

The background of the entire page is a repeating pattern of interlocking hexagons. The hexagons are in three colors: a dark maroon, a golden-yellow, and a light grey. The text is placed within these hexagons. The top-left hexagon is golden-yellow and contains the university name. The middle-right hexagon is maroon and contains the event title. The bottom-left hexagon is golden-yellow and contains the date and location. The bottom-right hexagon is maroon and contains the event description.

LOYOLA UNIVERSITY CHICAGO

2011 UNDERGRADUATE RESEARCH SYMPOSIUM

April 16th
2011

Gentile
Arena

Lakeshore
Campus

Showcasing the
Research, Scholarship
and Creative
Endeavors of Loyola's
Undergraduate
Students

WELCOME TO 2011 UNDERGRADUATE RESEARCH SYMPOSIUM

On behalf of Loyola's Undergraduate Research Opportunities Program (LUROP) and the Center for Experiential Learning, welcome to the 2011 Undergraduate Research Symposium. This is the 5th-annual university-wide research symposium here at Loyola, and each year we've continued to grow; this year being no exception. While the greatest number of presentations still come from those students with a LUROP fellowship, there are an increasing number of students presenting who are conducting research in other capacities, such as participating in guided independent studies or in research groups both at Loyola and at other Chicagoland research institutions.

We are pleased to hold this year's event at the culmination of national Undergraduate Research Week. The United States House of Representatives voted to declare the week of April 11, 2011 as Undergraduate Research Week to recognize the value of an undergraduate research experience in higher education. In addition, this year's symposium is a key event of Loyola's Weekend of Excellence: Celebrating Transformative Education, a series of events that highlight the scholarly and civic work of Loyola's undergraduates.

We are also excited to announce at this symposium the winners of the new LUROP mentor award. These annual, student-nominated awards were created to recognize the exceptional work of Loyola's faculty, staff, or graduate-student mentors who are contributing significant time and effort to the intellectual, ethical, and academic development of Loyola's undergraduate researchers.

These young scholars continue to produce transformative, inspiring, cutting-edge research in a wide range of disciplines, and we encourage you talk with as many presenters as you can during the event. For more information about undergraduate research at Loyola, please visit www.luc.edu/lurop, or stop by the Center for Experiential Learning in the Sullivan Center for Student Services.



Kelly Christopher, M.A.
Undergraduate Research Coordinator



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

2011 Undergraduate Research Symposium Overview

| | |
|----------------------------------|--------|
| Student Poster Session..... | 1:30pm |
| Award Announcements | |
| <i>LUROP Mentor Awards</i> | 3:15pm |
| <i>Poster Awards</i> | 3:20pm |

Refreshments will be available throughout the afternoon.



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. Undergraduates are also welcome to work with individual faculty members on research projects that may fall outside the realm of LUROP.

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.

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 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 CCH-funded faculty research projects, as well as CCH's international research projects.

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.

Presenter Abstracts

Noorah Abdullah

My Experience as a Mentee

Anthropology (2011)

Research Mentoring Program

Mentored by Eilleen Rollerson, PhD student in Sociology

I would like to present my experience of the Research Mentoring Program and how it affected my perceptions and increased my awareness of racial issues in America. Eilleen Rollerson was my mentor and her project dealt with the impact of community change on long term social service organizations in a high poverty community. I learned about the plight of African American communities in the inner city in relation to historical legacies, current political policies, and the effects of racism. At the end of the program I developed a close relationship with my mentor. I also gained an understanding of lower income communities and how policy initiatives effect the economic and political standing of African American communities and their social service organizations as well. The program was an enriching experience and I learned about the process of creating and developing a research proposal. I was proud to assist my mentor with organizing and editing her proposal to present to an approval committee. She successfully defended the proposal while I was away in Costa Rica on a study abroad trip

Roxanne Able

Faraday Waves in Vertically Oscillating Fluid Beds

Biophysics and Music (2012)

Mentored by Dr. Jon Bougie, Physics

Fluid layers, when vertically shaken, form Faraday waves which produce discrete patterns including square, stripe, and hexagon formations. Standard Newtonian fluids have a linear relation between stress and strain, characterized by the viscosity of the fluid. However, sheer thickening fluids increase in viscosity as stress is applied. Corn starch suspended in water acts as a shear thickening, non-Newtonian fluid. We add corn starch to water using Cesium Chloride to match density and prevent separation. This process allows us to vary concentrations of corn starch and Cesium Chloride in order to determine how the properties of the mixture change from fluid to solid while shaken. Our shaker unit is composed of a sub-woofer that sinusoidally oscillates a glass container that in the past has held bronze beads. We hope to observe how concentration variations effect phase transitions between Faraday waves and other effects seen in non-Newtonian fluids.

Jamal Mohammad Adas

Escape Pathways of Ethylene Isocyanide from Sperm Whale Myoglobin

Biology (2011)

Provost Fellowship and Mulcahy Scholars Program

Mentored by Dr. Ken Olsen, Chemistry

We have studied the mechanism for the escape of ethylene isocyanide (EtN) out of the distal heme pocket of sperm whale myoglobin (Mb). Obtaining this mechanism will help us understand the importance of the orientations of residues surrounding the distal heme pocket (His-E7, Val-E11, and Arg-CD3), and how these residues contribute to the overall function of myoglobin. Since EtN is a much larger ligand than oxygen, its potential escape pathways should be quite limited. The source of the EtN's escape from the heme pocket appears to be that the His-E7 swings out of the heme pocket toward the solvent phase. Understanding this mechanism will also shed light on the binding and escaping mecha-

nisms of other large molecules that can bind to the heme pocket of Mb. The mechanism found appears to agree with the previously postulated histidine gate pathway.

Lindsay Addy

Perceptions of the Undergraduate Liberal Arts Experience: Loyola University Chicago and Northwestern University Senior Students Speak

Sociology (2011)

Mentored by Dr. Marilyn Krogh, Sociology and Dr. Judson Everitt, Sociology

There is a large body of evaluative research concerning the undergraduate student experience but few, if any, comparative studies have been conducted. The purpose of this research is to ascertain how senior students perceive a well-rounded education and if they have received one at their university; comparing the results of students at Northwestern University and Loyola University Chicago. In addition, each student's undergraduate experience will be compared to their awareness of their University's mission statement to determine if a positive correlation exists. Through a survey instrument disseminated to senior students at both universities, this research hopes to understand what qualities of the undergraduate college experience are important to students today.

Christina M. Amaro

Links between Children's Self-Regulation and DSM Prevalence Rates

Presented with Sarah Pekoc

Psychology (2011)

Provost Fellowship

Mentored by Dr. Christine Li-Grining, Psychology; Maria Marcus, PhD student in Psychology and Jaclyn Lennon, Psychology

Though behavior problems tend to be higher among socioeconomically disadvantaged children, less is known specifically regarding behavior disorders among low-income, ethnic minority children during middle childhood. The current study examined the association between children's DSM-IV (Diagnostic and Statistical Manual of Mental Disorders) prevalence rates and their self regulation. Data for this study were drawn from Welfare, Children and Families: A Three-City Study, a longitudinal study which examined the well-being of low-income, predominantly African American and Latino children and families from Boston, Chicago and San-Antonio. Maternal reports of children's behavior disorders were negatively related to observations of their self- regulation. More specifically, children's affective, attention, oppositional and conduct problems in middle childhood were modestly linked to lower levels of self-regulation during early childhood.

Christina M. Amaro

Condition Severity and Social Acceptance in Children and Adolescents with Spina Bifida

Psychology (2011)

Research Mentoring Program

Mentored by Bonnie Essner, PhD student in Clinical Psychology and Dr. Grayson Holmbeck, Psychology

This study examined associations among pain intensity, gross motor functioning, and BMI percentile, and social acceptance outcomes in youth with spina bifida. Data for this study were drawn from the first wave of a longitudinal study on psychosocial development of children and adolescents with spina bifida. The sample was comprised of 126 youth with spina bifida ages 8-15 years (M = 11.25 years) and their parents, who completed questionnaires on family demographics, child health variables, and child social

acceptance. Findings of hierarchical multiple regression analyses indicated that higher child BMI percentile was significantly associated with less parent-reported social acceptance by peers, $\beta = -0.36$, $F(8.06) = 0.001$, $p = 0.001$. Pain intensity and motor function were not significantly associated with social adjustment outcomes. This study provides preliminary evidence that overweight in youth with spina bifida may contribute to the social functioning difficulties often reported in these youth.

Zainub Ashrafi

Home Cognitive Stimulation and Residential Risks as Predictors of Self Regulation in Preschool-Aged, Low-Income Children

Presented with Donna Flores

Psychology (2011)

Provost Fellowship

Mentored by Dr. Christine Li-Grining, Psychology; Maria Marcus, PhD student in Developmental Psychology and Jaclyn Lennon, Psychology

Children's ability to voluntarily control attention, behavior, and emotion in adaptive ways, also known as self-regulation, has been predictive of their academic achievement. As such, it is important to understand predictors of self-regulation. However, most studies about the development of low-income children's self-regulation focus on proximal predictors such as child-mother social interaction. Distal predictors of self-regulation, such as residential risk are less often studied, as are more cognitively-oriented child-mother interaction such as home cognitive stimulation. Data was derived from three waves of Welfare, Children, and Families: A Three-City Study. Residential risk was significantly associated with lower mother-reported child impulsivity. Also, neighborhood problems were found to be negatively linked to children's self-control. Cognitive stimulation in the home was not related to children's self-regulation.

Mary Ayers

Identification of Pyoverdine Siderophores in Bacterial Cave Isolates

Presented with Jennifer Obrzydowski

Biology (2011)

Provost Fellowship, Mulcahy Scholars Program and Biology Research Fellowship

Mentored by Dr. Domenic Castignetti, Biology

Our overall goal is to study nutrient cycling in the oligotrophic environment of a subterranean cave in Kentucky. An oligotrophic environment has less than two milligrams of total organic carbon per liter. We received twenty four bacterial cave isolates from Dr. Hazel Barton, University of Northern Kentucky, and examined the roles of these bacteria in the Nitrogen Cycle and iron collection. In order to understand nutrient cycling in caves, we are determining the role of these bacteria. Iron is a necessary trace element for all living entities, needed in many enzymes and proteins. In caves, little iron is available. Some bacteria are able to produce siderophores, iron chelating compounds. Siderophores are high affinity iron binding compounds that are released and absorbed by bacteria that are scavenging for the few available iron ions. A specific type of siderophore is Pyoverdine, produced predominantly by *Pseudomonas aeruginosa*.

Piotr Babinski

KFC 43 and the Short Arm of Human Chromosome 21

Biology, Molecular Emphasis (2011)

Mentored by Dr. Jeffrey Doering, Biology

The short arm of human chromosome 21 was omitted in the Human Genome Project because it is

mainly composed of heterochromatic regions of DNA. These heterochromatic regions contain repetitive elements, making it difficult to clone and sequence. Our laboratory is focused on mapping the short arm of human chromosome 21 (HC21p). To close some gaps in the current map I screened for KFC 43, a low copy number repeat (LCNR) known to be on HC21p, using the phage lambda HC21-specific genomic library. KFC 43 was originally isolated and sequenced from human chromosome Y (HCY) and HC21 hybrid cell lines hybridized with KFC43 sequence obtained from HCY showed positive results. Using the sequence from HCY as a probe, initial screenings of the phage lambda library yielded no results. Possible explanations for this could be sequence variation of KFC43 between HC21 and HCY. Next I designed PCR primers for KFC43, again using the sequence from Y as a template, in an attempt to amplify a portion of the sequence on HC21. Results from the PCR showed amplification and those fragments were then inserted into bacterial plasmids to be cloned and sequenced. Currently, we are isolating the plasmids using the QIAGEN Lambda mini kit and sending them out for sequencing. With KFC43 sequence information on HC21 we would be able to determine the sequence similarity to HCY, as well as map more of HC21p.

Roxanne Bavarian

Creating a Higher Resolution Map of the Juxtacentromeric Region of the Short Arm of Human Chromosome 21

Biology, Molecular Emphasis (2011)

Mulcahy Scholars Program

Mentored by Dr. Jeffrey Doering, Biology

The Human Genome Project left heterochromatic areas unsequenced due to the difficulty of sequencing the highly repetitive DNA associated with these regions. We are studying the short arm of chromosome 21 (HC21p) as a model for characterizing heterochromatic domains. Juxtacentromeric heterochromatic regions play a crucial role in proper chromosome segregation and cell division, and we are physically mapping this area on HC21p. A series of detailed restriction digests were performed using YAC clones that span the region (YACs 831B6, 5A12, 3A8, 1F8) followed by hybridization to various types of satellite DNA known to be contained within the region (Y-specific satellite, satellite I, and alphoid DNA). This allowed construction of a high resolution physical YAC contig map of the juxtacentromeric region, eliminating a previously-existing gap in the map of HC21p. The order of the satellite DNAs is now known, with the satellite I DNA cluster located between Y-specific satellite I and the centromeric alphoid DNA cluster. Further mapping is ongoing to determine the sizes of each sequence cluster and the distances between them.

Gurmeet Singh Bawa

The Effects of Caffeine on Memory Retention after Chronic Stress Exposure

Biology (2011)

Mulcahy Scholars Program

Mentored by Dr. Louis Lucas, Biology

The objective of this study was to investigate the effects of caffeine on memory after chronic stress. We hypothesized that caffeine would have a negative effect on memory after stress in the eight arm radial arm maze (RAM). We trained 12 male Sprague Dawley rats in RAM. After achieving a performance of 2 or less errors, animals were screened and separated evenly into two groups. Both groups were stressed daily for 10 days with one group given access to caffeinated water (75 mg/L) and the control group given access to tap water. After treatment, both groups were re-tested in RAM. Our results indicate that during the first day of post-treatment testing, the caffeine group performed slightly worse than the control group. For the remainder of testing, both groups stabilized around the same errors. Our conclusion is that caffeine may have a temporary negative effect on memory after stressful conditions.

Krishna L. Bharani

Allosteric Mechanism and Dynamics of ADP-glucose Pyrophosphorylase Activation

Chemistry, Biochemistry Emphasis and Biology (2011)

Carbon Scholars Program

Mentored by Dr. Miguel Ballicora, Chemistry and Dr. Ken Olsen, Chemistry

ADP-glucose pyrophosphorylase (AGPase) is an essential allosteric enzyme that catalyzes the regulatory and rate limiting biosynthesis of glycogen and starch in bacteria and plants, respectively. Previous studies show that mutagenesis of an amino acid (W113A), which is not in the allosteric site, has effects on the catalytic ability of the enzyme. This mutant enzyme is catalytically functional but does not respond to the activator even though it retains its ability to accept the activator. Using computational programs such as NAMD, VMD, and MOLMOL, we modeled and ran simulations on AGPase and its mutants to gain a better understanding of W113A effect. We have also performed an alanine scan of the loop containing W113A, and we have found a couple amino acid residues (T98A and D101A in tuber) that act similar to Ballicora's mutant. We are currently making E.coli AGPase mutants to validate our model's results. By studying this enzyme, we will gain a better understanding of allosteric and catalytic communication and further reveal properties of energy storage synthesis. This research could suggest a more efficient starch/glycogen synthesis and possibly contribute to the biofuel incentive.

Krishna L. Bharani

Changes in Rule-Based Category Learning with Age

Presented with Dietta Chihade and Kevin Nuechterlein

Chemistry, Biochemistry Emphasis and Biology (2011)

Mentored by Dr. Robert Morrison, Psychology

To develop neurocognitive markers for normal and pathological aging, we tested healthy younger (m=21 years) and older (m=71 years) adults using a rule-based category-learning task where participants learn to categorize visual gratings using trial-by-trial feedback while brain potentials were recorded. There were two distinct subgroups. The Rule subgroup learned more slowly than younger adults, but showed equivalent asymptotic accuracy. The No-Rule subgroup did not learn and showed near chance performance. In conclusion, rule-based category learning may be sensitive to factors predicting subsequent decline in executive and long-term memory abilities, as it appears to stratify older adults with neuropsychological profiles in the normal range.

Brianna Biggers

"We need to seek a common solution:" A Qualitative Study of Nonviolent Resistance in Honduras and U.S. Grassroots Advocacy

Communications Studies and Philosophy (2010)

Provost Fellowship

Mentored by Dr. Elizabeth Lozano, School of Communication

This qualitative research aims to understand the practice of nonviolent resistance in the U.S. and Latin America, focusing on the case of Honduras, which faced a coup d'etat in 2009. We examine the ways in which members of solidarity networks in Chicago and Honduras practice and understand nonviolent resistance and use communication to further social justice. Using snowball sampling, we conducted in-depth interviews over the course of eight months with nine participants, who ranged from Honduran physicians to members of an interfaith organization. Additionally, we performed observations at events including the U.S. Social Forum in Detroit and several public forums hosting Honduran grassroots activists. Some of the themes emerging from analysis include the perceived relationship between spirituality

and nonviolent resistance, the significance of international witnessing for peacekeeping, the defining role of a strong community in sustaining the struggle for social justice, and the power of the media to sway the direction of popular movements of dissent .

Mumtaj Chand

Characterizing Bone Morphology in the Mice Femoral Ablation Model
Psychology and Biology (2012)
Mentored by Dr. Dawn Franks, Rush University Medical Center and
Dr. Margaret McNulty, Rush University Medical Center

The rat ablation model has been commonly used to study intramembranous bone regeneration and is significant in relation to improving procedures such as joint replacement. The main purpose of this study is to modify and adapt the rat femoral ablation model for use in mice and to characterize bone morphology following marrow ablation in this model system. Eleven week old female C57/Bl6 mice underwent femoral ablation surgery in the left femurs with the right femurs serving as internal controls. Femurs from the animals were collected at day 0, 3, 6, 11, 13, & 18 post surgery and will be analyzed using micro-computed tomography (μ CT). Parameters such as bone volume (BV), total tissue volume (TV), BV/TV, and trabecular number, thickness, and spacing will be evaluated. The outcome of the study will be a comprehensive phenotypic of the femoral bone marrow ablation model in mice.

Ksenia Chernova

Fathers and Infant Crying
Psychology (2012)
Research Mentoring Program
Mentored by Leslie Katch, PhD student at the Erickson Institute

Previous research has explored excessive infant crying and its effects on mothers. However, there is a significant lack of research focusing on fathers of fussy infants. Excessive crying can be detrimental to parental health as well as the interactions between the infant and parents. Specifically, crying has been shown to be a proximate cause of physical infant abuse and fathers have been identified as main perpetrators. This study looks at better understanding experiences of fathers caring for excessively crying infants. Results of the study can provide new insights into coping and well-being of fathers caring for infants who cry more than normal and also provide a series of practical implications for professionals working with families and their infants.

Dietta Chihade

Changes in Rule-Based Category Learning with Age
Presented with Krishna Bharani and Kevin Nuechterlein
Biology (2011)
Mentored by Dr. Robert Morrison, Psychology

Please see Bharani abstract on page 9.

Miraj Chokshi

Neural Correlates of Featural & Relational Reasoning
Psychology (2012)
Provost Fellowship

Mentored by Dr. Robert Morrison, Psychology

Relational reasoning is an important cognitive ability in day-to-day life and is an essential mechanism for learning. We investigated how personal perceived power affected the types of strategies people select in relational reasoning. Participants were asked to rate groups of simple objects for how similar they were. Some were similar based on featural similarity while others were similar based on relational similarity (Medin, Goldstone, & Gentner, 1990; Experiment 1). Relational similarity is essential for reasoning based on analogy, a common learning mechanism. Based on previous studies we hypothesized that decreasing a person's perceived power would result in them favoring featural over relational similarity. To test this hypothesis we used a power priming task developed by Bridge and Chao (2009). Participants were primed for high or low power prior to performing the similarity rating task. We found no reliable effect of personal perceived power on the similarity-rating task.

Amanda Cimaroli

Project MENTOR

Presented with Alexandra Luterek

Social Work (2012)

Provost Fellowship

Mentored by Dr. Julia Pryce, School of Social Work

Project MENTOR is a three-year, holistic health program that assists thirty youth living in an at-risk, lower-income urban community on Chicago's South side. Project MENTOR targets the social, physical, intellectual and emotional development of students via involvement from the school, parents, and community members. Key components of programming include mentoring, family support services, and a six-week summer participatory action research program (PAR), which will be featured in this presentation. A key tenant of PAR is the focus on acquisition of knowledge in addition to life skill sets. Program activities were designed to deepen community engagement, develop research skills, and improve interpersonal communication. Our findings suggest that the PAR approach empowered youth to explore the causes and consequences of issues in their community and work together to improve their environment. Preliminary findings will be used to inform future program development, and as data collection on Project MENTOR as a whole.

John Conway

Stereotypes and Legal Decision Making

Psychology and Sociology (2011)

Mentored by Dr. Scott Tindale, Psychology

Three independent variables were examined in this study, the race of the offender in a sample scenario (Hispanic/nondescript), the race of the victim (Hispanic/nondescript), and the type of crime committed (violent/nonviolent). A 2x2x2 analysis of variance (ANOVA) was used to assess the impact of these three factors on the dependent variables of whether or not the offender was seen as motivated by situational or dispositional factors, perceived guilt of the victim, perceived guilt of the offender, the confidence participants felt in their decision, and the amount assigned in a proposed bond. Findings revealed main effects of the race of the offender and the type of crime committed across several conditions as well as several race and crime type interactions.

Katelyn Corrigan

Illinois Mental Health Courts

Sociology and Women and Gender Studies (2012)

Research Mentoring Program

Mentored by Monte Staton, PhD student in Sociology

Last summer I aided a graduate student on his sociological ethnographic dissertation project on the success of nine Mental Health Courts (MHC) in Illinois. A Mental Health Court is a recently developed strategy for dealing with the challenges of persons with severe mental illness involved in the criminal justice system. This project looked at work dynamics of the professionals who started and maintain these courts, how and why each MHC got started, opinions of the clients in the program, and structural forces that make up the program. Data was collected through a statewide survey of Illinois Circuit Court jurisdictions, the collection of archival data from all Illinois MHCs in operation, court observation, and on-site focus group interviews and self-report surveys at all Illinois MHC sites. This project looks into the successes of the MHCs and identifies possible problem areas that can be addressed through policy and procedure modifications.

Kimberly Cummins

Practicing What We Preach: writing center mission and identity in the age of assessment

Presented with Juan Favela, Claire Gaddis, Adam Michael, and Justyna Obrzut

English and Journalism (2012)

Mentored by Dr. Michael Meinhardt, English and Director, Writing Center

The LUC Writing Center has recently undergone a dramatic re-envisioning and is now experiencing high demand from the student body and administration; this is all the more remarkable given that the center is now almost entirely volunteer-based, mostly staffed by undergraduates, and these undergraduates hold a great deal of agency in center operations and development. Our tutors have begun to question the complicated issues including authority, direction, and mission that come into play, particularly regarding assessment and resistance issues. This two-part focus on Assessments Impact on Pedagogy and Purpose round-table panel for presentation at the East Central Writing Center Association 2011 Conference featured five undergraduate students and the center Director, and facilitated an interactive discussion with prepared discussion prompts for audience participation. Our intent was to call difficult areas of assessment and mission into question for the sake of writing center innovation and improvement.

Shaleen Dada

Children's Executive Functioning: Examining the Role of Autism Traits in Typically Developing Children

Psychology (2012)

Research Mentoring Program

Mentored by Sandra Vanegas, PhD student in Developmental Psychology

This study seeks to examine whether or not typically developing children exhibit difficulties in executive functioning and to what extent these dysfunctions may be attributable to the presence of autism traits. The main objective was to find out if the number of autism traits reported by parents affected their executive control in the home and school. Parent reports of autism traits and executive functioning in typically developing children between 6 and 12 years of age were collected in the present study. The findings will help in understanding how autism traits may be related to executive functioning, and potentially contribute to children's struggle in adapting to a social environment.

Jonathan Daus

Degenerative Joint Disease: An Analysis of its Presence in a 19th Century Skeletal Population

Anthropology (2011)

Mentored by Dr. Anne Grauer, Anthropology

Degenerative joint disease, also known as osteoarthritis, is one of the most common conditions found in skeletal remains. Its pathology and existence have been hotly discussed in physical anthropology. In particular, there is much debate as to its official causes. Previous literature has portrayed the disease as multifactorial, drawing from age, sex, and activity as contributors to its incidence. Loyola University's Biological Anthropology Laboratory is currently working on a 19th century skeletal population from Peoria, IL. Evidence of osteoarthritis has been found in a number of individuals. Based on the findings, the goal of this project is to examine demographic patterns in the population. In total, the resultant patterns will be used to determine whether the condition is a proper indicator of daily life in 19th century Peoria.

Caitlin DeRango

Oxygen Isotope Evidence for Mobility and Migration in 19th Century Grafton, Illinois

Anthropology (2011)

Provost Fellowship

Mentored by Dr. Rhonda Quinn, Anthropology

We explore patterns of origin, mobility, and migration in the 19th century human skeletal population from Grafton, Illinois. We used stable oxygen isotope analysis ($\delta^{18}\text{O}/\delta^{16}\text{O}$) to construct two primary data sets: one sampled from the premolar enamel of 22 individuals from Grafton Cemetery; the second sampled from local Illinois meteoric water and the shell and bone carbonate of local riverine fauna. Our results suggest that nearly three quarters ($n=15$) of sampled individuals were non-local migrants, with a majority ($n=13$) originating from the Northern Illinois border and a minority ($n=2$) originating from the Southern Illinois border near Missouri and Kentucky. While age was not a significant indicator of origin, source regions varied by sex with more males originating from Grafton or southerly localities and more females deriving from northerly localities. These findings question historical accounts of migration processes occurring in 19th century Grafton.

Anabelle Doulas

Juvenile Crisis Intervention Teams (CITs): A Qualitative Description of Current Programs

Psychology and Sociology (2011)

Mentored by Dr. Arthur Lurigio, Psychology and Criminal Justice

In response to the fragmentation of behavioral healthcare services in the educational, juvenile justice, and mental health systems, juvenile-CITs (J-CITs) have been implemented in a handful of jurisdictions to serve as an intervention for troubled and troublesome adolescents in need mental health care. Information about J-CITs is limited; little has been written about such programs, and no published studies have examined their effectiveness. Hence, the present study was undertaken to identify all of the currently operational J-CITs in the United States. We conducted structured telephone interviews in order to gather qualitative data regarding the philosophy, origins, operations, and components of each J-CIT. We afford an early look at several J-CIT programs in diverse geographic areas. We conclude with observations concerning the need for such programs as well as the challenges that police departments are likely to face in the implementation and maintenance of such initiatives.

Jessie Duncan

The EmPort Assessment: Measuring Preschoolers' Emotion Regulation in a Field-Based Setting

Presented with Sophie Mir

Psychology (2012)

Mentored by Kelly Haas, PhD student in Psychology; Jaclyn Lennon, Psychology and Dr. Christine P. Li-Grining, Psychology

Despite evidence of the importance of children's emotion regulation for their broader adjustment, there is a lack of field-based emotion regulation measures, which limits our ability to learn about emotion regulation among more ethnically diverse children. As such, the current study developed a direct assessment of emotion regulation, called the EmPort Assessment, which can be administered in school settings, and thus does not require children and their parents to travel to university settings to participate in research. Data for this study was drawn from the Seeds for School Success Project, which involved data collection from 97, mostly African American preschoolers. Preliminary steps included constructing scales for two tasks, the Mishap Situation and the Imperfect Circles task. Descriptive statistics on these scales begin to reveal the extent to which we were able to capture variation in children's emotion regulation.

Juan Favela

Practicing What We Preach: writing center mission and identity in the age of assessment

Presented with Kimberly Cummins, Claire Gaddis, Adam Michael, and Justyna Obrzut

Business and Computer Science (2012)

Mentored by Dr. Michael Meinhardt, English and Director, Writing Center

See Cummins abstract on page 12.

Ninoshka Fernandes

Characterizing L1 retroelements from the heterochromatic short arm of human chromosome 21

Biochemistry, Biophysics, Physics, and Mathematics (2011)

Mentored by Dr. Jeffrey Doering, Biology

L1 retroelements are a major component of the interspersed repetitive elements, which constitute more than 42% of the genome. L1s are autonomous non-LTR retrotransposons that duplicate and insert themselves into the genome via an RNA intermediate. Most L1s are truncated with only the full length (FL) ones capable of actively transposing. L1s, while well-characterized in euchromatic regions, have not been studied in heterochromatic regions. The short arm of human chromosome 21 (HC21p) is a good model for studying L1 organization in the heterochromatic regions. Our previous studies showed that while L1s are generally underrepresented on HC21p, those that are present are disproportionately FL. We are using PCR to isolate previously cloned fragments from HC21p containing FL L1s from a phage library and transfer them to plasmids for sequencing. My sequence data will then identify potentially active L1s on HC21p and allow testing for its retrotransposition activity in the genome.

Artur Filipowicz

Preparation of Cyclotetraerythrylene (CTTV) Tetraketone

Chemistry, Biochemistry Emphasis (2011)

Mulcahy Scholars Program

Mentored by Dr. Daniel Becker, Chemistry and Marlon R. Lutz, Chemistry

Host-guest chemistry involves the complementary noncovalent binding between two molecules and can serve as the basis for analytical detection and signaling, as well as a model for receptor-ligand binding

critical in biological systems. Supramolecular scaffolds have been extensively employed for the 3-dimensional placement of recognition elements in host molecules. Cyclotrimeratrylene (CTV) and the related veratrole tetramer cyclotetraveratrylene (CTTV) are conformationally flexible scaffolds that have been employed, but most of the reported chemistry involves manipulation around the periphery of these systems. We are interested in apex-modified CTV and CTTV derivatives for use as intermediates and as an attachment to surfaces. We wish to report the synthesis and characterization of the previously-unknown CTTV tetraketone, including an x-ray crystal structure. Formation of the tetraketone is accompanied under certain conditions by the formation of the corresponding bis-spiro lactone, formed via trans-annular electrophilic aromatic substitution of the tetraketone. We are also exploring the possibility of nucleophilic addition to CTTV Tetraketone to create a tetraphenyl derivative of CTTV with phenyl-lithium.

Donna Flores

Home Cognitive Stimulation and Residential Risks as Predictors of Self Regulation in Preschool-Aged, Low-Income Children

Presented with Zainub Ashrafi

Psychology (2012)

Mentored by Dr. Christine Li-Grining, Psychology; Maria Marcus, PhD student in Psychology and Jaclyn Lennon, Psychology

Please see Ashrafi abstract on page 7.

Claire Gaddis

Practicing What We Preach: writing center mission and identity in the age of assessment

Presented with Kimberly Cummins, Juan Favela, Adam Michael, and Justyna Obrzut

English and Secondary Education (2011)

Mentored by Dr. Michael Meinhardt, English and Director, Writing Center

See Cummins abstract on page 12.

Jennifer Gomez

Carbohydrate Microarray Synthesis for Pathogen Detection and Capture

Chemistry, Biochemistry Emphasis (2012)

Carbon Scholars Program

Mentored by Dr. Daniel Becker, Chemistry and Dr. John Kelly, Biology

Carbohydrates and bacteria are interconnected. Carbohydrates bind to the surface of bacteria as a part of cell-to-cell recognition, which affects the signaling between cells. The carbohydrates bind through proteins located on the surface of bacteria. These proteins will only bind to specific carbohydrates. There are different kinds of protein receptors on bacteria such as lectins and fimbriae. These receptors play a part in the adherence of bacteria to the surface of the host cell. In addition, carbohydrates show potential for new therapies centered around the way in which they interact with bacteria in order to cause the host cell to become infected. In this research project, the goal is to synthesize carbohydrate derivatives that have known connections with a particular bacterium and attach them to a gold surface. After the derivatives have been synthesized, nanoarrays will be created to bind the synthesized carbohydrate to its specific bacteria.

Vicky Ha

A Case Example of Social Work and Legal Advocacy for Child Welfare Reform

Presented with Nicole Howver

Psychology and Social Work (2011)

Provost Fellowship

Mentored by Dr. Maria Vidal de Haymes, School of Social Work and Dr. Edward Gumz, School of Social Work

This presentation discusses how caseworkers in two community-based organizations became aware of a pattern of discrimination in Illinois child welfare services. Social workers partnered with client families and attorneys to advance a class-action lawsuit that yielded significant reform of the state's child welfare services.

Natalia Hajnas

Study of Teen Adjustment in Affluent Communities

Psychology and Biology (2013)

Research Mentoring Program

Mentored by Dr. Amy Bohnert, Psychology; Lea Travers, PhD student in Clinical Psychology and Edin Randall, PhD student in Clinical Psychology

Research with adolescents who come from affluent backgrounds has pointed to thoughts that they may not be a low-risk group for degree of life satisfaction and adjustment. However, not only may affluent youth be neglected from an outside perspective, but within their own household. This study will investigate the discrepancies between parent and youth responses to their amount of life satisfaction and adjustment.

Michael Halagan

Evolution of the SIRE1 retrotransposon family in genomes of wild members of the soybean genus

Bioinformatics (2011)

Mulcahy Scholars Program

Mentored by Dr. Howard Laten, Biology

This research project is focused on the analysis of the evolutionary significance of the retrotransposable element SIRE-1. Retrotransposons are a subclass of transposons and are genetic elements that can amplify themselves in a genome. They are ubiquitous components of the DNA of many eukaryotic organisms, especially in plants. SIRE-1 is one of the youngest retrotransposable elements and was discovered in the soy bean genome. To analyze the evolutionary significance of SIRE-1 I decided to look for the element in other closely related organisms. To do this I used primers that were created from consensus sequences from the SIRE-1 element in the soy bean genome. With these primers I ran PCR on isolated DNA from organisms that are closely related to soy bean. Several of the primer pairs worked so I then cloned and sequenced these elements. From using bioinformatic tools I was able to further analyze these sequences's evolutionary significance.

Daniel Harris

Mapping the Histone Modifications of Human Chromosome 21

Biology (2011)

Mulcahy Scholars Program

Mentored by Dr. Jeffrey Doering, Biology

We are studying the detailed structure of the short arm of human chromosome 21 (HC21p), originally thought to be heterochromatic. Recent data suggests that this region may be a mosaic of both euchromatic and heterochromatic domains. The goal of my project is to map the histone modifications on the chromatin of HC21p to deduce whether it is heterochromatic or euchromatic. To determine the particular histone modifications on various regions of HC21p I have used chromatin immunoprecipitation (ChIP). I have been examining histone modifications on the chAB4 duplison, a 200 kb paralogous sequence present on HC21p as well as in heterochromatic regions on other chromosomes in the genome. Our initial results show that many of the histone modifications in the chAB4 region are markers of euchromatin. Further histone modification studies on other portions of HC21p will provide the most complete structural map of any heterochromatic genome region.

Adam Hilterbrand

Antagonistic Co-evolution Between Escherichia coli C and Bacteriophage Phi X174

Biology, Molecular Emphasis (2011)

Mulcahy Scholars Program

Mentored by Dr. Catherine Putonti, Biology and Computer Science

Many host/pathogen systems exist in a constant arms race. As the host becomes resistant to the pathogen, the pathogen must evolve to once again infect the host. This system, known as antagonistic co-evolution, is also evident in the host/pathogen system of Escherichia coli C and bacteriophage Φ X174. In this model system, E. coli C changes the structure of a cellular wall component known as a lipopolysaccharide (LPS), where the phage attaches and enters the bacterium. When the LPS is altered, the phage must evolve in order to infect the bacteria again. By directing mutations via error-prone PCR to the N-terminus of the H protein, the region of the protein responsible for viral adsorption into the host cell, mutant lines were sequenced and screened to assess their ability to re-infect resistant bacteria.

Michael Hollowed

Continuum Simulations of Granular Systems with Varying Layer Depth

Physics and Chemistry (2012)

Mentored by Dr. Jon Bougie, Physics

When shaken sinusoidally, granular systems exhibit waves that form patterns such as stripes, squares, or hexagons. We explore the relationship between granular layer depth and pattern formation using three-dimensional time-dependent continuum simulations of these shaken systems. We characterize stripe patterns formed in granular layers by their wavelengths which exhibit an inverse relation with frequency. With varying layer depth, the wavelengths of patterns also vary for a given frequency, but when properly scaled yield a relationship independent of layer depth. We investigate the relationship between these patterns and shocks that are also formed in the layer to determine whether or not this relationship is similarly independent of layer depth. By conducting simulations of systems with different frequencies and layer depths, we generate data which we graphically analyze to establish relationships between shocks, patterns, and layer depth.

Marguerite Hoving

New Data Structures for Heterogeneous Genetic Data

Bioinformatics (2011)

Provost Fellowship

Mentored by Dr. Catherine Putonti, Biology and Computer Science

Genome-wide association studies (GWAS) are conducted to compare the variations of single nucleotide polymorphisms (SNPs) between patients with and without a condition/disease. In order to ascertain that a SNP or set of SNPs is in fact connected to the condition, a large collection of both control data and test data is needed. Generating such a large set of patient data is typically not feasible for a single investigator, thus necessitating multiple studies to be pooled together. There is, however, no universal format established for this data; rather it largely dependent upon the platform used for typing of patient SNPs and the availability of supplemental patient data. Given these differences, integrating such data, despite its potential benefits, is a logistical nightmare. Here we will create a universal syntax for GWAS data and an automated pipeline for formatting heterogeneous data sets to expedite and improve the exploration of variations that are associated with disease.

Nicole Howver

The Burgos Consent Decree: A case example of Social Work and Legal Advocacy for Child Welfare Reform

Presented with Vicky Ha

Psychology and Social Work (2012)

Provost Fellowship

Mentored by Dr. Maria Vidal de Haymes, School of Social Work and Dr. Edward Gumz, School of Social Work

See Ha abstract on page 16.

Benjamin Irvine

Modeling the Motion of a Magnet in the Presence of a Conductor

Presented with Matt Kemnetz

Biophysics (2013)

Mentored by Dr. Asim Gangopadhyaya, Physics; Thomas Ruubel, M.S., Physics and Dr. Alan Saleski, Mathematics

We propose to develop an analytical model of magnetic damping. Magnetic damping occurs when a magnet moves in proximity to a conductor. The changing magnetic field produces an electric field, which generates currents in the conductor. These eddy currents then produce a magnetic field that opposes the motion of the magnet. This phenomenon is utilized in the braking systems of hybrid cars, some trains, and roller coasters. The major benefit of magnetic braking is that an object can be slowed down without losing energy to friction. The kinetic energy of an object is converted directly into electrical energy. Magnetic braking is extensively used in industry where computational methods are employed to accurately model magnetic braking. Our improved analytical model will provide an excellent benchmark for any computational models. A better understanding of magnetic braking could pave the way toward new innovations in regenerative braking.

Brittany Johnson

Ramblr Gamblr: A Digital Ethnography of the Culture of Fulltilt.com

Communications Studies (2012)

Mentored by Dr. Meghan Dougherty, School of Communication

Fulltilt.com, an online poker website created in 2004, has become popular among college students and post-grads because of its low-limit entry, bonuses, and promotions. This digital ethnography explores what motivates college and graduate students to participate in online poker. Interviews and participant observations provide an understanding of online poker trends, motivations to gamble online, and behav-

ioral characteristics in play. Preliminary findings show that long-term players experience a transition from leisure play to more intense forms of participation that feel more like work. Some college and graduate students are making enough money playing poker online to pay for school. This motivates them to keep playing, and also initiates the transition from online-poker-as-play to online-poker-as-work. In addition to these observations, I give an auto-ethnographic account of my own personal experience as a college student in the community.

Samuel Johnson

Coping Methods as Predictive Factors in Disordered Eating Behavior

Psychology (2011)

Mentored by Dr. Colleen Conley, Psychology and Chris Zaddach, PhD student in Clinical Psychology

Existing literature has implicated coping strategies in the etiology and maintenance of health behaviors including a link between negative/non-productive coping strategies and disordered eating behavior (Hasking 2006; Hansel & Whittrock 1995). Disordered eating behavior has been widely studied and described in female populations (Visser 2008; Lavender & Anderson 2010). However, recent trends in research have indicated an apparent increase in disordered eating among males (Ray 2004). The paucity in available research necessitates a closer examination of the relationship between both male and female disordered eating behaviors and coping methods, as it may contribute to the development of more reliable screening and treatment techniques. For the present study, investigators were interested in identifying the predictive relationship between student coping styles and disordered eating. Findings indicate a significant predictive relationship between different coping methods and disordered eating behavior for both genders.

Connie Kalble

Exposure to Media & the Thin Ideal: How Do Women Respond?

Presented with Lauren Potthoff

Sociology (2010)

Mentored by Dr. Scott Leon, Psychology

The female beauty ideal in Western cultures advocates an unrealistically thin body, which is consistently perpetuated by the media. The current study examined women's emotional and cognitive reactions to media images portraying this ideal. Participants' body dissatisfaction and disordered eating behaviors were also examined. Results suggest that higher levels of body dissatisfaction reported by participants were significantly associated with participants wishing they look like the models. Further, higher levels of body dissatisfaction were associated with participants wishing to be as thin as the models in the images, wanting to lose weight, and admitting their willingness to give up specific foods or drinks.

Akadia Kachaohana

Filling the Gaps in the HC21p Physical Map

Biology, Molecular Emphasis and Biophysics (2011)

Biology Research Fellowship

Mentored by Dr. Jeffrey Doering, Biology

Our laboratory is working towards completing a map of the short arm of human chromosome 21, which is a heterochromatic genome region primarily composed of repetitive elements difficult to clone and sequence, and so were not studied by the Human Genome Project. In order to eliminate gaps in our map, I screened a phage lambda HC21-specific genomic library with $\beta 2$, a high copy number beta satellite sequence. I identified two positive phage plaques from the library, and went on to purify each plaque and

the DNA within them. I used PCR to amplify the $\beta 2$ inserts from lambda Charon 21A's HindIII site. I am digesting the fragments with HindIII and ligating them into the pUC18 plasmid vector. Transformation with blue-white colony screening will permit isolation of the recombinant plasmids. These plasmids will be purified and sent out for sequencing. Analysing the sequences will help fill the gaps in our map.

J. Alex Keena

Culture and Conflict Management

Political Science and Anthropology (2011)

Provost Fellowship

Mentored by Dr. Molly Melin, Political Science

The quantitative research on interstate conflict tends to ignore the role of culture in the conflict management processes. This is most likely due to the challenges related to measuring culture, which has traditionally been studied qualitatively. This project attempts to resolve this dilemma by focusing on two salient features of culture: language and religion. By compiling a profile of state linguistic and religious demographic data, I have enabled a large-sample empirical analysis of culture and its association with third-party participation in interstate conflict. The results show that third-party states are less likely to intervene in conflicts when they share linguistic demographics with both disputant states. Conversely, third-party states are more likely to intervene in conflicts when they share religious demographics with both disputant states. These findings suggest that culture is a variable that affects interstate conflict resolution and highlight the importance of incorporating culture into future studies of conflict management.

Ashton Kemerling

Simple and Efficient Computation of all Longest Common Subsequences

Computer Science and Mathematics (2012)

Provost Fellowship

Mentored by Dr. Ronald Greenberg, Computer Science

The longest common subsequence (LCS) problem is a classic computational problem. Dr. Greenberg recently produced an algorithm that improves the standard LCS algorithm by finding all of the possible LCSs for two strings. Over the past year Ashton and Dr. Greenberg have worked together to improve the algorithm, update the supplemental material, and fix errors throughout the paper. In this talk Ashton will explain what a LCS is, and how the new algorithm is an improvement over the classic solution.

Matt Kemnetz

Modeling the Motion of a Magnet in the Presence of a Conductor

Presented with Benjamin Irvine

Physics and Mathematics (2013)

Mentored by Dr. Asim Gangopadhyaya, Physics; Thomas Ruubel, M.S., Physics and Dr. Alan Saleski, Mathematics

Please see Irvine abstract on page 18.

Unleen Kiverkis

Microscopic Investigation into the Dynamics of Falling Chains

Presented with Lacy Simmons

Physics (2012)

Mentored by Dr. Asim Gangopadhyaya, Physics

We are examining the dynamics of a falling chain, a classic textbook physics problem that has never been explained on the microscopic level. Traditionally the problem is presented one of two ways. The first being where one end of the chain is in a stationary fixed position and the other end is hanging at a fixed length. The second presentation of the problem is where the chain is in a straight hanging position. The motion of the chain when released has previously been described as free-falling, although studies have been conducted showing the chain is actually following conservation of energy laws. Our preliminary experiments confirm that the chain is conserving energy as it falls. The purpose of our project currently is to show how energy is conserved at the microscopic level. We will be working to define the forces acting upon the masses in the chain and describe their motion.

Kimberly Lauren Klages

Associations between language processing and nonverbal communication skills and social skill development among youth with spina bifida

Psychology and Biology (2011)

Research Mentoring Program

Mentored by Dr. Grayson Holmbeck, Psychology and Lauren O'Hara, PhD student in Clinical Psychology

The purpose of this study was to investigate language processing and nonverbal communication skills of youth with spina bifida (SB) using the Comprehensive Assessment of Spoken Language (CASL) and the Diagnostic Analysis of Nonverbal Accuracy (DANVA). This was part of a longitudinal study examining neuropsychological functioning and psychosocial adjustment among youth with SB. Regression analyses revealed that the Non-literal language subtest of the CASL was significantly associated with the self-control subtest, and the Inference subtest of the CASL was significantly associated with the responsibility and assertiveness subtests. The subtest of the DANVA was significantly associated with all domains of social skill development, and the subtests of the DANVA was significantly associated with the cooperation subtest. Our findings suggest that language processing and nonverbal communication skills of youth with SB are within the low average range.

Rachel Kooistra

Surviving transport: Oxidative stress response of early mosquito stage malaria parasite Plasmodium

Biology (2011)

Provost Fellowship and Mulcahy Scholars Program

Mentored by Dr. Stefan Kanzok, Biology

After being taken up as part of the mosquito's blood meal, the malaria parasite *Plasmodium* transforms into a motile form, the ookinete, to escape the blood meal and avoid being digested. It takes the ookinete 18 hours to mature into the motile stage. During this time, the parasite withstands environmental stresses from both the blood meal digestion and the mosquito's immune response. Our data indicates that *Plasmodium* significantly upregulates antioxidant genes in response to these stresses. To investigate this oxidative stress response we have challenged mosquito-stage parasites in vitro with various reactive oxygen species. Our results suggest that *Plasmodium* induces distinct genes in response to specific concentrations of each oxidant. These results allow us to understand how the malaria parasite responds to different environments. Knowledge of the antioxidant defenses of the parasite may be used for transmission intervention studies.

Anastasia Kozyleva

Synthesis of Folate containing DicarbazolePhenothiazine PDT Agents

Chemistry, Biochemistry Emphasis (2012)

Mulcahy Scholars Program

Mentored by Dr. David Crumrine, Chemistry

Curing cancer has never been an easy task, but the resources that exist today offer a much more aggressive battle against the disease. Dr. Crumrine's laboratory has joined in this battle by focusing on a more recent method known as Photodynamic Therapy (PDT), a non-surgical procedure that offers the possibility of being non-toxic. If successful, it will cause little damage to healthy cells, the way that chemotherapy does, concentrating most of its effect on the tumor. In the lab we will be synthesizing Phenothiazine-based photosensitizers (PS) which are PDT agents that are used to target cancer cells. When these complexes are exposed to certain wavelengths of light they become excited. When excited, PS can react with the cell membrane or with cellular oxygen, generating cytotoxic oxygen. The oxidative stress caused by this oxygen will kill local cells, leading to tumor death. Several methods using copper catalysts are being studied and tried to synthesize the optimal PDT agents.

Angelica Krajewski

The Roots and Routes of the Polish Memoir Genre

English and International Studies (2013)

Provost Fellowship

Mentored by Dr. Dan Vaillancourt, Philosophy

Despite overwhelming political, religious and social strife since the 12th century, Polish writers have embraced memoir as their genre of expression. Poles have explored their lives through personal reflection emphasizing what Czesław Miłosz characterized as a Polish "craze for memoir." The problem with Polish memoir is that, in the words of Marian Kaczmarek, "We do not yet have a history of Polish memoir and it will probably not be written soon." However, the astoundingly progressive works deserve a place on the world stage. We examine the roots of the Polish memoir tradition and the routes it took to establish itself. First, why has the Polish contribution to memoir been lost in the history of world literature? Second, what are the roots of the Polish memoir, from the Medieval period to the partitioning of Poland in 1795? Third, what are the routes the Polish memoir traveled to establish a distinct ontology?

Nicholas Kreifels

Tunisia: Economic Success on a Struggling Continent

Accounting (2011)

Provost Fellowship

Mentored by Dr. Peter Schraeder, Political Science

Tunisia, a country in North Africa, is ranked by the African Competitiveness Report (2009) as number one out of 53 African countries and 40th globally by the Global Competitiveness Report (2009) as concerns the strength and competitiveness of its economy. This ranking stands in sharp contrast to the often gloomy portrayal of Africa in the United States media. My research project is designed to help me, a double major in Accounting and Finance, better understand the puzzle of how Tunisia has succeeded economically where most African countries have failed. I will specifically focus on a variety of explanatory factors: (1) state and private sector relations; (2) credit availability for the private sector; (3) development in banking institutions; and (4) government control, regulation and policy.

Monika Lach

Behavioral and Serotonergic Changes in Response to Repeated Passive Observations of Aggression
Biology (2011)

Mulcahy Scholars Program

Mentored by Dr. Louis Lucas, Biology

This study aimed to investigate the behavioral and neurochemistry changes in response to repeated passive observations of aggression. Using serotonin receptor (5-HT_{1B} and 5-HT₂) binding autoradiography, I hypothesized that passive observers exposed to aggression would show lower densities of 5-HT_{1B} and 5-HT₂ receptors in the dorsal raphe nuclei (DRN), compared to the control group. Thirty-six male Sprague-Dawley rats either observed aggressive (n=18) or non-aggressive (n=18) interactions for 10 min per day for 23 consecutive days. Results indicate that rats observing aggression exhibited higher densities of 5-HT_{1B} and 5-HT₂ receptors in the DRN, compared with those exposed to the non-aggressive condition. Our findings suggest that changes in receptor densities due to chronic exposure to aggression do not resemble the precedent reported for stress-induced aggressive behavior. Furthermore, passive observers appear to develop aggressive behavior through a learned, and not a stress-induced, mechanism.

Katrina Lamont

Nitrogen Conversion in Venezuelan and Kentucky Caves

Biology, Molecular Emphasis (2013)

Mulcahy Scholars Program

Mentored by Dr. Domenic Castignetti, Biology

Caves are oligotrophic environments that have no sunlight and less than two milligrams of total organic carbon per liter (Barton and Jurado, 2007). The way nutrients are cycled in these non-ideal living environments is not greatly understood. Our goal is to examine twenty-five Kentucky and approximately fifty Venezuelan cave pseudomonads, a family of bacteria, for their ability to perform aspects of the nitrogen cycle. Denitrification and ammonification are the two processes of the nitrogen cycle on which we are focusing. The nitrogen cycle plays a crucial role in the cycling of nitrogen throughout terrestrial ecosystems and making it available to organisms. The cycle involves taking nitrogen from the air and converting it into ammonia, nitrate, and nitrite, which organisms can use to make their proteins, amino acids, DNA and RNA. Our collaborative research, with Dr. Hazel Barton, includes looking at Kentucky isolates and determining their ability to perform various aspects of the nitrogen cycle. These, and other cave isolates could be cycling nitrogen because there was pitting of the rock minerals by ammonia, which is a product of the nitrogen cycle.

Devon M. Langston

Peripheral Functionalization of the Novel Cyclophane N3-CTV

English, Creative Writing Emphasis (2011)

Provost Fellowship

Mentored by Dr. Daniel Becker, Chemistry and Dr. Andria Panagopoulos, Northwestern University

The continued interest in Supramolecular molecules, which consist of two or more molecules bound by intermolecular forces, is because of its applicability to multiple fields such as medicine. A scaffold that has been extensively employed in supramolecular chemistry is the trimeric crown-shaped molecule cyclotrimeratrylene (CTV). A 7-step linear synthesis was carried out based on previous work [J. Org. Chem. 2010, 75, 7887-7892] to afford the desired CTV derivative, N3-CTV, in a 42% overall yield. The next goal is to explore electrophilic aromatic substitution (EAS) on the periphery of the trimethyl N3-CTV to create a derivative with halogens located around the periphery. This is done by subjecting Trimethyl

N3-CTV to electrophilic reagents to create a halogenated derivative. The functionalization of positions 4- and 5- around the periphery of the molecule will enable Pd-catalyzed couplings and provide access to manifold derivatives through functionalization to modulate physicochemical properties including solubility and metal-ligating properties.

Lana Larcher

Finding an Ideal Number of Days per Week to Spend in Tutoring

Presented with Naomi Titean

Elementary Education (2012)

Provost Fellowship

Mentored by Dr. Diane Schiller, School of Education

Our research project, "Finding an Ideal Number of Days per Week to Spend in Tutoring" involved hiring approximately 30 tutors to work at local Chicago Public Schools, all of which have consistently scored below state standards on ISAT testing. My tutors worked with approximately 40 (or more) students per school, in 4th-8th grade, who have scored between 0.25 and 2 standard deviations below state expectations. Students came in to tutoring approximately two or three times per week, watched COUNTDOWN videos correlated to the subjects they were struggling with, and played math games with their tutor. The students also completed activity sheets with each video watched to facilitate learning. Progress was analyzed in the spring of 2011. The interpretation of the statistical analysis is that there is a significant difference between achievement of students who spend two or less days per week in tutoring as compared to students who spend three or more days per week in tutoring. Our research is based on B. S. Bloom's research, which indicates that individual instruction (tutoring) can raise test scores by up to two standard deviations. Our project is rooted in social justice and giving back to the community surrounding Loyola University Chicago.

Samantha Lewandowski

Towards an Applicable Definition of Sustainable Development in Inner Cities

Environmental Science and Sociology (2011)

Mentored by Dr. Marilyn Krogh, Sociology and Dr. Kelly Moore, Sociology

The purpose of this project is to describe what is meant by the term sustainable development from an environmental studies perspective, as well as what its application would look like in an American inner city context. The environmental studies perspective holds that sustainable development includes social, environmental, and economic components. However, ambiguity often surrounds the term and uncertainty exists regarding how to utilize such a complex notion that involves such diverse fields. This project will formulate a more concise, applicable definition of sustainable development. Furthermore, it will shed insight on how to do sustainable development in inner cities, while at the same time arguing that this specific type of development is needed if the social problems in inner cities are to be reduced and the quality of life there is to be increased.

Jeff Leya

Characterizing the Subtelomere Region of Human Chromosome 21p

Biology, Molecular Emphasis (2011)

Mulcahy Scholars Program

Mentored by Dr. Jeffrey Doering, Biology

The location of heterochromatic DNA, or transcriptionally inactive DNA, makes its importance in chromosomal organization and replication clear. One of the major areas of heterochromatic DNA is on the te-

lomere of acrocentric chromosomes. Telomeres are found on the ends of both arms of chromosomes and have several important functions in the cell. These include maintaining the integrity of the genome, homologous pairing during meiosis and mitosis and recombination. My work focuses on four hybrid cell lines, with each containing four different copies of human chromosome 21. My first goal was to compare the sequences to determine the extent of population polymorphisms, this was done via bacteria cloning and sequencing. The sequences were then localized to a specific portion of the portion of chromosome 21p via PCR. My final goal was to study the histone modifications present in the 21p telomere. This was done with a technique known as Chromatin Immunoprecipitation (ChIP) is used.

Richard Linchangco

The search for the deferrioxamine B-metabolizing gene in the bacterium Mesorhizobium loti

Presented with Jhanvi Shah

Biology (2011)

Biology Research Fellowship

Mentored by Dr. Domenic Castignetti, Biology

The bacterium *Mesorhizobium loti* is able to degrade the siderophore deferrioxamine B (DFB). Four mutants (18, 26, 34, 42) unable to metabolize DFB were produced using transposon mutagenesis (Tn5: OT182). The transposon apparently has inserted itself into one or more of the genes that enable *M. loti* to degrade DFB. Since the transposon's nucleotide sequence is known, it can act as a marker. DNA of four mutants was digested using EcoRI and BglII restriction enzymes and then run on a Southern blot using the transposase gene on the transposon as a probe. These enzymes produce fragments that contain transposon DNA, but also *M. loti* DNA. The fragments obtained from the BglII digest were then ligated with T4 DNA ligase and transformed into *E. coli*. To ensure the quality and composition of the isolated recombinant plasmids from BglII digest, as well as check the plasmid formation from Mutant 34 and 42 an electrophoresis was conducted. Once the plasmids were confirmed as containing the correct DNA, primers were designed using the known sequence of the transposon and the plasmids will be sent out for sequencing.

Taylor Losole

Antenatal Depression: A Comparison of Two Common Measurement Tools

Biology and Bioethics (2012)

Research Mentoring Program

Mentored by Mary Byrn, PhD student in Nursing and Dr. Sue Penckofer, School of Nursing

At least 20% of women have depression during pregnancy. Antenatal depression is related to poor prenatal care, delivery complications, preterm delivery, low infant birth weight, poorer maternal infant attachment, and negative infant reactivity. The Edinburgh Postpartum Depression Scale and the Center for Epidemiologic Studies Depression Scale are two common instruments found to measure antenatal depression. This study will determine the prevalence of antenatal depression in a sample of 135 pregnant women between 24 and 40 weeks gestation, and compare the two tools (CES-D and EPDS). Both the CES-D and EPDS were found to be reliable, with Cronbach's alphas of .895 and .908 respectively. According to the CES-D (≥ 16), 28% of the sample had depression. Using the EPDS (≥ 12), 16% of the sample had depression. This study will provide researchers and clinicians useful information on the best instrument to use when measuring antenatal depression.

Alexandra Luterek

Project MENTOR

Presented with Amanda Cimaroli

International Studies (2012)

Provost Fellowship

Mentored by Dr. Julia Pryce, School of Social Work

Please see Cimaroli on page 11.

Katarzyna Majewska

Reaction rates of atmospheric constituents in Chicago Air

Chemistry (2011)

Provost Fellowship

Mentored by Dr. Martina Schmeling, Chemistry

My Provost research project will be based on analyzing the chemical composition of atmospheric constituents and the calculation of the reaction rates and time it takes for the reactions existing in the atmosphere to happen. I will use different instruments to collect and analyze the air samples. After that, I will use the skills learned in Physical Chemistry to perform advanced kinetic calculations on the data collected. I will spend the biggest amount of time on collecting and analyzing data subsequently will apply my knowledge from Physical and Environmental Chemistry predict reaction rates and pathways.

Elias Majid

Project Victory Garden

Biology (2011)

Provost Fellowship and Mulcahy Scholars Program

Mentored by Dr. Chad White, Natural Sciences and Adam Schubel, CUERP

The problem of distance and ignorance are recurring themes in the faults of the modern food system. Food is grown in one location than shipped a great distance to the rest of society, locking in a spiritual, physical and mental distance from our food. This project has been working to re-introduce food production on Loyola University Chicago's campus as a proxy to the city of Chicago. Where a container garden on a concrete terrace was created and evaluated. Two questions were evaluated 1) are plants in a container garden a viable source of food production, 2) will the garden create a distinguishable increase in population in terrace space.

Jacob Marshall

STAAC (Study of Teen Adjustment in Affluent Communities)

Psychology and Biology (2013)

Provost Fellowship

Mentored by Dr. Amy Bohnert, Psychology; Lea Travers, PhD student in Clinical Psychology and Edin Randall, PhD student in Clinical Psychology

Research of adolescents from affluent families suggests that they experience higher levels of depressive symptoms than adolescents from low-income families. Little is known, however, about how the ability to plan and organize (i.e., executive functions) may contribute to increased adjustment problems among affluent adolescents. In this study, we plan to examine relations between depressive symptoms, and executive functioning. We will also examine gender differences between these variables.

Nuria Martinez

Democracy, Culture and Catholicism International Research Project

Accounting and Management (2012)

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

Mentored by Dr. Gunes Tezcur, Political Science; Dr. Elizabeth Hemenway, History and Dr. Michael Schuck, Theology

The Democracy, Culture and Catholicism International Research Project (DCCIRP) is a collaborative undertaking by The Joan and Bill Hank Center for the Catholic Intellectual Heritage (CCH) and the Office of the Associate Provost and Assistant to the President for Global Affairs and Initiatives. It gathers scholars from four continents to study the complex relationship between democracy and Roman Catholicism in the modern world. As an undergraduate research assistant, I worked under the guidance of two Loyola professors writing for the publication of the DCCIRP.

Sarah Massarani

Nitrogen Cycling by Cave Bacteria

Biology, Ecology Emphasis (2012)

Mulcahy Scholars Program

Mentored by Dr. Domenic Castignetti, Biology

Caves are oligotrophic environments that have less than two milligrams of total organic carbon per liter. The way nutrients are cycled in these ecosystems is not well understood. Our goal is to examine twenty-five Kentucky and approximately fifty Venezuelan cave pseudomonads, a family of bacteria, for their ability to perform aspects of the nitrogen (N) cycle. The nitrogen cycle plays a crucial role in life as aspects of it provide the element to organisms. It involves taking nitrogen from the air and converting it into ammonia, nitrate, and nitrite, which organisms can use to make their proteins, amino acids, DNA and RNA. Our research, with Dr. Hazel Barton of the University of Northern Kentucky, includes studying the Kentucky isolates to determine if they perform aspects of the nitrogen cycle.

Timothy McAlister

Solving the Bi-Equation

Psychology (2012)

Mentored by Dr. Anthony Burrow, Psychology

The goal of the study was to examine differences in sexual behavior and connectedness in personal relationships and religion between different sexual orientations. The participants completed a 15-20 minute survey. The survey consisted of topics such as sexual debut age, disclosure of sexual identity others, and opinions about the fluidity of sexual orientation and within group differences and similarities. Results showed that individuals of the same gender identities had more likenesses than members of the same sexuality orientation. All homosexual were more likely to have a lower oral sexual debut age than intercourse that involved penetration. Connectedness to others was higher in male homosexuals with a masculine identity compared to a feminine identity. However, homosexual men with a masculine identity were less like to disclose sexual orientation to other. When it was disclosed, it was often to a female. Homosexual and bisexual individual were significantly more likely to feel that sexual orientation was fluid and not fixed.

Amara Mian

Expression of Antioxidant genes in Plasmodium

Biology (2011)

Provost Fellowship and Mulcahy Scholars Program

Mentored by Dr. Stefan Kanzok, Biology

The Malaria parasite *Plasmodium* infects humans and mosquitoes during its complex life cycle. It's transmission vectors and primary hosts are female *Anopheles* mosquitoes, which represent an environment dramatically different from the human host. Stress response mechanisms have to be in place in the protozoan parasite to prevail and secure transmission. To better understand the survival strategies of *Plasmodium* we investigate the parasites' response to oxidative stress by monitoring the expression patterns of putative antioxidant genes during oocyst and sporozoite development in the mosquito vector. A novel thioredoxin-like gene shows dramatic upregulation in mosquito stage but not in blood stage parasites.

Adam Michael

Practicing What We Preach: writing center mission and identity in the age of assessment

Presented with Kimberly Cummins, Juan Favela, Claire Gaddis, and Justyna Obrzut

Physics (2013)

Mentored by Dr. Michael Meinhardt, English and Director, Writing Center

See Cummins abstract on page 12.

Sophie Mir

The EmPort Assessment: Measuring Preschoolers' Emotion Regulation in a Field-Based Setting

Presented with Jessie Duncan

Psychology and Biology (2012)

Mulcahy Scholars Program

Mentored by Kelly Haas, PhD student in Psychology; Jacyn Lennon, Psychology and Dr. Christine P. Li-Grining, Psychology

Please see Duncan on page 14.

Sophie Mir

Is earlier parenting related to later children's later executive functioning during early childhood?

Psychology and Biology (2012)

Provost Fellowship

Mentored by Kelly Haas, PhD student in Psychology; Jacyn Lennon, Psychology and Dr. Christine P. Li-Grining, Psychology

Research has provided compelling support that there is a correlation between children's later development and executive functioning (EF). EF refers to higher-order cognitive processes that aid individuals in the monitoring and regulation of actions, including skills such as inhibitory control, planning, and attentional flexibility. Relatively little research has examined the association between parenting and EF. The present study investigates the relation between maternal sensitivity and children's later distractibility, a correlate of EF. The data for the study was obtained from the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development (SECCYD), a longitudinal, multimethod dataset based on children from 10 locations throughout the U.S. (n = 977). Results, for

example, revealed a modest bivariate correlation between earlier measures of mothers' sensitivity and children's later distractibility.

Lauren Mogil

Retrotransposon-associated minisatellites in the soybean genome

Presented with Kamil Slowikowski

Biology and Bioinformatics (2011)

Carbon Scholars Program

Mentored by Dr. Howard Laten, Biology and Dr. Catherine Putonti, Biology and Computer Science

The soybean genome contains several thousand copies of the GmOgre (Gmr9) retrotransposon. A ~20,000 bp consensus sequence was previously constructed and found to contain a minisatellite repeat region between the end of the coding region and the 3' Long Terminal Repeat (LTR). The region contains five distinct minisatellite families with monomers ranging in length from 26 to 164 bp. The monomers are interspersed and repeated three to sixteen times within this region of GmOgre. The origin of this minisatellite region is not yet known. We developed a computational method to characterize other loci where these minisatellites might be present. We found a total of 77,265 monomer copies of the five minisatellites in assembled chromosomes from Genbank. In addition to those found in members of the GmOgre family, we found 486 copies of these minisatellites in 176 retrotransposons representing 21 additional retrotransposon families. Also, an additional 23,413 monomers are located in regions of the soybean genome that are currently unannotated. However, the majority of these minisatellites are contained in GmOgre. PCR analysis suggested and the computational analysis confirms that the total lengths of some of the minisatellite clusters may be far longer than that found in the GmOgre consensus sequence.

Jessie Montes de Oca

Coping Socialization in African American Youth: Do Kids Listen to Their Mothers?

Psychology (2012)

Mentored by Dr. Noni Gaylord-Harden, Psychology

Low income, African American youth face stressors at higher rates than other groups (Brantley et al., 2002). To facilitate adaptation to stress, parents socialize their children to use coping strategies (e.g., Abaied, & Rudolph, 2010). The current study examined associations between mothers' socialization of coping and child coping strategies, as well as how discrepancies between mother and child reports of coping socialization predict child coping. Participants were 95 African American youth (mean age = 11.80) and their parents. Children's reports of coping socialization of engagement and disengagement were positively associated with children's use of engagement and disengagement coping. Mothers' self-reports of coping socialization were unrelated to child coping. Larger discrepancies between parent and child reports of socialization were associated with more maladaptive coping, but these specific associations varied by gender. Results are discussed in terms of the implications of multiple reporters of parents' socialization on children's coping behavior.

Amanda Moore

In vivo Study of Zebrafish Response to a Bovine Serum Albumin based Folate Directed Photodynamic Therapy Agent

Biology (2011)

Mulcahy Scholars Program

Mentored by Dr. Ken Olsen, Chemistry and Dr. Eric Schroeter, Biology

By developing a photodynamic therapy agent using complex with Bovine Serum Albumin (BSA), folate and malachite green or fluorescein we can potentially induce cell death in cancer cells. We are using zebrafish as a model organism to test the effectiveness of the complex. With this complex the cancer cell would take up the BSA complex using the folate receptor endocytosis and when a laser hits the cell it excites the malachite green which in turn converts the oxygen within the cancer cell to singlet oxygen. The production of singlet oxygen leads to cell toxicity and death. Zebrafish have the ability to regenerate tissue. This ability provides a great model organism for our type of study because we can potentially kill a cell and watch it be replaced by the organism. Like cancer cells, cells of zebrafish embryos will also have folate receptors due to their rapid growth. In preliminary experiments we observed that the photodynamic therapy agent was ingested by the zebrafish and localizes within the gut.

Geneva Morris

South Asians in the Media: Perceptions and Representations

Anthropology and International Studies (2011)

Research Mentoring Program

Mentored by Bhoomi Thakore, PhD student in Sociology

The media is a powerful and transformative factor on individual and group socialization. Although in recent years media representations of minority groups have become more prevalent and positive within the media, there is still a prevailing tendency to perpetuate stereotypes. The South Asian community has grown in size and representation in the media, but there are still gaps in the research and subsequent literature surrounding this group. By conducting research on the efficacy of various research methods, this project worked to create a successful, thoughtful, and effective survey to examine contemporary representations of South Asians in the American popular media. As an initial step in the overall project, the survey results were used to unpack the effects of such representations on the formations of South Asian-American's identity and non-South Asian-American's racial perceptions. The concluding survey results will attempt to fill the gap in literature about South Asians as well as to encourage the future participation of underrepresented groups in media studies.

Jakob O. Nalley

Retinoic Acid as a Node in a Developmental Pathway Influenced by Teratogen Exposure

Biology, Ecology Emphasis and Environmental Science (2011)

Mulcahy Scholars Program

Mentored by Dr. F. Bryan Pickett, Biology

Retinoic Acid (RA) is a crucial developmental regulator in the early developmental patterning of vertebrate embryos. Retinoic acid is produced primarily by mesoderm, but it signals to brain, gut and muscle. The enzyme retinaldehyde dehydrogenase 2 (RALDH2) takes part in a complex pathway that converts vitamin A (retinol) into retinoic acid. We have constructed a reporter transgene, RALDH2-YFP, fusing the first 3100 base pairs of the RALDH2 promoter to an open reading frame of a cDNA of yellow fluorescent protein (YFP) in a Tol2 transposon. A stable transgenic zebrafish line has been made incorporating this construct. By observing RALDH2-YFP fluorescent expression, developmental patterning events can be monitored as embryos are exposed to environmental teratogens, specifically temperature differences. We have discovered that temperature exposure modifies the expression of this transgene, suggesting that environmental insults may interact directly with retinoic acid production to influence embryogenesis in fish. Through observational studies utilizing YFP fluorescent expression and known developmental landmarks, we have been able to quantify the impact temperature has on the developmental timeline. We have also observed a number of posterior deformities that may arise due to the increase in water temperature. We aim to gauge the significance of these observed deformities at the population level. Our work has potential application to the impact of global climate change on wild fish populations.

Kevin Nuechterlein

Changes in Rule-Based Category Learning with Age

Presented with Krishna Bharani and Dietta Chihade

Psychology (2011)

Mentored by Dr. Robert Morrison, Psychology

Please see Bharani abstract on page 9.

Justyna Obrzut

Practicing What We Preach: writing center mission and identity in the age of assessment

Presented with Kimberly Cummins, Juan Favela, Claire Gaddis, and Adam Michael

Biology (2012)

Mentored by Dr. Michael Meinhardt, English and Director, Writing Center

See Cummins abstract on page 12.

Jennifer Obrzydowski

Identification of Pyoverdinin Siderophores in Bacterial Cave Isolates

Presented with Mary Ayers

Biology (2013)

Mentored by Dr. Domenic Castignetti, Biology

Please see Ayers abstract on page 7.

Kelsey Oseid

Developing Well-Designed, Well-Researched Informational Materials To Aid Refugees and the Volunteers Who Serve Them

Visual Communications and Sociology (2011)

Provost Fellowship

Mentored by Joyce Epolito, MFA, Fine and Performing Arts

The purpose of this faculty research assistance position is to develop new materials in conjunction with First Steps Publishing. Existing materials created by First Steps Publishing were bilingual, with text in English and Burmese. With the aid of input from user surveys and focus groups, as well as a thorough review of resettlement materials produced by other nonprofits, First Steps' existing materials were synthesized into a comprehensive all-English volume. The new materials are highly illustrated with an emphasis on step-by-step visuals to enhance readability for low-literacy and English Language Learning users. The materials are not specific to refugees from any particular language background, and so can be used by a wider number of people. Additionally, so that refugees and volunteers will have free automatic access to them, the materials will be made available through the First Steps website.

Reggie Pacheco

Stress as a Mediator between Income and Achievement among Low-Income, African American Youth

Psychology (2011)

Mentored by Dr. Maryse Richards, Psychology and Israel Gross, PhD student in Clinical Psychology

It's well established that poverty affects children and adolescents' academics, but less is known about mechanisms driving this relationship. Data from 167 fifth to eighth grade low-income urban African

American adolescents were collected. We hypothesized that perceived stress (a self-report measure) mediates the relationship between total family income and GPA. Regressions indicated significant relationships between income and GPA, $\beta = .19$, $t(170) = 2.52$, $p = .013$, income and stress, $\beta = -.20$, $t(170) = -3.37$, $p = .001$, stress and GPA, $\beta = -.16$, $t(167) = -2.10$, $p = .037$. When stress was controlled, income predicted GPA but was significantly reduced, $\beta = .18$, $t(166) = 2.42$, $p = .017$. The Sobel method revealed the indirect path (the reduction in the direct path) was statistically significant, $z = 1.97$, $p < .05$. Thus, perceived stress youth face from poverty negatively impact academic outcomes. Implications of this research are discussed.

AuBre Parnicky

Communication and Research in Social Work

Social Work (2011)

Provost Fellowship

Mentored by Dr. Shweta Singh, School of Social Work

Through three projects, I have been analyzing the significance of communication and research within the field of social work. The three projects I have done in collaboration with Dr. Singh are: a radio show showcasing the Indian subcontinent, a series of play therapy sessions with 5th graders at a Chicago Public School that has a high concentration of immigrant and refugee children, and analyzing interviews for content and documenting the differences shown between the male and female interviewees. Through these projects, I have been able to do research on a population that at Loyola, and within the larger community, is largely forgotten; the people of the Indian Subcontinent are the focus of my research and working with this population has shown a different side to research and social work that is invaluable to my career.

Bhavik Patel

A study on the Ligand-binding Pathways of the Heme-containing PAS Protein, EcDOS, of Escherichia Coli

Chemistry and Classical Civilization (2011)

Provost Fellowship and Mulcahy Scholars Program

Mentored by Dr. Ken Olsen, Chemistry

The PAS domain is an important structural motif that is found in proteins from all kingdoms of life (Saskura et al, 2006). Recent studies have shown the Escherichia coli direct oxygen sensor (EcDOS) to sense and bind oxygen at the heme within its PAS domain. Ligand exiting pathways for oxygen and subsequent conformational changes which govern the cognate phosphodiesterase activity, however, still remain unknown. Using Locally Enhanced Sampling Molecular Dynamics (LESMD), we found trajectory pathways for diatomic oxygen in both the native EcDOS and several mutants. Our results suggest interactions amongst Arg97, the oxygen ligand and Phe 113. We propose a model which suggests three pathways by which the oxygen exits the heme-PAS domain of EcDOS and distinct functions for specific residues. By understanding how ligands, like oxygen, exit the protein and the importance of specific residues involved within the process, we have a better understanding on how the specific signal transduction of EcDOS occurs within Escherichia coli and the PAS-domain family as whole.

Kelsey Patel

Transcription Regulation in Escherichia coli

Biology (2011)

Research Mentoring Program

Mentored by Bruno Lima, PhD student in Microbiology and Immunology

Transcription is the basis for how bacteria adapt to changes in their environment. Bacteria can respond to changing environmental conditions by altering transcription of appropriate genes. Some environmental changes rely on the activation of signal transduction pathways to relay this information and orchestrate the appropriate response. My project focused on the CpxAR signal transduction system and some of the genes that it regulates. The CpxAR system is composed of the sensor kinase, CpxA and response regulator, CpxR. Phosphorylation of CpxR by CpxA regulates transcription of many genes, including *cpxP*. Previous work has shown that *cpxP* transcription can be regulated in a CpxA-independent manner by the addition of glucose to growth media. To determine whether glucose regulates transcription of other CpxR-regulated promoters, we measured transcription activity of 8 CpxR-regulated promoters. Our results indicated that all tested promoters are regulated by glucose; however, this regulation is distinct from by CpxA-dependent regulation. We conclude that glucose-induced transcription regulation is distinct from CpxA-dependent regulation.

Koonal Patel

Fostering Peer Networks for First Generation College Students through Living Learning Communities
Psychology (2009)

Mentored by Dr. Colleen Conley, Psychology and Daniel Dickson, PhD student in Clinical Psychology

Past research documents the unique difficulties faced by first generation college students (FGCS) in comparison to traditional students. FGCS are more likely to be employed and commuters; though, less likely to seek outside academic resources (e.g., academic advising, club involvement) (Pike & Kuh, 2005). Recent findings suggest these factors are negatively associated with development of social networks and decreases the likelihood of utilizing University resources, which is associated with higher student dropout rates (Barry, Hudley, Kelly, & Su-Je Cho, 2009; Bui, 2002; McCarron, G. & Inkelas, K., 2006). Recently, Living Learning Programs (LLPs) have been implemented at many universities to foster peer connections through shared academic and social experiences in a residential community. For FGCS, these peer networks may offer opportunities to discuss their unique experiences and receive support on campus. The current research hopes to distinguish the effects of LLPs on FGCS in fostering social networks.

Nirav Patel

*Analysis & Cloning of the Zebrafish *fezf2* Promoter*

Biology, Molecular Emphasis (2011)

Provost Fellowship

Mentored by Dr. Eric Schroeter, Biology

By using fluorescent proteins, it is possible to observe retinal cells as they develop. The purpose of this project is to introduce different genes into live zebrafish embryos to study the neural development within zebrafish. The Gateway system has been created to facilitate insertion of the transgenes which allowed the creation of the final expression construct. Upon successful creation of the destination vector we can microinject our plasmid into fish embryos and study the expression patterns of the *Lmb1* and *Prox1* promoters through neural development in the retina.

Poonam Patel

The In Vitro Innervation of Taste Cells by Rat Geniculate Ganglion Neurites

Biophysics and Biology (2012)

Mulcahy Scholars Program

Mentored by Dr. M. William Rochlin, Biology

In vivo, synapses form between taste cells of fungiform papillae and sensory axons of the geniculate ganglion. To date, no one has succeeded in getting neurites to innervate taste cells in vitro. By optimizing culture conditions using different concentrations of neurotrophic factors and substratum molecules, I can promote contact between neurites and taste buds. Ultimately, we will try to determine if these contacts are functional using electrophysiological approaches. I am investigating if Eph/ephrin signaling, which can mediate repulsion or stabilization are expressed in these cells and can influence taste cell recognition.

Purvi Patel

Women in the Academia

History (2011)

Provost Fellowship

Mentored by Dr. Bridget Turner Kelly, School of Education

Women have experienced disproportionately slow promotion and tenure rates (Christman, 2003; Finkelstein et al., 1998) and disproportionately high rates of leaving academia by their second or third semesters (Glazer-Raymo, 2001; Moody, 2004; Trautvetter, 1999). The literature (Bensimon & Marshall, 2000; Finkelstein et al., 1998; Glazer-Raymo, 2001; Rice, Sorcinelli & Austin, 2000) on women faculty generally supported the assertion that the socialization process, “work[s] to the disadvantage of women in academe [and] continue[s] to exert a strong, if increasingly unheralded impact” (Acker & Armenti, 2004, p. 4) on their tenure and promotion. Feminist scholars have documented the ways in which faculty socialization disadvantages women in particular. This study sought to listen, understand and examine specific events that women faculty voiced as critical to their experience. Utilizing these experiences this study examined historical, institutional and political aspects of faculty culture from a critical feminist perspective defined by Bensimon and Marshall (2000). The critical feminist perspective is not about comparing women’s experiences to men. Rather, it is concerned with exposing gender biases found in traditional structures.

Eric D. Pedone

Synthesis of New Dyes for Photodynamic Therapy

Chemistry, Biochemistry Emphasis and Spanish (2011)

Provost Fellowship and Mulcahy Scholars Program

Mentored by Dr. David Crumrine, Chemistry

Photodynamic therapy is a relatively new form of cancer treatment which focuses on the use of photoexcitable drugs which become cytotoxic once exposed to specific wavelengths of light. This treatment is less invasive than other forms of chemotherapy treatments, as it can be directed specifically toward a tumor with the use of a light source. This research project aims to synthesize a new photosensitizer complex using the aromatic tricyclic compound phenothiazine as the starting material. The goal is to create a photosensitizer which responds to infrared light. This particular wavelength is believed to be more effective than visible light at penetrating bodily tissues to reach deeper tumors.

Sarah Pekoc

Links between Children’s Self-Regulation and DSM Prevalence Rates

Presented with Christina Amaro

Psychology (2013)

Mentored by Dr. Christine Li-Grining, Psychology; Maria Marcus, PhD student in Psychology and Jaclyn Lennon, Psychology

Please see Amaro abstract on page 7.

Veronica Policht

Hydrodynamics Simulations of Density Inversion in Granular Layers

Biophysics (2012)

Mulcahy Scholars Program

Mentored by Dr. Jon Bougie, Physics

Granular hydrodynamics studies the general behavior of grains, i.e. collections of roughly spherical macroscopic particles. The focus of my research has been the nature of density inversion: density inversion is observed when a low density layer of grains is close to the plate of oscillation with a high density layer of grains above. Where density inversion occurs, the energy imparted to the grains by the plate's motion can initiate something analogous to a phase-change with the bottom level behaving as a gas and the upper level behaving like a liquid and, in special cases, a solid. To model density inversion, I use a continuum simulation for three-dimensional, time-dependent forms of hydrodynamic conservation equations. Using this program I have attempted to identify a set of ideal circumstances for density inversion. These simulations have shown that the time-dependence of the density inversion is related to its shaking frequency.

Steven Portnoy

"I love you, I love you not." Narcissists' Evaluation of Romantic Partners after Perceived Rejection

Psychology (2011)

Provost Fellowship

Mentored by Dr. Tracy DeHart, Psychology

People high in narcissism are believed to have high explicit (i.e., conscious) beliefs about the self that mask underlying negative implicit (i.e., unconscious) beliefs about the self (DeHart, Longua, & Smith, in press). Given these discrepant explicit and implicit beliefs about the self, one major question which arises is if people high in narcissism enhance their romantic partners as they do the self. In the current research, a 14 day web-based Diary Study of College Student Daily Life was used to investigate the hypothesis that the relation between people's reports of perceived rejection and evaluations of their romantic partners would be influenced (i.e., moderated) by their level of narcissism. Specifically, the current study predicted that people who were high in narcissism would demonstrate a stronger relation between perceived rejection and negative evaluations of romantic partners compared with people lower in narcissism. This study will add to our understanding of narcissism and relationship functioning.

Lauren Potthoff

Exposure to Media & the Thin Ideal: How Do Women Respond?

Presented with Connie Kalble

Psychology and Sociology (2011)

Mulcahy Scholars Program

Mentored by Dr. Scott Leon, Psychology

Please see Kalble abstract on page 19.

Srividya Prasad

Functionalization of Rubrene Crystals via Vapor Phase Reaction

Chemistry (2012)

Carbon Scholars Program

Mentored by Dr. Jacob Ciszek, Chemistry and Dr. Douglas Natelson, Rice University

Organic semiconductors are an emerging class of materials that promises to revolutionize electronics

and computing, especially devices such as light-emitting diodes (OLEDs) and field-effect transistors (OFETs). Of particular interest are polyaromatic compounds such as tetracene and rubrene; recent studies demonstrate that applying a self-assembled monolayer (SAM) onto a crystalline rubrene surface dramatically increases current conductivity. However, the surface chemistry of rubrene is not well understood. Functionalizing the surfaces of homogenous tetracene and rubrene single crystals with the well-studied, versatile Diels-Alder reaction provides a means to better grasp how SAMs improve conductivity. We built a horizontal, multi-zone quartz furnace to fabricate tetracene and rubrene single crystals via physical vapor growth. By adjusting their respective temperature gradients (including source temperature, deposition temperature, and growth time), the size and purity of these crystals is optimized. We studied crystal face adsorption and monolayer coverage of a fluorescent dye on these crystals through confocal fluorescence microscopy.

Bryan Quach

Development of Computational Methods for DNA Regulatory Motif Prediction in Plasmodium Promoter Regions

Bioinformatics (2012)

Carbon Scholars Program

Mentored by Dr. Catherine Putonti, Biology and Computer Science; Dr. Stefan Kanzok, Biology and Dr. Konstantin Läufer, Computer Science

Malaria is a disease caused by parasites belonging to the genus *Plasmodium* that causes over one million deaths annually. Despite research efforts on gene control mechanisms in *Plasmodium* species, little is known regarding its transcriptional regulation. Numerous regulatory element binding site prediction algorithms have been developed to aid in uncovering novel transcription factor binding sites (TFBS), but they have proven ill-suited for analyzing organisms with AT-skewed genomes such as *Plasmodium*. We discuss the development of a new algorithm for DNA motif discovery. Our model suggests enhanced motif prediction power by incorporating structural properties from known protein-DNA interaction sites and improved expectation values for statistical pattern recognition using motif-occurrence analysis. The ability to recognize TFBS within *Plasmodium* would provide invaluable insight into the regulation and functionality of the parasite's genes within its two-host system that could potentially lead to the discovery of new targets for controlling Malaria.

Krista Reiling

Qualifying Selective Pressure for Translational Efficiency under Different Environmental Conditions

Biology (2013)

Mentored by Dr. Catherine Putonti, Biology and Computer Science

The adaptation of pathogens to their host(s) is a major factor in the emergence of infectious disease and the persistent survival of many of the infectious diseases within the population. Since many of the smaller viral pathogens are entirely dependent upon host machinery, species often adopt a codon usage profile similar to their host species'. The coding sequence of bacteriophage phiX174 capsid protein was altered to include eleven codons that rarely occur within highly expressed genes or reflect low tRNA abundances in its host, *Escherichia coli* C. The mutant line was propagated via serial plating for several hundred generations under two environmental conditions. Fitness assays were conducted throughout revealing different selective pressures between the two experimental conditions.

Andrea Sarah Roberts

The Impact of Parental Support and Support-Seeking Coping on Academic Achievement and School Behavior in African American Children

Psychology (2011)

Mentored by Dr. Noni Gaylord-Harden, Psychology

Parental support consistently predicts positive outcomes in African American children (Gaylord-Harden, 2008). However, the findings for support-seeking coping are mixed; likely due to discrepancies between support sought and actual support received (Landis et al., 2007). For children without sufficient support from others, seeking support might predict poorer outcomes. The current study examines differences between two groups of children on academic achievement and school behavior: 1) children with high support-seeking coping and high parental support, and 2) youth with high support-seeking coping and low parental support. It is predicted that children in the second group will show lower academic achievement and more behavior problems than the children in the first group. Participants are 235 African-American children (mean age = 10.37) who reported on coping strategies and parental support. Teachers rated classroom behaviors and provided standardized test scores. The implications for social support sought and the quality of support received are discussed.

Jordan Rohlfing

An Interaction between Philosophy and Psychology: Using Literature Reviews to Evaluate one of Nietzsche's Theories

Political Science and Psychology (2011)

Research Mentoring Program

Mentored by Justin Marquis, PhD student in Philosophy

The research project was a multi-disciplinary study in the fields of philosophy and psychology. The study attempted to use psychological literature reviews to find support for what Nietzsche theorized. Nietzsche believed that individual differences will affect how people view and cognitively relate the world around them. Individual differences could include values, affects, language, needs, culture, drives, and motivations. Examples of how humans relate to the world around them include perception, beliefs, knowledge, classification and categorization. Nietzsche believed the relationship between individual differences and cognition to be such that some ways of cognizing the world may be incommensurable with others. The literature review did not support such a strong assertion, but Nietzsche's theory did suggest possible future research programs.

Zachary Romer

*A study of the generation time of bacteriophage $\Phi 8$ in *Salmonella* and *P. syringae**

Bioinformatics (2012)

Provost Fellowship

Mentored by Dr. Catherine Putonti, Biology and Computer Science

Bacteriophage $\phi 8$ is a double stranded RNA-based virus that has been shown to be a distant relative of the well-characterized $\phi 6$. Its genetic material is bound in three segments, contained inside a polyhedral capsid which is enveloped by a lipid-containing membrane (Hoogstraten). $\Phi 8$ attaches to its hosts by means of the rough lipopolysaccharide, a constituent of the outer membrane of gram-negative bacteria. In this paper the generation time of $\phi 8$ has been tested in two different hosts, *Salmonella* and *P. syringae*. $\Phi 8$ was determined to have a shorter generation time in *Salmonella* than in *P. syringae*, and also tended to form more and slightly larger plaques in *Salmonella*. Although $\phi 8$ infects *P. syringae* in the same manner as it does *Salmonella*, it seems that the virus has difficulties reproducing as effectively in *P. syringae*, and exhibits those difficulties through its decreased plaque formation and longer generation time.

Joseph Saelens

Mutation Accumulation and Genomic Stability of a Bacteriophage with an Artificially Increased Genome Size

Bioinformatics (2011)

Mulcahy Scholars Program

Mentored by Dr. Catherine Putonti, Biology and Computer Science

It has long been observed that pathogens and the hosts they infect possess similar genomic sequence compositions. Pathogen-host genomic sequence compatibility is particularly important in viral infections, as viruses are often entirely dependent upon the biological machinery of the host they infect to reproduce. It has previously been observed that bacteriophages (viruses that infect bacteria) often utilize the preferred codons (triplets of nucleotides corresponding to a given amino acid) of its host species. In previous experiments evolving mutant strains of the bacteriophage Φ X174 containing engineered subsequences that exhibit the opposite codon bias of *Escherichia coli*, we have observed a strong evolutionary pressure for these mutants to revert (for the most part) to the ancestral state of those subsequences. In our latest experiment, we are investigating evolutionary pressure both in regards to mutation accumulation in non-coding regions of viral genomes as well as the stability of a genome as it continues to increase in size.

Carlene Schleisman

The rearrangement of a N3-CTV derivative

Chemistry, Biochemistry Emphasis (2012)

Mulcahy Scholars Program

Mentored by Dr. Daniel Becker, Chemistry

Supramolecular chemistry involves the formation of molecular scaffolds that have the ability to be used in specific intermolecular recognition of guest molecules. Cyclophanes, supramolecular structures composed of aromatic units with bridging chains, may be used to form cage-like structures which can be utilized in molecular and receptor recognition, to prepare crown ethers, and as building blocks for organic catalysts. My research focused on the cyclophane N3-CTV, which was synthesized via a 7-step synthesis involving 3 palladium-catalyzed Buchwald-Hartwig reactions as the key carbon-nitrogen bond forming steps. An attempted complexation with CuBr_2 gave a promising blue color, but soon formed a black crystalline solid. Through X-ray crystallography this solid proved to be a very unusual radical cation that arose from an inner sphere electron transfer, reducing the Cu(II) to Cu(I) and oxidizing the scaffold to the radical cation. I will present the X-ray structure along with a mechanistic hypothesis for the rearrangement.

Patrick Schreiner

Quantifying Genome Sequence Compatibility Between Viruses and Their Hosts

Biology and Bioinformatics (2012)

Provost Fellowship

Mentored by Dr. Catherine Putonti, Biology and Computer Science

Dinucleotide CpG under-representation is well known to occur in mammalian genomes. The leading hypothesis for this under-representation of CpG dinucleotide content can be explained by methylation of cytosine residues and the corresponding deamination that occurs in 5-methylcytosine. Viruses that have infected humans for an extended period of time exhibit these same dinucleotide CpG deficiencies, although CpG dinucleotide content does not result in methylation throughout the viral genome. It is suggested that genomic signatures of viral genomes have a direct correlation with the content of the host DNA in which they infect. The similarity of the viral genome to its specific host's genome allows the vi-

rus to more efficiently escape immune response. We have developed software for the analysis of di-, tri, and tetra-nucleotide usage correspondences between a wide variety of viruses and their hosts. Examination was performed not only at overall genome compositional biases but using a sliding window approach.

Mary Schufreider

Varying Conceptualizations and Measures of Spirituality/Spiritual Well-Being

Psychology (2011)

Research Mentoring Program

Mentored by Kyle Telander, PhD student in Counseling Psychology

This research focuses on the validity of Ryff's scale of psychological well-being. It challenges whether her scale can be applied to all races. Within Ryff's scale of psychological well-being are subsections. We manipulated this scale to fit African Americans, and we changed one of the subsections to measure spiritual well-being. Figuring out how to properly define spiritual well-being and which questions best fit the notion of spiritual well-being was something we worked tediously on. The poster will explore how we decided to define spiritual well-being and how we made our decision.

Breanna Scorza

Targeted Photodynamic Therapy Agents via Folate Mediated Endocytosis

Chemistry and Biology (2011)

Mulcahy Scholars Program

Mentored by Dr. Ken Olsen, Chemistry

In order to synthesize a novel photodynamic therapy agent, hemoglobin protein was isolated from whole bovine red blood cells through sequential ammonium sulfate precipitations and cation-exchange column chromatography. The isolated protein was then covalently modified through the formation of a cross link between hemoglobin dimers in order to stabilize the protein. The hemoglobin will undergo conjugation with a photosensitizer, Malachite Green, and a targeting agent, Folic Acid, before undergoing characterization for further use in anti-tumor treatment.

Shaan Setia

Effects of BPG on Hemoglobin

Biology (2012)

Provost Fellowship and Mulcahy Scholars Program

Mentored by Dr. Ken Olsen, Chemistry

2,3- Bisphosphoglycerate (BPG) is an allosteric effector of human hemoglobin. Presence of BPG will decrease hemoglobin's affinity to oxygen. The deoxygenated form of hemoglobin (T-state) binds BPG more tightly than the oxygenated form (R-state). Our research investigated the interaction between BPG and hemoglobin using molecular dynamics simulations. During a 10 nanosecond simulation, BPG did not disassociate from the oxygenated state of hemoglobin. We have also investigated the interaction energies between different states of hemoglobin and BPG. As expected, the interaction energies between BPG and hemoglobin were much higher in the T-state conformer. This is further evidence proving that BPG does not disassociate from R-state hemoglobin but merely weakens its interactions. Our research also determined that BPG has an effect on oxygen binding pathways. During simulations, oxygen was able to find its way into the binding pockets of R-state hemoglobin within 10 nanoseconds, unlike T-state simulations.

Jhanvi Shah

The search for the deferrioxamine B-metabolizing gene in the bacterium Mesorhizobium loti

Presented with Richard Linchangco

Biology (2014)

Mentored by Dr. Domenic Castignetti, Biology

Please see Linchangco abstract on page 25.

Saloni Shah

The Application of Democratic Principles to the Functioning of the European Union

Political Science (2011)

Provost Fellowship

Mentored by Dr. Alexandru Grigorescu, Political Science

For a continent that had been exhausted after World War II, the first priority was to create a system to prevent another war. It was believed that another war could be avoided if an organization was created that interlinked economies of West Germany and France. Established in 1952, the organization came to be the European Coal and Steel Community, later known as the European Union. Within this organization a Common Assembly, later known as the EU Parliament, was established. To understand any democratic changes that have occurred within this organization, it is necessary to understand the changes in the Parliament. Therefore, this research asks why democratic changes have occurred in the European Parliament by focusing on the representation, voting, transparency, enlargement, and NGO participation.

Sarah Sharief

Species-limits and Phylogeography of Pomatorhinus ruficollis in Southern China

Biology, Molecular Emphasis (2011)

Mulcahy Scholars Program

Mentored by Dr. Sushma Reddy, Biology

While there has been much interest in Asian avifauna in the past, the diversity of species present today is still unknown despite its profound implications for preserving the integrity of long-standing ecosystems. The family Timaliidae or babblers is a large and diverse group with many species only found in southeast Asia. Species-limits in many taxa within this family still need to be resolved in order to be able to conduct biogeographic analyses. We examined the genetic divergence within several populations of the species Pomatorhinus ruficollis. By using modern techniques such as polymerase chain reaction, electrophoresis and DNA sequencing technology, we obtained information about the genetic makeup of these organisms and then used this information to assess species-limits and the phylogenetics relationships between these bird populations. Our analyses of the ND3, ND2, cytochrome b, TGF, MUSK and FIB-5 gene sequences indicated distinct populations of the birds on either side of the Pearl River (Ji Xiang) in China.

Jonathan Siden

Minority Stress Predictors of Substance Use and Sexual Risk Behavior Among a Cohort Sample of Men Who Have Sex with Men (MSM)

Social Work and Women and Gender Studies (2012)

Provost Fellowship

Mentored by Dr. John Orwat, School of Social Work and Michael Dentato, PhD student in Social Work

Much data indicates that men who have sex with men (MSM) are at greater risk for HIV infection and poly-substance use and that the group's minority status inflicts greater stressors upon the population. This study investigates associations between factors of minority stress such as external prejudice, expectations of rejection, and internalized homophobia with poly-substance use and/or sexual risk behaviors. The analysis will utilize data from a previously conducted longitudinal study of self-identified MSM. Factors and outcomes associated with substance use and sexual risk behavior will be investigated. The study will compare whether each aspect of minority stress independently and/or collectively predicts substance use and/or sexual risk behavior amongst MSM. The study will utilize Minority Stress Theory in its interpretation of data and theoretical framing. Expected results are that minority stress factors increase participation in poly-substance use and sexual risk behavior as independent measures and when combined. Final results will expand upon prior research into the relationship between sexual risk behaviors, poly-substance use, and the presence of social stressors, will enhance social workers understanding of the role that social stressors play in regards to MSM's sexual and substance-related behaviors and enhance the cultural competence and scope of interventions .

Kelly Silay

Perceived Discrimination, Stigma Consciousness, and Romantic Relationship Functioning

Psychology (2012)

Provost Fellowship

Mentored by Dr. Tracy DeHart, Psychology

Research has demonstrated the negative impact of discrimination on physical and mental health outcomes as well as impacting interpersonal relationships. The current study explores the effects of discrimination on romantic relationship functioning. Specifically, we explore how stigma consciousness in women and perceived discrimination towards women affect relationship satisfaction. We predict that women higher in stigma consciousness who report more perceived discrimination will also report more negative relationship outcomes compared to women lower in stigma consciousness. In exploring these ideas, we investigate natural, real-world experiences of perceived discrimination and how they affect relationship satisfaction. We used a two-week daily diary research design that recorded participants' daily perceptions of discrimination and romantic relationship functioning. The current research will attempt to provide insight for alleviating the negative effect of perceived discrimination on relationship functioning and to improve negative mental and physical health associated with perceptions of discrimination.

Lacy Simons

Microscopic Investigation into the Dynamics of Falling Chains

Presented with Unleen Kiverkis

Biology, Molecular Emphasis (2012)

Mentored by Dr. Asim Gangopadhyaya, Physics

Please see Kiverkis abstract on page 20.

Lacy Simons

Elucidation of Select Divalent Metal Requirements for Growth of Bacillus anthracis and Expression of Protective Antigen

Biology, Molecular Emphasis (2012)

Mentored by Dr. Clinton Leysath, National Institute of Health

Bacillus anthracis is the gram-positive, sporulating bacterium responsible for causing the disease anthrax. Anthrax toxin plays a key role in virulence. Toxin action commences when Protective Antigen (PA83), a multifunctional protein, transports Lethal Factor (LF) and Edema Factor (EF) into the cell. Protective antigen is comprised of four domains; domain I, which contains the furin cleavage site also has two calcium ions strongly bound to the protein near its C-terminus, that are structurally important to the protein. Many traditional methods of detecting PA involve the use of conventional fluorophores, which have considerable limitations with regard to assay sensitivity. A minimally invasive method of labeling PA for time-resolved fluorometry is to exchange the Ca²⁺ with Eu³⁺ or Tb³⁺ in the twin site of domain I. Western blots were used to detect the amount of PA present at each concentration, and fluorescent microscopy was used to track PA in the cell.

Anna Rose Sjodin

The effects of emerging contaminants on stream ecosystems

Biology, Ecology Emphasis (2011)

Mulcahy Scholars Program

Mentored by Dr. Nancy Tuchman, Biology and CUERP and Lane Vail, CUERP

Research Project Abstract: Globally, one of the largest problems facing human and environmental health is access to fresh water. In recent years, many different pharmaceuticals and personal care products (PPCPs) began appearing in these valuable sources, including rivers, streams, wastewater, and drinking water. In order to address the environmental impacts of these emerging threats, our study examines the effects of azithromycin and Bisphenol-A (BPA) on stream ecosystems. Artificial stream ecosystems were dosed with three levels of azithromycin, and stream community health was measured. After adjusting dosing levels, results show that in streams with high doses of azithromycin, primary production rates were significantly lower than those with low doses and the controls. Communities of the freshwater amphipod *Hyaella azteca* were also maintained and dosed with four different levels of BPA. These results were inconclusive, and reasons for inaccuracy are discussed.

Anna Rose Sjodin

The effects of hybrid cattails on methane emissions in wetlands and implications for restoration

Biology, Ecology Emphasis (2011)

CUERP Fellowship

Mentored by Dr. Nancy Tuchman, Biology and CUERP and Shane Lishawa, CUERP

Wetlands are very susceptible to exotic species invasion. Many in the Great Lakes region have been invaded by hybrid cattail *Typha x glauca*. Using mesocosms, we studied the effect water level has on methane emissions in wetlands. We also assembled chambers to monitor methane emissions through anaerobic digestion of *Typha*. Water depth and methane flux were positively correlated, and there was a negative correlation between redox potential and methane flux. The presence of *Typha* was positively correlated with methane emissions in low water mesocosms, and *Typha* stem density was positively correlated with methane emissions. Also, percent soil organic matter was higher in the high water *Typha* mesocosms. Anaerobic digestion of *Typha* happened most effectively at 38° Celsius. It is important to restore wetlands by eliminating *Typha*, and this can be done sustainably as the *Typha* biomass can be successfully recycled in order to provide methane biogas.

Kamil Slowikowski

Retrotransposon-associated minisatellites in the soybean genome

Presented with Lauren Mogil

Bioinformatics (2011)

Mulcahy Scholars Program
Mentored by Dr. Howard Laten, Biology

Please see Mogil abstract on page 29.

Maria Smith

The Relation between Obesity and Self Care Practices in Low Income, African American Youth with Asthma

Psychology (2011)

Provost Fellowship

Mentored by Dr. Maryse Richards, Psychology

Asthma and obesity are two chronic health conditions that disproportionately effect African American youth. Although studies have continually shown links between these two health conditions, few studies have sought to understand the differences in the way asthma is managed in overweight and healthy weight African American adolescents (Gennuso et al. 1998, Ford 2005). The goal of the current study is to explore these differences, hypothesizing that the asthma self-care practices of overweight students will be significantly different from those of healthy or normal weight. Originally, this study sought to find a mediator in this relationship. While no significant mediation was found, higher student BMI was found to predict higher asthma self-efficacy which in turn predicted asthma self care practices. This finding has important clinical implications for future asthma management programs aimed at African American adolescents.

Ramunas Stanciauskas

Exploring Viral Species In Chicago Near-Shore Waters

Biology, Molecular Emphasis (2011)

CUERP Fellowship

Mentored by Dr. Catherine Putonti, Biology and Computer Science

Microbial life is a critical component to a variety of Earth's ecosystems and includes an assortment of species, the most abundant member being the virus. The composition of an ecosystems' viral diversity has a significant impact on other microbial species and likely drives fluctuations in bacterial density and diversity within the system. While Lake Michigan waters are routinely tested during the summer months however, little is known about the more abundant viral species present. Cultivating within the laboratory necessitates the availability of proper growth conditions, most notably host species availability. Chicago area near-shore waters were sampled and filtered for viral particles. Lytic phages capable of infecting *Escherichia coli* C were detected. Fitness assays and sequencing were conducted to aid in the classification of these viruses. Identification of these particular phages through amplification techniques and plasmid based methods will aid in developing a viral profile of the Lake Michigan ecosystem.

Emily Stuart

Gender differences in event reporting: The role of positive automatic thinking

Psychology

Mentored by Daniel Dickson, PhD student in Clinical Psychology and Dr. Colleen Conley, Psychology

Previous research has supported the effects of positive automatic thinking in promoting mental health (Missel & Sommer 1983). Positive automatic thoughts have been found to be negatively associated with depression (Burgess & Haaga, 1994), and anxiety (Ingram, 1995). Studies suggest that positive auto-

matic thinking is correlated with decreased depression in response to negative events (Lightsey, 1994). The present study hypothesized that increased positive automatic thoughts would buffer the effect of negative life events on perceived stress and tested the hypothesis that gender will moderate these effects. College students (n=1083, 70.9% female, M age = 18.48) completed measures positive automatic thinking, perceived stress and the stressful life experiences. A series of hierarchical multiple regression analyses was conducted to test the three-way interaction among gender, positive automatic thinking and stressful life experiences predicting perceived stress. The three-way interaction was significant ($\beta=.14$, $p=.03$). Further analyses revealed that there were nonsignificant differences between males and females ($|\beta_s| < .07$, $p_s > .11$). Across gender, stressful life experiences were predictive of perceived stress for both high positive automatic thinking ($\beta=.46$, $p<.001$) and low positive automatic thinking ($\beta=.53$, $p<.001$). Results suggest high levels of positive automatic thinking may act as a buffer against perceived stress in response to stressful life events.

Brian M. Sweis

The Behavioral Effects of Chronic Stress on Mental Health

Psychology and Biology (2012)

Carbon Scholars Program

Mentored by Dr. Louis Lucas, Biology and Dr. Robert Morrison, Psychology

Stress is a part of everyday life, which, with repeated, unrelieved bouts, can alter neurophysiological processes in the brain and disrupt regular cognitive and behavioral functions including memory, anxiety, and stress reactivity. Using an animal model in a spatial memory task, 10 adult male Sprague Dawley rats were trained on a radial arm maze before half were exposed to chronic stress (10d, 2hr/d) while the other half remained as non-stressed controls. It was hypothesized that chronic stress would temporarily impair memory performance and that differences in anxiety and stress reactivity could be early indicators of susceptibility to stress. Results reveal that, post-stress, some subjects actually showed improved memory performance that correlates with transient increases in anxiety levels and stress reactivity distinct from those with impaired memory. This suggests that chronic stress can have varying effects on memory, both adverse and beneficial, not independent of predisposed differences in behavior.

Nausheen Syed

Attention and Distractibility in Infants: A Study on Infants and How They Control Their Attention

Bioethics (2011)

Provost Fellowship

Mentored by Dr. Kathleen Kannass, Psychology

The goal of this study was to answer questions about the development of attention in 7 and 11-month-olds and how they resisted distraction. For example, could they use their ability to predict events and form expectations to help distribute their attention? Could they use other skills to help them pay attention? Our project investigated whether infants could prioritize their attention with regards to the type of distracting event presented to them (a predictable distractor or an unpredictable distractor). We presented a toy to the infant to play with and a distractor (a bright square that beeps) in the background. Data collection is in progress. It will be interesting to link the results of this study to other studies done on infants and even preschoolers and see what their attention skills are like.

Joseph J. Tasch

Structural and Functional Studies for the regulation of Bacterial Glycogen Synthesis

Chemistry, Biochemistry Emphasis and Mathematics (2011)

Provost Fellowship and Mulcahy Scholars Program

Mentored by Dr. Miguel Ballicora, Chemistry

Glycogen is a molecule which acts as a long-term energy storage device for both plant and animal cells. The first step of glycogen production in bacteria uses the enzyme ADP-Glucose Pyrophosphorylase (ADP-Glc PPase), which catalyses the elongation of polysaccharide chains where the energy is stored. We hypothesize that a small, specific segment of amino acids on this enzyme (103-115 in E.coli ADP-Glc PPase), plays a critical role in the function of the enzyme as a catalyst. Our goal is to perform mutations on each of the amino acids in the segment to see the effect they will have on the enzyme's overall activity. The long term goal of our research is to identify the important residues on this enzyme which control its function. With a better understanding of how the enzyme works, we can then find a way to control its activity inside the cell, making it more efficient.

Pankti Thakkar

Characterization of Telomeric and Subtelomeric Regions of Human Acrocentric Chromosomes
Biology, Molecular Emphasis (2011)

Mentored by Dr. Jeffrey Doering, Biology

Telomeres are tandemly repeated DNA and ribonucleoprotein complexes present at the ends of all the chromosomes. Telomeres play an important role in genome stability, prevention of end to end joining of chromosomes, end replication, replicative senescence, and cancer biology. My work aims to compare the telomere region within the acrocentric short arms of chromosomes 13 and 21. This work will help identify DNA sequences that are critical for human telomere function. A subtelomeric tandemly repetitive sequence of 6.3 kb was found on acrocentric chromosome p arms in previous studies. A 580bp sequence within the repeat was used to create a subtelomeric primer that served as the basis for a telomere-anchored polymerase chain reaction (PCR). DNA fragments amplified by this approach were isolated from chromosomes 13 and 21, cloned and sequenced. The analysis so far shows significant differences in subtelomeric structure between the p arms of chromosomes 13 and 21.

Yesha Thakkar

Gonadal steroid treatment reduces recovery time in a murine model of nerve injury: Effects of testosterone and its metabolites estradiol and dihydrotestosterone
Biology (2012)

Mentored by Dr. Keith Fargo, Edward Hines VA Hospital

Steroids enhance the regeneration of both axons and dendrites after motoneuron injury. The Syrian hamster facial nerve crush model has been particularly fruitful in studying these effects. We have learned from this model that steroids reduce recovery times, and that this is due in large part to increased axon regeneration rates. A growing catalog of knockout mice makes it increasingly critical to study these effects in a murine model as well. Adult male mice were subjected to unilateral facial nerve crush injury, resulting in facial paralysis. Some were also treated with either testosterone, dihydrotestosterone, or estradiol. Animals were observed daily for the return of facial nerve functions, including vibrissae orientation & movement, eye blink reflex, and orolabial symmetry. All three steroids significantly reduced the time to full recovery, with approximately equal efficacy. However, they were differentially effective in reducing recovery time for some of the specific measures, with estradiol being most effective. For example, for both orolabial symmetry and vibrissae movement, estradiol was the only steroid that significantly reduced recovery time. These data extend our knowledge of steroid-enhanced facial nerve recovery to a murine model. Moreover, the fact that estradiol was the most effective raises interesting questions about the mechanism of action of gonadal steroid treatments.

Milot Thaqi

Site Directed Mutagenesis of ADP Glucose Pyrophosphorylase

Chemistry, Biochemistry Emphasis and Biology, Molecular Emphasis (2012)

Mentored by Dr. Miguel Ballicora, Chemistry

ADP-glucose pyrophosphorylase (ADP-Glc PPase) is the enzyme responsible for the regulation of bacterial glycogen synthesis. The precise role that glycogen may play in bacterial is still not clear; however, it was suggested that the accumulation of glycogen by bacteria may give advantages during starvation periods, providing a stored source of energy and carbon surplus. ADP-Glc PPase has been found to be positively and negatively regulated by key metabolites and intermediates, of low metabolic energy levels, respectively. To determine the allosteric regulation of the Escherichia coli ADP-Glc PPase, we performed site-directed mutagenesis on key residues determined from the crystal structure of the protein. This research has major implication in the production of starch in potato tubers and other plants.

Naomi Titean

Finding an Ideal Number of Days per Week to Spend in Tutoring

Presented with Lana Larcher

Elementary Education (2012)

Provost Fellowship

Mentored by Dr. Diane Schiller, School of Education

Please see Larcher abstract on page 24.

Benjamin Turturice

Pressure Overload Induces Activation in SSEA-1+ Cells and Differentiation in Bone Marrow Stem Cells

Chemistry and Biology (2012)

Mentored by Dr. Marc Penn, Cleveland Clinic

Cardiac pressure overload (PO) occurs in several disease states such as hypertension and aortic stenosis. Previous work in our lab has shown that there is stem cell signaling in the heart in response to PO and that bone marrow stem cells (BMSC) aid in cardiac repair. The aim of this project is to define populations of BMSC that responds to PO. Trans-aortic constriction (TAC) was used to create PO in the murine LV. 8 week old C57Bl/6J underwent TAC and sham operations. Tissue was collected 2 weeks post-surgery and 3 days prior to harvest, mice were pulsed with BrdU to label proliferating cells. Bone marrow populations were analyzed using flow cytometry to quantify percentage of cells expressing known stem cell antigens SSEA-1 and c-kit, hematopoietic lineage markers (Lin), and BrdU + cells. TAC animals demonstrated significant changes in phenotypic expression of lineage markers, c-kit, and SSEA-1 compared to sham animals.

Nishit Vora

Gas Ligand Pathways in Human Oxyhemoglobin

Biology and Anthropology (2011)

Provost Fellowship

Mentored by Dr. Ken Olsen, Chemistry

We have been working on finding the pathway that oxygen takes to get to the heme in human hemoglobin. We began by finding a model of oxyhemoglobin (PDBid: 2dn1). We created a water box around the protein structure with added ions to simulate its normal environment. We then added 50 oxygen molecules randomly in space around the protein. We then put the entire structure through 10 nanoseconds of

molecular dynamics simulation to see where the oxygen molecules travel as a function of time. We used the NAMD molecular dynamics program for these simulations. The data are being analyzed using the VMD molecular graphics program to determine how the oxygen molecules interact with the hemoglobin. We will use these results to uncover a tunnel (or tunnels) where the oxygen molecules travel to the heme.

Lauren Wedel

Relationship between obesity and asthma on the asthma quality of life in urban African American teens
Psychology and Biology (2011)

Provost Fellowship

Mentored by Dr. Barbara Velsor-Friedrich, School of Nursing

Asthma is a chronic health condition that effects 7.1 million children in the U.S. It is more prevalent in Black children than among White children in the U.S. The number of obese children in the U.S. has increased over the past several decades, A National Health and Nutrition Examination Survey reports that 16.9% of 2-19 year olds are obese. The prevalence is even higher in the African American population. The need to address the QOL of chronically ill children an adolescents is a priority in the United States. Measuring the QOL of these children and adolescents indicates how the illness impacts their daily lives, as well as their ability to adapt to it in their social, emotional and physical areas of functioning. There is an opportunity to research the relationship between asthma and obesity and their impacts on the QOL of the adolescents.

Tyler White

Effect of Microalgal Species Identity on the Taxonomic Structure of Denitrifying Bacteria

Biology, Molecular Emphasis and Environmental Science (2011)

Mulcahy Scholars Program

Mentored by Dr. Chris Peterson, Biology and Dr. John Kelly, Biology

Past research on microbial effects on biological processes such as denitrification has focused primarily on inputs and outputs. While there is little known about the influence of algal species composition on denitrifying bacterial consortia, there is evidence suggesting that the species compositions that comprise these associations play a role in the variable rates of denitrification. This project seeks to track changes in the taxonomic composition of denitrifying bacterial communities after inoculation of a common seed source into algal mono-cultures containing different species. This will help to assess the importance of species specific associations between algae and bacteria to the denitrification process.

Monica Widmann

The Right to Freedom of Information in post-1989 Constitutions

Political Science and International Studies (2011)

Rudis Fellowship

Mentored by Dr. Alexandru Grigorescu, Political Science

Before the end of the Cold War, very few countries had legislation protecting the right to freedom of information (FOI). Even fewer included this freedom in their constitutions. However, after the end of the Cold War, when a large number of countries became democratic, there has been an increase in the adoption of specific constitutional protections of FOI. This research studies the inclusion of FOI protections in post-1989 constitutions and the impact of such constitutional protections on specific FOI legislation. Furthermore, I compare several pre-1989 and post-1989 constitutions through a "most similar systems research design." I show that countries with post-1989 constitutions are more likely to pass com-

prehensive FOI legislation than countries that do not have this constitutional protection. Overall, I find a correlation between the inclusion of FOI in a constitution and the strength of FOI legislation.

Christopher G. Williams

Optimizing the Organization and Growth of Metal Organic Frameworks

Chemistry (2011)

Mulcahy Scholars Program

Mentored by Dr. Jacob Ciszek, Chemistry

Scientists have harnessed solar power by utilizing semiconducting materials. Up until now the majority of solar cells have been constructed out of silicon. However, upon the discovery of semiconducting metal organic frameworks (MOFs) there is a new potential material that could be used for solar cells. In order to create a solar cell out of MOFs, one must achieve a full coating of a surface; any breaks in coverage results in non-functional photovoltaic devices. The goal of my research was to try and maximize the percent the metal surface was covered by the MOF crystals. One way we could achieve this goal was to determine the effect a self assembled monolayer (SAM) between the MOF and the metal surface had on the formation of the MOFs. Our experiments varied the monolayer's length, exposed functional group, and functional group's orientation to understand these parameters effects on the size, uniformity, and coverage of MOF crystals.

Eric Wilkinson

Continuum Simulation of Impact into Granular Beds

Physics (2010)

Mulcahy Scholars Program

Mentored by Dr. Jon Bougie, Physics

We study the dynamics of objects impacting into a granular media using continuum simulations. Although a static bed with long-lasting contact between grains exhibits a solid-like configuration, the bed may become locally fluidized near an impact by an external object. Previous studies into the propagation of shocks through a granular bed indirectly suggest grains should flow freely near the impact site, yielding behaviors that could be analyzed using a granular hydrodynamics approach. We test the ability of a set of proposed granular hydrodynamics equations to describe the dynamics of a granular bed following impact using a numerical simulation.

Morgan Woosley

A Template for Respiratory Gating for Lung Cancer: To Gate or not to Gate?

Biophysics (2011)

Provost Fellowship

Mentored by Dr. Anil Sethi, Loyola University Medical Center

Radiation therapy for patients with lung cancer is often compromised due to respiratory motion. When tumor motion is not accounted for, parts of the target are severely under dosed. Thus, lung tumors have been often treated with large target margins. This unfortunately leads to unnecessary irradiation of surrounding lung and limits target dose escalation. To reduce the effect of respiratory motion, different approaches (gating, breath hold, etc.) have been employed with limited success. We plan to evaluate a simple non-invasive method of determining tumor motion and developing intensity modulated radiation therapy (IMRT) plans that significantly reduce dose to critical structures.

Laurel Yohe

Behavioral and Neurochemical Effects of Stress and Aggression

Biology and Bioinformatics (2011)

Carbon Scholars Program

Mentored by Dr. Louis Lucas, Biology and Dr. Duke Han, Rush University

Stress has been associated with the induction of aggressive behavior. However, there is controversy as to whether all types of stress result in aggression. In order to address methodological shortcomings of previous studies, we examined different amounts of exposure to stress and different weight-classes of naive opponents. We looked at effects of stress on behavior based on aggressive and defensive behavior. In addition to behavioral parameters, hormonal and neurochemical variables were analyzed. Blood serum levels of testosterone and corticosterone were determined by radioimmunoassay. To analyze neurochemical effects of stress, densities of dopamine D2 receptors in the striatum and serotonin 5-HT1B receptors in the prefrontal cortex were measured using ligand-binding autoradiography. Thus far, we have determined a single exposure to stress does not have discernable effects on aggressive behavior. Our results now include the behavioral, neurochemical, and hormonal effects of two degrees of chronic stress (5-days and 10-days). These findings will promote further research of stress effects on aggressive behavior.

Madison Zuverink

Mutagenesis of Catalytic Residues of Escherichia coli ADP-glucose Pyrophosphorylase

Biology (2011)

Provost Fellowship and Mulcahy Scholars Program

Mentored by Dr. Miguel Ballicora, Chemistry

The enzyme ADP-glucose pyrophosphorylase plays a vital regulatory role within metabolic pathways of starch and glycogen synthesis. Previous investigations in plants demonstrated a Lys42 residue in the binding domain is important for function. Creation of mutations by site-directed mutagenesis clarifies properties integral to catalyzing reactions. Characterization begins by comparison of the mutant's kinetics with the wildtype enzyme.

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