure as well as the composition of Eukaryotes ranging from plant cells to human kidney and cheek cells. We also observed the birefringent properties of prokaryotes including *E. coli*, *Bacillus subtilis*, *Micrococcus luteus* and *Rhodospirillum rubrum*. This led to the studying of their birefringent properties from a structural, physical and biochemical perspective. We designed a program to calculate the amount of light passing through *E. coli* using Jones calculus. This model of calculating birefringence is based after the birefringence observed in radial liquid crystal droplets and in plant cells with an ordinary index of refraction is parallel to the surface normal and an extraordinary index which is perpendicular to the surface normal. This model will be compared with microscopy images of *E. coli* and other cells in polarized light.

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♦ 122 ♦

*Increased P2-N2 Event-Related Potential Response in Older Individuals with Exceptional Memory Function*

**Rebecca Shukhman**, Psychology (2013)

Mulcahy Scholars Program

Mentored by Robert G. Morrison, Psychology

SuperAgers are individuals over the age of 80 who show exceptional long-term memory for their age. They have previously been shown to have thicker left anterior cingulate cortices (ACC) than similar-aged older adults with age-typical memory. In this study we used a Go-NoGo task with EEG to specifically measure ACC function. SuperAgers showed an enhanced P2-N2 event-related potential (ERP) as calculated from their EEG recordings. Importantly, the magnitude of the P2-N2 ERPs were correlated with their long-term memory performance, suggesting that structural and functional differences in the ACC may be related to their exceptional long-term memory.

♦ 123 ♦

*African American Couples Daily Diary Study: The Relationship between Perceived Racial Discrimination and Romantic Relationship Functioning in African American Couples*

**Tameer Siddiqui**, Psychology: Natural Sciences (2013)

Mentored by Tracy DeHart, Psychology

In this study, we will be examining the relation between perceived discrimination and romantic relationship functioning (perceived regard, satisfaction, closeness). A sample of 150 African American couples will complete measures of stigma consciousness, perceived discrimination, and romantic relationship functioning. It is hypothesized for African American participants high in stigma consciousness, perceived discrimination will be negatively related to romantic relationship functioning. In contrast, for African American participants low in stigma consciousness, perceived discrimination will be unrelated to romantic relationship functioning. Thus, this finding allows us examine the dynamics in the context of African American couples' daily lives-determining what effects discrimination has on the self and how these impact their partners' relationship functioning. Given the importance of people's close relationships to healthy functioning, insight into these questions will add to current understanding of the race-related stress process and aid in the development of relationship therapies tailored for African American couples.

♦ 124 ♦

*Mutational analysis of transcription factors related to malaria transmission*

**Lacy Simons**

Mentored by Kim Williamson and Crystal Magle, Biology

*Plasmodium falciparum*, a causative agent of malaria, infects millions and kills hundreds of thousands per year. Knowledge concerning the regulation of gene expression during development of the parasite's transmission form (the gametocyte) is limited. Apicomplexan ap2 (ApiAP2) domain-containing transcription factors were identified in the *Plasmodium* genome, including, PFL1085w, which is mutated in a gametocyte deficient *P. falciparum* line. This project aims to detect PFL1085w mutations in other gametocyte deficient lines by DNA sequencing. Our results indicate that PFL1085w is highly conserved across all tested strains, showing that PFL1085w mutations are not responsible for gametocyte development deficiencies in the strains tested.

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♦ 125 ♦

*Allosteric Mechanisms and Dynamics of ADP-Glucose Pyrophosphorylase*

**Ligin Solamen**, Bioinformatics (2014)

Mulcahy Scholars Program, Women in Science Enabling Research (WISER) Program, Provost Fellowship

Mentored by Kenneth Olsen and Miguel Ballicora, Chemistry

Adenosine-5-Diphosphate Glucose Pyrophosphorylase (AGPase) is an allosteric enzyme that is involved in the regulatory step of the biosynthesis of glycogen in bacteria and starch in plants. These polymers are the main sources of energy in the organisms. AGPase is the catalyst in the rate limiting reaction between ATP, an energy source, and Glucose-1-Phosphate (G1P). By analyzing the allosteric communications and the enzymatic activity, we can possibly suggest a more efficient method of starch and glycogen synthesis. Single residue virtual mutations are generated in highly conserved regions of the E.coli enzyme; molecular dynamic simulations are then performed.

♦ 126 ♦

*Discussing the Apparent Alkyl Transfer and Phenazine Formation via an Aryne Intermediate*

**Elizabeth Spaargaren**, Biology (2014)

Mulcahy Scholars Program, Provost Fellowship

Mentored by Daniel Becker, Chemistry

Through work with N3-CTV, a modified version of the known cyclophane CTV, our group has discovered products of alkyl-shifted phenazine derivatives, rather than the expected 9-membered triazaorthocyclophane when treating chlorotriaryl derivatives or fluorotriaryl derivatives with potassium diisopropylamide. These phenazine derivatives produce at high yields, with varying reaction rates and intermediates, including the aryne intermediate, with the presence or absence of halogens and alkyl groups. Without halogenated phenazine derivatives, the shift proceeds more slowly and does not result in an aryne intermediate. The mechanistic possibilities of this aryne intermediate will be discussed.

♦ 127 ♦

*What Can I Do?: Waste Reduction Education on Campus*

**Aerielle Springer**, **Astra Dabolins**, Environmental Science (2014); **Samuel Gold**, **Richard Greenfield**, Biology (2013); **Jenna Hille**, Psychology (2013); **Maxwell Lehmann**, Biology (2013); **Roksana Nedjat**, Psychology (2013); **Vishal Patel**, Biology (2013)

Mentored by Schusler, Tania, Environmental Science

Our project is create a video and accompanying PowerPoint that can be placed on the Office of Sustainability website and can be shown to incoming students that focuses on the current efforts on Loyola University Chicago campuses to reduce waste and how they can get involved.

♦ 128 ♦

*Network Technologies used to Aggregate Environmental Data*

**Paul Stasiuk**

Mulcahy Scholars Program

Mentored by Konstantin Laufer and George Thiruvathukal, Computer Science

A discussion on the benchmarking of different data exchange frameworks when applied to collecting and aggregating environmental data.

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♦ 129 ♦

*Positive Outcomes for Youth: Grit and Self Worth among Low Income, Urban, Ethnic Minority Girls*

**Elisabeth Stewart**, Psychology (2013)

Mentored by Amy Bohnert, Psychology

This study examined (1) age and ethnic differences in grit, (2) the relation of grit and self worth, and (3) moderating effects of age and ethnicity on that relation in a sample of low income, urban, minority girls. Grit is defined as perseverance and passion for long term goals, and along with socioemotional factors such as self worth, grit has been highlighted as a possible facilitator of better youth outcomes (Duckworth et al., 2007). Correlational analysis showed a significant positive relation between grit and self worth. Results suggest grit and self worth may work together to facilitate better outcomes.

♦ 130 ♦

*Juvenile probation officers' schemata of delinquents*

**Jacob Stolz**, Psychology (2014)

Provost Fellowship

Mentored by Arthur Lurigio, Criminal Justice, Psychology

This project serves as a replication of a 1985 study conducted by Lurigio and Carroll about probation officers' schemata of offenders. The amount and nature of juvenile probation officers' schemata were investigated in an attempt to improve their decision-making processes. In contrast to the study conducted by Lurigio and Carroll, the project focused on the schemata of juvenile probation officers of juvenile delinquents. The researchers conducted qualitative interviews in order to identify schemata that probation officers have of juvenile delinquents. The study also identified key differences in the ways in which male and female probation officers develop schemata.

♦ 132 ♦

*Nonviolent Communication: An ethnographic comparative analysis of Tibetan Buddhist "Dependent Origination" & South African "Ubuntu"*

**Claire Surma**, Communication Studies & International Studies (2013)

Provost Fellowship

Mentored by Elizabeth Lozano, Communication Studies and International Studies

This two-phase international study compared two culturally-specific concepts, Tibetan Buddhist "Dependent Origination" and tribal South African "Ubuntu." Both of these concepts a) highlight humanity's interconnectedness and b) support and advocate for nonviolent action. Specifically, the study focuses on devotees' understanding and practice of these concepts at a personal daily level. In-depth interviews and observations were conducted with participants who had experienced violence firsthand while living in Tibet during the Chinese Invasion and South Africa during the end of Apartheid. Participants included Tibetan Buddhist monks in Rogers Park, Chicago and Christian theologians in Cape Town, South Africa. The research findings suggest that both Dependent Origination and Ubuntu promote a similar understanding of humanity, but are not parallel. While the first emphasizes compassion and non-duality, the latter emphasizes reconciliation and communalism. Questions and suggestions for further inquiry are proposed.

♦ 133 ♦

*Emerging Nations' Healthcare Coverage - Organization of Healthcare in Brazil and India*

**Darshan Thakkar**, Accounting & Finance (2013)

Mentored by Mine Cinar and Mary Malliaris, Quinlan School of Business

This is a comparative study containing information about current healthcare organization and infrastructure in place in Brazil and India, and subsequently, opportunities for improvement in both countries. As the economies of

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both of these nations have grown significantly in the past decade, this study aims to look at some of the repercussions and/or changes that have occurred in the respective healthcare systems as well as the changes in consumer access to healthcare. Accordingly, the main topics covered are healthcare system, insurance and healthcare coverage, and statistical data on the effectiveness of systems in place.

♦ 134 ♦

*Two-Dimensional Order Analysis in Escherichia coli Colonies*

**Derek Thayer**, Biophysics (2013)

**Ines Kusmic**, Physics (2013); **Parita Patel**, Biology (2014); **Rushal Patel**, Biology and Psychology (2013);

**Adem Shuaipaj**, **Monika Singh**, Psychology (2013)

Mentored by Robert Polak, Physics

*Escherichia coli*, along with some other rod-like molecules or organisms, can form a nematic liquid crystalline phase of matter where the system orients along a particular direction characterized by an order tensor. We develop this two-dimensional order tensor, along with the order parameter and director, to describe such a system. To facilitate this process, data can be collected and analyzed using MATLAB and MicrobeTracker Suite and preliminary results describing the system are presented. Physical understanding of this system is expected to be expanded upon and applied to other characteristics of biological systems, such as growth rates.

♦ 136 ♦

*Codon bias within viral species*

**John Thompson**, Molecular Biology (2013)

Biology Summer Research Fellowship, Mulcahy Scholars Program

Mentored by Catherine Putonti, Bioinformatics

A successful virus must constantly evolve to remain infectious to its coevolving host. Viruses frequently utilize optimal codons that are preferred by their host, promoting maximum translational efficiency. Thus, protein production is affected by which codons are contained within the genome. Translational selection has the ability to shape specific codon frequency based on optimal codon usage. A codon coding for the most abundant tRNA will maximize protein output within a cell. As a bacteriophage undergoes mutations to reach, or return to, optimal codon usage, the degree of fitness at which its mutation accumulation rate plateaus is still unclear.

♦ 137 ♦

*Enhancing STEM Learning Through Caregiver-Child Interactions at the Chicago Children's Museum*

**Michael Tynan**, Psychology (2014)

Provost Fellowship

Mentored by Catherine Haden, Psychology

This research focuses on how the experiences of young children during hands-on learning projects determine their interest in STEM activities. Participants in the experimental group watch a demonstration at the Chicago Children's Museum skyscraper exhibit illustrating the necessity of diagonal cross-beams in tall buildings. The control group hears about skyscraper history. Children then build their own skyscrapers at the museum, and one week later (to test for retention of information) they build a structure at home. We hypothesized that children who hear the talk about engineering use more cross-beams in their structures than children who do not.

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♦ 138 ♦

*Functional Analysis of cis Regulation of the retinaldehyde dehydrogenase 2 gene in Zebrafish*

**Loren Velasquez**, Political Science and Advocacy & Social Change (2015), **Miguel Barajas**, Biology (2013)

Biology Summer Research Fellowship, Carbon Undergraduate Research Fellowship Program,  
Mulcahy Scholars Program

Mentored by F. Bryan Pickett, Paula Martin and Catherine Putonti, Biology, Computer Science

The retinaldehyde dehydrogenase 2 (raldh2/aldh1a2) gene plays an important role in normal development by patterning the brain, vertebral column, limbs and thoracic and abdominal organs. Using the tools of bioinformatics cis regulatory elements and a minimal promoter for this gene was identified by evolutionary comparison to other fish genomes. To identify important cis regulatory regions, and eventually proteins, that regulate RaldH2 gene activity we have performed transgenic experiments to determine if promoter deletions drive the expression of the reporter gene Yellow Fluorescent Protein in regions of the embryo that are the same as those in the normal raldh2 gene.

♦ 139 ♦

*Family Visits for Children and Families in Foster Care*

**Tania Velazquez**, Political Science, Advocacy & Social Change (2015)

**Baltazar Pizano**

Provost Fellowship

Mentored by Maria Vidal De Haymes, School of Social Work

The foster care system was designed to be a temporary placement while children wait to return to their parents. A permanency plan must be established for all children in care, stating clear goals for a permanent living arrangement to facilitate the child's reunification with his/her family. For this purpose, it is crucial that children in foster care maintain family connection through parent-child visitation. This research intends to explore family visitation services, particularly how the caseworkers make decisions regarding the place, frequency, length of time, supervision, and intervention when planning and implementing the parent-child mandated contact. This qualitative study will include in-depth interviews to caseworkers as well as to surveys to their supervisors working for the child welfare state agencies. The findings of the study will have important implications for child welfare policies as well as social work practice with families involved with the child welfare system in the United States.

♦ 140 ♦

*Determining Structure and Function of the Subtelomere of the Short Arm of Human Chromosome 21*

**Elizabeth Vicker**, Molecular Biology (2013)

Mulcahy Scholars Program, Provost Fellowship

Mentored by Jeffery Doering, Biology

Subtelomeres are heterochromatic regions that lie between telomeres and chromosome-specific regions of the chromosome. Subtelomeres play important roles in homologous recombination and telomere stability. While they have been characterized on some chromosomes, they remain uncharacterized on acrocentric chromosomes. We want to determine the DNA organization of this region on chromosome 21p using PCR with primers unique to sequences specific to the subtelomeric regions, including a 6 kb, 650 bp, 1500 bp, and 6 bp degenerate sequences. I am currently looking at regions of the subtelomere on HC15 and looking at variations in sequence compared to HC21.

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◆ 141 ◆

*Neural Correlates Associated with Executive Function Performance in Bilingual Individuals*

**Natasha Vyas**, Biology (2013)

Carbon Undergraduate Research Fellowship Program

Mentored by Rebecca Silton, Psychology

From a unique interdisciplinary developmental neuroscience perspective, the innovative proposed study retrospectively focuses on how prior language brokering experiences across development contribute to enhancing EF abilities. It is hypothesized that frequent experiences of translating and paraphrasing on a daily basis, particularly from a young age, will positively facilitate the development of EF, particularly in the domains of inhibition, updating, and shifting. The proposed study will employ electroencephalography (EEG) methods to collect data while participants complete inhibition, updating, and shifting tasks. Data analyses will strive to identify specific patterns of frontocingulate neural electrical activity and their relation to EF performance in bilingual language brokers, bilingual non-brokers, and monolingual speakers. Participants will be recruited from pre-screened Loyola undergraduate students who functioned as language brokers for their families through childhood and adolescence.

◆ 142 ◆

*Simulation Assisted Enzyme Engineering on N-Acyl Homoserine Lactonase, AiiA*

**Paul Wadsworth**, Bioinformatics, Biology (2014)

Carbon Undergraduate Research Fellowship Program

Mentored by Dali Liu, Ken Olsen, Chemistry, Biochemistry

*Vibrio Cholerae*, the causative agent of cholera, produces N-acyl homoserine lactones (AHLs) as quorum sensing signaling molecules to regulate virulence production. The quorum-quenching AHL lactonase (AiiA) can subvert these quorum-sensing pathways by hydrolyzing AHLs. Using *in silico* mutagenesis via Molecular Dynamics simulation, critical residues can be identified and mutated to improve enzyme potency. The mutants displaying enhanced enzyme specificity will be experimentally expressed, purified and characterized to validate the results of the simulation assisted enzyme engineering. This project will (1) exploit the anti-virulent potential of AiiA and (2) provide better understanding of the parameter restraints inherent in Molecular Dynamics simulation.

◆ 143 ◆

*The Influence of Second Language Exposure and Utilization on Executive Functions in Low-Income, Latina Adolescents*

**Kristin Walker**, Psychology, Sociology (2013)

Mentored by Amy Bohnert, Psychology and Kim Burdette, Psychology Graduate Student

This study examined the relation between second language exposure and utilization on executive function in low-income minority adolescents. Results suggest that low-income bilinguals may not experience the same bilingual advantage to EF as higher SES bilinguals. Additionally, modality of language exposure and utilization impact the bilingual EF advantage.

◆ 144 ◆

*Manners*

**Matthew Wasiewicz**, Psychology (2013)

Mentored by Dena Valentino

This presentation will exhibit the Psychology 390 Internship project that I have done for a non-for-profit company in the community. I've implemented a Behavior Support Plan (BSP) that has proven to be successful based on elements of Behavioral and Industrial/Organizational psychology. In the BSP, I focused on a client's maladaptive behavior which was interfering with the educational development of himself and others. At this symposium, you will

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find out how important behavioral plans are and why they matter. To anyone who wishes to find out more about Behavioral Psychology, or even how to change bad habits, this presentation is for you!

◆ 146 ◆

*Analysis of Thioredoxin domain-containing protein 9 Expression in Zebrafish by Indirect Immunofluorescence*

**Megan Weber**, Biology (2012)

Provost Fellowship

Mentored by Eric Schroeter; Stefan Kanzok, Biology

Thioredoxin domain-containing 9, or Txndc9, is a protein known to be present in all eukaryotic organisms. Its presence can be traced back to early evolutionary history, perhaps indicating its critical role in the development of any organism. Dr. Stephan Kanzok at Loyola University Chicago recently generated the first antibodies to this protein. The antibodies to Txndc9 were initially made against the protein from the malaria parasite, *Plasmodium berghei*. Since Txndc9 is present in all organisms, it is logical to assume that its functionality within a zebrafish embryo relates to its functionality within a human embryo. Further analysis of Txndc9 within zebrafish cells was conducted by means of indirect immunofluorescence. My results showed the fluorescence of microtubule structures within zebrafish embryos under the confocal microscope. The appearance of microtubule structures possibly depicts Txndc9's association with microtubules and thus, the cytoskeleton.

◆ 147 ◆

*The Effects of Child- and Adult-Directed Television on Attention and Distractibility in Preschoolers*

**Kelsey Wendland**, Psychology, English (2014)

Provost Fellowship

Mentored by Kathleen Kannass, Psychology

In their everyday lives, young children are constantly bombarded with multiple stimuli that compete for their attention. Recent research has examined how children attend to tasks while a distracting event (e.g., television) occurs in the background. The current study explored the effects of distraction (children's versus adults' television programs) on preschoolers' attention. Three- and four-year-olds completed four age-appropriate tasks in one of three television distraction conditions: child, adult, or no program. The children were evaluated on how they divided their attention and on their task performance. Four-year-olds were expected to have better attention to the tasks and the child-directed television was expected to distract more overall.

◆ 148 ◆

*Analysis of Zebrafish as a Model Organism for Photodynamic Therapy and Cell Ablation*

**Caralynn Wilczewski**, Molecular Biology (2013)

Mulcahy Scholars Program

Mentored by Eric Schroeter, Biology

One area of research which has not yet utilized the model organism zebrafish is the field of photodynamic therapy. In a project coordinated with the Department of Chemistry, we have engineered a photosensitive agent, chlorin, and linked it to the molecule BSA to create a targeted light therapy with pinpointed cell ablation. Confocal microscopy was used to initiate a photochemical reaction which stimulated cell death in targeted tissues while minimizing deleterious side effects in the surrounding tissues. We have successfully applied photodynamic therapy to intestinal tissue in zebrafish, examined tissue regeneration post-therapy, and believe the data generated establishes zebrafish as an ideal model organism for further research regarding photodynamic therapy.

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♦ 149 ♦

*Phylogeography of Brachypteryx montana, a widespread bird across the islands of the Philippines*

**Mark Wojdyla**, Molecular Biology (2013)

Biology Research Fellows Program

Mentored by Sushma Reddy, Biology

The rich biodiversity of the Philippines has been molded by past climatic and geological conditions. We conducted a phylogeographic analysis of a widespread bird species, *Brachypteryx montana*, to examine its diversification across the Philippine islands. Genetic variation in these birds was examined by sequencing two mitochondrial genes, ND3 (351 bp) and ND2 (1047 bp), for more than 200 individuals across the different islands. The results of our phylogenetic analysis showed populations on geographically proximate islands were closely related. With this analysis, we reconstructed the divergence of *Brachypteryx montana*, and contributed to the knowledge of past connections between Philippine islands.

♦ 150 ♦

*Globalization and Savoring: How exposure to foreign cultures promotes greater life satisfaction*

**Kathryn Younkie**, Social Psychology & International Studies (2013)

Mentored by Fred Bryant, Psychology

A longitudinal study explored how appreciation of foreign culture and social connection created through exposure to globalization help promote savoring ability. Savoring is a technique of intentionally seeking positive experiences to increase overall life satisfaction. A sample of 130 undergraduate participants were measured for possible moderating variables of Cosmopolitanism and Big Five personality traits. A pre- and post-test measure for Savoring, Happiness and Individual Globalization were given to evaluate a possible increase over the week-long study period.

♦ 151 ♦

*The Effects of Distracting Stimuli on Infant Attention During Toy Play at 7- and 11-months*

**Mary Zimmermann**, Psychology (2013)

Mentored by Kathleen N. Kannass, Psychology

Understanding attention in infancy is crucial to the advancement of the field of cognitive development, as the development of attention plays such a substantial role in the attainment of new information during infancy. The present study investigates the developmental changes that occur in the first year of life in the ability of infants to allocate and maintain attention, and is especially concerned with how external factors, such as a distractor stimulus, could affect an infant's ability to control their attention. I hypothesize that due to their increased ability to use endogenous control, the 11-month-olds will demonstrate a greater ability to maintain focused attention on a target activity.

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