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11th Annual Research in the Capitol [Program], March 29, 2016

University of Northern Iowa. University Honors Program.

Iowa State University. Honors Program.

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Authors

University of Northern Iowa. University Honors Program., Iowa State University. Honors Program., and University of Iowa. Honors Program.

The background of the entire page is a photograph of the interior of the Iowa State House Rotunda. The view is from a low angle looking up at the ornate, multi-tiered dome. The dome is decorated with gold leaf and features a central fresco of an eagle with wings spread, holding a shield, with the American flag below it. The fresco is set against a blue sky with white clouds. The dome is surrounded by a ring of windows and is supported by a series of columns. The overall atmosphere is grand and historic.

Iowa Regent Universities present the

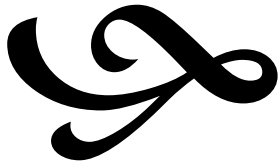
11th Annual Research in the Capitol

Tuesday, March 29, 2016

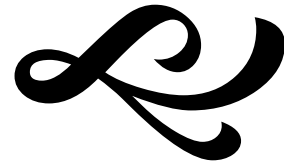
11:30am — 1:30pm

Iowa State House, Rotunda

Des Moines, Iowa



Welcome



Welcome to our **eleventh annual** Research in the Capitol. In the last decade, over 500 undergraduates from our three Regent's Universities have come to the Iowa Statehouse to present their work to legislators, members of the Board of Regents, and the public. These students have gone on to contribute to our state as doctors, educators, engineers, lawyers, nurses, and professionals in various disciplines. The opportunity for our students to share their knowledge and exuberance with legislators, Regents, and guests in the Iowa Capitol is a special honor that has stayed with them across the years.

Research involvement plays a central role in undergraduate education. Students who take part in research are more successful academically, are more developed in their career and professional preparation, and are more satisfied with their college experience. Research engagement provides the conditions for collaborative learning and critical thinking that benefit our students as they move into the workforce or on to graduate or professional training. The presentations before you today required countless hours of effort on the part of the students and their mentors outside of the classroom and represent the shared commitment our students, staff, and faculty place on the undergraduate experience.

As you speak with these outstanding students, you will learn first-hand the impact research involvement has on Iowa's students and the impact those students have on the research conducted at our outstanding Iowa Public Universities.

Robert Kirby

Director—Iowa Center for Research by Undergraduates

Schedule

11:30am Opening Remarks

Bob Kirby

Director, Iowa Center for Research by Undergraduates

Student Speaker

11:45am-1:30pm

Student Poster Presentations

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Student Presenters

1. Alyssa Adamec - University of Northern Iowa

Coralville, IA

Major(s): Communication Disorders & Music Performance

Mentor(s): Julia Bullard & Jami Gilbert

Perceptions of Use of Hearing Protection in High String Musicians

Noise Induced Hearing Loss (NIHL) is a common occupational disease, especially in musicians. Research shows high string players have poorer thresholds in their left ear compared to other orchestral players. My research focused on two questions: (1) How does wearing hearing protection impact a performer's experience? and (2) can high string players adjust to use of hearing protection? Participants took an initial survey and received a hearing test. Then, participants wore hearing protection over three weeks during solo practice and large ensemble rehearsals, completing surveys at the end of each week. These surveys included qualitative self-assessment of key components of musicality: tone, intonation, practicing and musical experience. My goal is to encourage musicians to wear ear protection, so they function in their profession longer. This also identifies areas for further research- when use of hearing protection should begin, and how students can be encouraged to wear hearing protection.

2. Patrick Adrian - University of Iowa

Chicago, IL

Major(s): Physics and Mathematics

Mentor(s): Scott Baalrud

Neutral Particles in Ionized Gases

Plasma physics describes the most abundant state of known matter in the universe, hot ionized gas. Theoretical descriptions of plasmas are key to address issues that arise in space, atmospheric, energy, and semiconductor sciences. The ability to predict classical plasma properties under a given set of conditions is key for designing any processes that utilizes this unique fourth state of matter. The semiconductor industry utilizes plasma for etching to achieve circuit assembly at the nano-length scale. This industry needs to predict the conditions created by imposing a boundary in a plasma. The single most important variable in the boundary value problem is to describe at what speed ions will leave the plasma and impact the boundary (i.e. the semiconductor). Complications ensue when the plasma consists of multiple ion species. A recent theoretical description has developed a new boundary condition for these multi-component plasmas. We extend this theory to include descriptions of the neutral collision effects that have been neglected previously. We make quantitative predictions for the instabilities that arise from the multiple species of ions flowing past each other in the presence of a neutral pressure.

3. Aparna Ajjarapu - University of Iowa

Ames, IA

Major(s): Biochemistry

Mentor(s): Phoebe QI

Improving Food Quality Through Protein and Polysaccharide Interactions

Protein-polysaccharide complexes have possible applications as fat replacers or texture modifiers in the food industry. They can also be used in stabilizing dairy beverages, in formulation of emulsion systems and in protein drug delivery. β -lactoglobulin (β -LG) and α -lactalbumin (α -LA) are major dairy whey proteins commonly found in mammalian milk. Sugar beet pectin (SBP), a plant-based product, is commonly used as a gelling agent in jams and as a stabilizer in fruit and milk drinks. α -LA, β -LG and SBP are safe for human consumption. They also have high nutritional value and possess many useful properties. These qualities make β -LG and α -LA with SBP interesting protein-polysaccharide complexes to study. The overall goal of the current study is to understand the effect of SBP on α -LA and β -LG and to improve the functional properties (mineral binding and emulsification) of foods containing α -LA and β -LG using SBP. In order to do this, the physical and chemical properties of α -LA and β -LG with SBP were studied using various assays and the data was analyzed using student t test and ANOVA. Results from this study showed sugar beet pectin significantly influenced the physical and chemical properties of α -LA and β -LG and improved protein functionality manifold.

4. Seima Al-Momani - University of Iowa

Iowa City, IA

Major(s): Psychology

Mentor(s): Michelle Voss

Effects of Moderate Intensity Aerobic Exercise on Brain Function

Research suggests that physical activity improves working memory performance, but little is known about the underlying brain mechanisms supporting this increase. This study examines the effects of one session of moderate intensity exercise on working memory, which might help us understand how repeated exercise benefits the brain and cognition. We predicted that moderate intensity exercise would increase activity in brain regions involved in working memory. The study was conducted with 20 participants who performed a working memory task while in a functional Magnetic Resonance Imaging (fMRI) scanner, an instrument that measures brain activity, before and after a 30-minute exercise session. Participants completed two different exercises on separate occasions: an active aerobic cycling at moderate intensity and a passive cycling controlled by the bike. Results show greater task-related brain activity after the active exercise compared to the passive exercise. However, we did not find significant changes in performance on the task following either exercise condition. These findings suggest that brain activity is sensitive to single sessions of exercise, but performance changes might only be significant after repeated exercise. One potential neural mechanism in which aerobic exercise affects the brain is by enhancing the activity in brain regions involved in working memory.

5. Jill Aunan - University of Iowa

Iowa City, IA

Major(s): Communication Sciences and Disorders

Mentor(s): Beth Walker

Importance of Hearing Aid Use within Classrooms for Children Who Are Hard of Hearing

Classrooms have noise level standards to follow in order to provide the optimal learning environment for students. Overall noise level and the amount of echo within a classroom play vital roles for children who are hard of hearing (HH) because listening becomes more difficult when these measures increase. Noise and echo levels are easily recorded by educational audiologists using an iPod application called AudioTools. This study had three goals: 1) verify the consistency of AudioTools when collecting overall noise and echo levels within the classroom, 2) examine the amount of time children who are HH were using their hearing aids and FMs, and 3) determine how often the amplification devices were functioning appropriately. We found that AudioTools echo

level measure was reliable, whereas multiple measures of overall noise level in unoccupied classrooms were less consistent. Additionally, the majority of the children using their hearing aids and FMs had appropriately functioning equipment. While over 90% of the children were wearing hearing aids, about 20% of the children who had access to FM technology were not using their FM systems. While AudioTools proves to be effective, we suggest that educational audiologists take multiple measurements within a classroom when using this application.

6. Terryl Bandy - University of Iowa

Oxford, IA

Major(s): Geoscience

Mentor(s): Brad Cramer

Using a handheld laser to gather high-resolution data from the global rock record in the field

Identifying the positions in any given outcrop or core is critical in determination of how many samples and their locations are while out in the field. Many of the chemical events in the rock record are preceded by significant variations in redox sensitive elemental abundances (e.g Mo, V, Cr, ect.), and recognizing these variations can be used to help determine the rough position of events in the rock record. / The availability of the portable X-ray fluorescence (pXRF) provides the opportunity for rapid and inexpensive determinations of the redox-sensitive trace metal abundances in the field or from a core repository. To test this methodology we used the pXRF to obtain elemental abundances from the Schlamer #1 core which was deposited between about 443 Myr to 416 myr ago. The core was drilled by the Illinois State Geologic Survey from SW Illinois. The first step in this proof-of-concept approach is to demonstrate the reliability of pXRF data by comparing ICP-MS data from identical sample positions. Preliminary result demonstrates that the pXRF is a useful tool to help determine where higher resolution sampling practices should be done. /

7. Mitchell Beckman - University of Northern Iowa

Houston, MN

Major(s): Economics

Mentor(s): Bryce Kanago

Determinants of the GPA's of College Students

Previous empirical research explores the relationship between the number of hours worked per week and the grade-point-average (GPA) of college students. Based on the data used in this research, there is a substantial negative correlation between hours worked and GPA. However, previous researchers have discovered that other variables are also determinants of GPA. I reviewed the literature to explore what variables have been used previously and what conclusions previous researchers have reached. I collected data from a survey I distributed that asked students to provide their GPA, the dependent variable in my equation, and answer questions about their pre-college entry exams, time spent studying and working, and other uses of their time which are potential key independent variables. My research employs regression analysis of the survey data and focuses on the possibility of a nonlinear relation between hours worked and GPA, while controlling for other variables.

8. Seth Behrends - University of Northern Iowa

Cedar Falls, IA

Major(s): Sociology

Mentor(s): Marybeth Stalp

Friends in High Places: Drinkers' Perceptions of Gender, Sobriety, and Relationships with Nondrinkers

This study examines the sociological questions of how sobriety impacts friendships or relationships between college student drinkers and nondrinkers, and how drinking and sobriety influence perceptions of gender and sexuality in the eyes of college student drinkers. Researchers in the past have tended to focus on the population of students in college who drink, and significantly fewer studies have discussed issues involving students who do not consume alcohol. Ten college student drinkers, consisting of five men and five women, were interviewed in this study. Participants tended to have very few to no nondrinking friendships, primarily associating this separation with conflicting ideas of "fun." Drinkers also tended to judge the gender or sexuality of other drinkers significantly more than of nondrinkers.

9. Christina Behrens - University of Iowa

West Des Moines, IA

Major(s): Psychology

Mentor(s): Lori Ihrig

Psychosocial factors present in high-potential middle school students in rural Iowa

STEM Excellence and Leadership is an after school enrichment program to challenge high-potential rural students and prepare them for advanced coursework. Students spend 48 hours engaging in science curriculum and another 48 hours in math curriculum during the academic year. The program began in the fall of 2015 in eleven rural Iowa middle schools. A talent pool of high-potential 5th grade students was identified at each school district and given the ACT Explore assessment. The preliminary results show that 5th grade students selected for the program, on average, place between the 48th and 59th percentiles in eighth grade level Math and Science. In addition, students took the ACT Engage test, which measures several psychosocial factors including Motivation, Social Engagement, and Self-Regulation. The preliminary Engage results show that the students in the program rank their perception of School Safety Climate in the 75th percentile. In addition, they have a strong sense of Academic Discipline, averaging in the 76th percentile. On the other hand, these high-potential students only average in the 56th percentile for Optimism.

10. Parker Bennett - University of Northern Iowa

Cedar Rapids, IA

Major(s): Political Science

Mentor(s): Annette Lynch

Forms of Masculinity in Fashion: An Analysis of the Masculine Re-appropriation of the Hedonic

The purpose of this project is to use Marilyn DeLong's visual analysis system coupled with Lori Landay's and Susan Kaiser's agonistic/hedonic gender dichotomy to analyze 21 European and American menswear collections from 2006 and 2016. This analysis is intended to document the transformation of recent menswear's collections focus on communicating agonistic power, the ability to physically and mentally complete an action, to a more fluid expression of hedonic power, an indirect power to attract attention – a playful role of dress often restricted to women's wear collections. Analysis of the two data sets revealed a distinct difference in aggregate levels of hedonic-coded traits between 2006 and 2016, with 2016 showing a much larger tendency towards high-scoring images, and thus more hedonically-coded images. This study analyzes the construction of masculinity through the lens of fashion over time and illustrates an increasing trend towards male acceptance of the hedonic mode and gender fluid dress.

11. Kierstin Blomberg - Iowa State University

Newhall, IA

Major(s): Meteorology

Mentor(s): William Gutowski

Analyzing Climate Change in the Arctic by Examining Indices of Severe Weather from Contemporary Climates

This project investigates how climate is potentially changing in relation to two specific severe weather indices on land areas in the Arctic region. According to the Intergovernmental Panel on Global Climate Change's 5th Assessment Report, the overall average temperature of the Earth has been increasing and will continue to increase at even higher rates, and regions in the Arctic are expected to warm more rapidly than the global mean. To see if more frequent and more intense storms have been occurring and/or will be occurring in the future in this region due to these warming temperatures, data based on the two severe weather indices, the K-Index and the Total Totals Index, was analyzed. The K-Index is used to assess the convective potential of an environment, and the Total Totals Index is used to assess an environment's potential storm strength.

12. Rebecca Clay - Iowa State University

Le Mars, IA

Major(s): Agronomy and Global Resource Systems

Mentor(s): J. Gordon Arbuckle

Cover crops as a gateway to greater conservation in Iowa? Integrating crop models, field trials, economics and farmer perspectives

To build resilient production systems in light of climate change, farmers will increasingly need to implement conservation practices that are profitable while mitigating negative environmental impacts. Winter cover crops are known to promote soil and water health, yet it is estimated that only 1-2% of agricultural acres in Iowa are planted in cover crops. This project investigates why some farmers utilize the practice and what barriers exist for others. The research team conducted four farmer focus groups in regions with differing soil and climate conditions. Each focus group was recorded and transcriptions were analyzed using NVivo 10 software. Data were coded for emergent themes using a grounded theory approach to data analysis. Repeated themes concerning facilitators include innovative strategies and perceived benefits. Two themes associated with barriers concern farm-level challenges as well as current limitations based on the predominant corn-soybean cropping system.

13. Abbi Cobb - University of Northern Iowa

Marion, IA

Major(s): Sociology

Mentor(s): Marybeth Stalp

Childhood Factors and Incarceration for African American Men: How Early Life Community Experience Influences Adult Outcomes

There is a dearth of research that analyzes childhood influence on adult incarceration, and an associated lack of emphasis on the relationship between childhood poverty, lack of educational attainment, and family structure on criminality among African American men – a population wherein individuals are both incarcerated and generally socioeconomically disadvantaged at disproportionately higher rates. Consistent with the recent demand for criminal justice reform, the need for systematic research pertaining to tendencies in criminality has

become apparent. Resulting from secondhand statistical data analysis on aggregate state factors such as childhood poverty rate, rate of single-parenthood, and high school drop out rate, the intention of this study is to fill the existing void through examination of the effects of these childhood familial conditions on incarceration in adulthood among African American men.

14. Daniel Coulthard - University of Iowa

New Hartford, IA

Major(s): Geoscience, Environmental Science

Mentor(s): David Peate

Textural and Chemical Analysis of Anomalous Volcanic Rocks Erupted in Iceland

The Búðahraun flow is located far away from where volcanism usually happens in Iceland. The rock is comprised of elements and minerals which are very common in igneous rocks that come from a mantle source. The minerals that make up the largest crystals are called Olivine, Clinopyroxene and Plagioclase Feldspar. These same minerals also make up the fine grained portion of the rock that cannot be further described using the naked eye alone. These anomalous episodes of volcanism are not well understood in a sense that we do not know where exactly they come from within the Earth. Using chemical and mineral information, the details of this magmatic "plumbing" network can be revealed. / From a textural standpoint, mineral sizes help describe crystal populations present in the rock itself. Manually tracing crystals on scans of the rock and mapping microscopic crystals using sophisticated instruments help in attaining this data. Additionally, analysis of Clinopyroxene crystals will help determine conditions the magma experienced on its path to the surface. This will help characterize where this lava came from within the Earth and how it got to the surface. /

15. Carolyn Darling - Iowa State University

Aurora, IL

Major(s): Mechanical Engineering

Mentor(s): Ming-Chen Hsu

Wind Turbine Blade Optimization

The demand for wind energy is continually increasing, making it important to continue to improve wind turbine designs in order to increase efficiency and long-term reliability. Advances can be achieved through computational analysis. For instance, mechanical stress distribution can be predicted from high-fidelity structural simulations. The complete mechanical stress distribution can then be used to understand fatigue life of a wind turbine blade. While the simulations are very beneficial, the realism of the simulation varies depending on the fidelity of the computational setup. The objective of this research project is to improve the wind turbine blade design optimization by considering realistic wind loads corresponding to each individual design applied in the structural analysis. This is achieved by using an aeroelastic computer-aided engineering tool to determine realistic loads and then projecting them onto the surface of blades. An improved blade design using the proposed method will be shown.

16. Nick Eginoire - University of Iowa

Norwalk, IA

Major(s): Biology

Mentor(s): Anna Malkova

Effects of DNA repair in G1 of the cell cycle

DNA is damaged frequently by both internal and external events. If the damage is left unrepaired it can have harmful effects on the cell. Over time organisms have evolved DNA repair pathways that repair this damage. There are conservative and detrimental repair pathways. One particular type of damage that can occur is a "Double Stranded Break" (DSB), in which both strands of DNA get "cut". A pathway of interest that repairs these DSB's is called "Break Induced Replication" (BIR). Which a broken strand invades a homologous chromosome and replicates its DNA to repair the break. This process is highly mutagenic and can lead to different genetic diseases including cancer. BIR has been highly studied in G2 of the cell cycle, but I'm studying it in G1. This carries importance being in G1, since this is where many non-dividing human somatic cells spend most of their life. With the deployment of different Genetic techniques, I'm elucidating what is occurring in G1 to better understand how BIR is functioning.

17. Safwan Elkhatab - Iowa State University

Andrew Barnes – Iowa State University

Bettendorf, IA / Bettendorf, IA

Major(s): Kinesiology & Health / Kinesiology & Health

Mentor(s): Marian Kohut

Upper Respiratory Humoral Immunity in Response to Exercise and Psychological Stress

Upper-respiratory viral infection in humans is mediated by a number of factors. Anti-viral proteins, changes in gene expression, and the release of specific signaling molecules are all elements of a healthy immune response to a potential pathogen. These complex immune processes and components have not yet been well characterized. In this project, we specifically explored the nature of non-cellular constituents that help fight viral infection.

Nasal lavage—a technique in which saline solution is used to rinse the nasal cavity, allowing for the collection and solvation of certain antiviral compounds—was performed on human subjects. The soluble antiviral components were tested for their ability to effectively inhibit influenza virus infection in vitro. Samples were collected and processed following a moderate exercise bout, prolonged exercise bout, and during conditions of psychological stress.

18. Anna Fisher - Iowa State University

Cedar Rapids, IA

Major(s): Nutritional Science and Global Resource Systems

Mentor(s): Donna Winham

Aflatoxin Contamination in Groundnuts: Determining Awareness Of its Effects on Human Health

Aflatoxin contamination, a result of commonly found fungi (*Aspergillus flavus*) in agricultural crops in the semi-arid tropics, contributes to both chronic disease and poverty. Consuming aflatoxin-contaminated food products can lead to malnourishment, jaundice, and cancer. It is necessary to reduce aflatoxin contamination in food to promote healthy, productive populations.

The goal of this study is to better understand Indian groundnut farmers' awareness of aflatoxin contamination, prevention practices, and the possible effects of consuming aflatoxin on human health. Data was collected in the Ayyavaripalli village through focus group discussion and a survey. Seventy groundnut farmers were asked questions based on demographic information, their agricultural practices, and awareness of aflatoxin contamination. The results found in this study encourage further dissemination of knowledge to these groundnut farmers to reduce or eradicate aflatoxin contamination in their crops.

19. Timothy Fuqua - University of Iowa

Plainfield, IL

Major(s): Biology: Genetics

Mentor(s): Albert Erives

Flies, hedgehog, and the study of gene regulation

The DNA inside our cells consists of two components: genes and regulators. Genes are sequences of DNA your cells read as a template to create proteins, which help the cell grow and develop. The regulators of DNA, however, control when, and in which cells, the genes are expressed. One type of regulator DNA is the enhancer, and its DNA contains unique sequences that binding proteins called transcription factors (TF's) attach to. The combination, orientation, or spacing of TF's bound to an enhancer determines when and where genes are expressed. The logic behind enhancers and how they function to pattern genes is poorly understood. Using a fruit fly model, our lab studies enhancers using a subset of TF's to decode their logic. This project specifically focuses on an enhancer for a gene called hedgehog – which is highly important for the development of flies and humans. We found this enhancer helps “clean up” the Hedgehog expression pattern into robust, and partitioned compartments within the fly. Through these findings, we hope to gain a better understanding behind how enhancers function, and how hedgehog is regulated in both flies and humans.

20. Jeffrey Gustafson - Iowa State University

Kiron, IA

Major(s): Chemistry

Mentor(s): Theresa Windus

Computation Applied to the Future of Rare Earth Separations

Lanthanides are at the heart of many modern advances in electronics and green energy technologies such as high-strength permanent magnets in wind turbines and for electric cars. Because they are so widely used, there is great demand for these elements in high-purity states. However, they don't occur in rich veins like iron but are sparsely distributed across the earth, with some of the richest deposits found in China. Development of more effective extraction and purification methods and materials could enable utilization of less rich ores found here in America and secure these elements vital to our national energy security. Our research has begun looking into using short calcium-binding peptides, which are known to interact with lanthanide ions and can be made using bacteria, to potentially preferentially bind to one lanthanide over another. Our first step is calculating the binding energies of these ions with acid functionalized amino acids.

21. Laurelin Haas - Iowa State University

Muscatine, IA

Major(s): Community and Regional Planning and Environmental Studies

Mentor(s): Monica Haddad

Site Suitability Analysis for Student Housing in Ames, Iowa

In Ames, Iowa, the growing student population has placed new demands on the City's multifamily housing. Enrollment has increased by 34% in the past fifteen years, and urban planners are challenged to meet the needs of the current student population while also planning for the continued demand for student housing in the future. In order to determine appropriate locations for further student housing development, a site suitability analysis will be conducted using three criteria. New housing development should be located within 0.25 miles of a public transportation stop, within a cluster of high rates of student population, and within

medium- to high-density residential zones or areas with mixed-use zoning. Spatial analysis will be conducted using Arc GIS software and GeoDa software. Specifically, exploratory spatial data analysis, distance surface, and kernel density surface will be developed. Finally, recommendations of areas with growth potential for the student housing market will be delivered.

22. Lance Heady - University of Iowa

Quincy, IL

Major(s): Biochemistry and Neurobiology

Mentor(s): Andrew Pieper

Efficacy of P7C3 Neuroprotective Compounds in the C. Elegans Model of Huntington's Disease

Huntington's disease (HD) is a fatal genetic disorder that causes progressive dysfunction and death of nerve cells in the brain. An estimated 30,000 Americans are currently symptomatic with HD, and another 200,000 are at risk for developing the disease. The new P7C3 class of neuroprotective molecules has been shown to protect against cell death in multiple animal models of human neurodegeneration, including Parkinson's disease, amyotrophic lateral sclerosis and traumatic brain injury. Here, we examine the efficacy of P7C3 neuroprotective compounds in a *Caenorhabditis elegans* (*C. elegans*) worm model of Huntington's disease. This worm model mimics the human disease by showing the same increased levels of protein aggregation in nerve cells, as well as associated behavioral deficits. The overall goal is to foster development of new treatment strategies for patients suffering from Huntington's disease.

23. Jasmine Hernandez - University of Northern Iowa

San Antonio, TX

Major(s): Sociology

Mentor(s): Marybeth Stalp

Religion in Ms. Marvel: How University of Northern Iowa students interpret Islam in the life of Kamala Khan

In studying the Ms. Marvel comics, I examine how University of Northern Iowa students understand and interpret Islamic culture in the life of the teenage Muslim Pakistani-American immigrant and heroine, Kamala Khan. In a generation where Islam has become associated with terrorism due to 9/11 and ISIS, it has become a sensitive topic that should be studied. Understanding how comic readers view and understand Islam and how comics in mass media portray Islam is important because the medium of comic is often a subtle reflection of society. Although cartoons are meant for humor, Ms. Marvel provides realistic themes allowing for readers to feel connections with the character's story. When discussing Islam in this comic, readers tended to lean towards more stereotypical over realistic descriptions. Due to both personal assumptions and how Ms. Marvel portrayed Islam, I find in this research that Ms. Marvel is reiterating and reinforcing Muslim stereotypes.

24. Brooke Hollenberg - University of Northern Iowa

Boone, IA

Major(s): Psychology

Mentor(s): Adam Butler

College Students' Beliefs About Alcohol and Drinking at UNI Homecoming

The college experience has long been associated with heavy consumption of alcohol. Moreover, alcohol consumption by college students is linked to a variety of negative outcomes, including poor academic performance, assault, injury, and death. Although research has focused on many environmental factors that contribute to collegiate drinking, one relatively unexplored area is drinking on college campuses tied to special events. There is research evidence suggesting that certain college events perpetuate higher levels of alcohol consumption. The current study investigated social beliefs related to drinking during the University of Northern Iowa's homecoming using a sample of 161 full-time students. Beliefs that alcohol promotes good feelings and social pleasure during homecoming were related to drinking for men but not for women. In contrast, beliefs that alcohol makes one more gregarious were not related to homecoming drinking. The findings suggest that event programming that promotes camaraderie and pleasure for men may curb high consumption of alcohol on homecoming.

25. Brandon Hoskins - University of Northern Iowa

Cedar Falls, IA

Major(s): Biology

Mentor(s): Michael Walter

Isolation methods and DNA analysis of small bacteriophages of bacillus anthracis

Bacteriophages are viruses that infect or exploit an organism as a parasite. Bacillus anthracis the causal agent of anthrax disease and the source of 'bio-weaponized' anthrax spores acts as host to parasites. Our research on phages of B. anthracis continues efforts to reduce the bioterror and disease threats posed by anthrax spores. Having previously selected phages that adhere to, and kill B. anthracis bacteria emerging from spores, special interest is now focused on smaller phages with the same capabilities. Since 1998, we have developed phage based study systems that can kill anthrax bacteria and detect anthrax spores from air samples using an electronic (Quartz Crystal Microbalance) spore detector prototype. The detector produced poor signal quality due to characteristics of the unintentionally selected larger, 'tailed phages'. Smaller ('tailless') phages offer qualities that overcome problems with the less uniform QCM electrode surface and may improved signal quality.

26. Jacob Isbell - University of Iowa

Garrison, IA

Major(s): Physics, Astronomy

Mentor(s): Robert Mutel

Sizing Up Alien Worlds

Once an exoplanet is discovered, repeated observations of it crossing in front of its parent star can tell us much about both the planet and the solar system it inhabits. Firstly, to show the accuracy of the prediction software I wrote, I compare previously published characteristics to those predicted by the model. After a brief overview of observing with Gemini, Iowa's Robotic Telescope, I focus on the observations of WASP-10b, a system that has shown irregularities in planet size and orbit timing. Lastly, I present a survey of several other systems observed at Gemini and discuss their possible implications.

27. Sara Judickas - University of Northern Iowa

Bettendorf, IA

Major(s): Biology

Mentor(s): Mark Myers

Prairie Power Project

Two of the most pressing ecological issues facing human society are the loss of biodiversity and the rising demand for alternative energy sources. In Iowa, the development of bioenergy crops comprised of native tallgrass prairie species has the potential to address both issues. We conducted a field experiment assessing the potential biomass yields and wildlife habitat value of four candidate tallgrass prairie agroenergy crops grown at site formerly managed for annual row crop production in Black Hawk County. From 2009-2014, we annually monitored crop productivity and wildlife use of the plots. Diverse (16- and 32-species) prairie mixtures were as productive (~7.3 to 8.8 Mg/ha) as switchgrass monocultures and were more resistant to weedy invasion. Bird and butterfly abundance and diversity were consistently greater in diverse mixtures compared to the low-diversity crops, and several grassland birds of conservation concern nested at the site.

28. Jenny Juehring - University of Iowa

Muscatine, IA

Major(s): Political Science, Economics

Mentor(s): Vicki Hesli Claypool

The Relationship between Bureaucratic Corruption and the Voting Decision

While much is known regarding voter turnout and vote choice, little research has been done on the effect of corruption on the two. The little work that has been done conflicts with what the researchers hypothesize the effect will be. Using survey data from Russia and Ukraine, I explore the relationship between voter's decisions and their experiences with and perceptions of corruption. Specifically, I look at the effect of bureaucratic corruption on vote choice in the 2012 presidential elections in Russia and the 2014 presidential elections in Ukraine. Bureaucratic corruption generally refers to informal payments, or bribes, citizens give to officials in exchange for favors. I hypothesize that bureaucratic corruption will decrease voter support for incumbents. Voters will choose to punish incumbents for corruption in society by voting for the challenger. Preliminary results do indicate that bureaucratic corruption has a negative effect on incumbent support in presidential elections.

29. Tamar Kavlashvili - University of Iowa

Tbilisi, Georgia

Major(s): Biology

Mentor(s): Shujie Yang

Inverse Relationship between Progesterone Receptor and Myc in Endometrial (Uterine) Cancer

Endometrial cancer, which is a cancer that arises in the lining of the uterus is the most common gynecological disease. It is hormonally regulated which means hormones Estrogen and Progesterone have growth and differentiation roles, respectively. Progestin therapy is often used in endometrial cancers however its success rate depends on whether the particular cancer is hormone receptor positive or negative. Many advanced tumors lose PR expression. We recently reported that the efficacy of progestin therapy in advanced cancers with the loss of hormone receptors can be significantly enhanced by combining progestin with epigenetic modulators, which we term "molecularly enhanced progestin therapy. Mechanism of action through ER (Estrogen Receptor) however remained unclear. ER is a principle inducer of PR and necessary for its functional expression. Therefore we modeled advanced endometrial cancer by generating ER-null endometrial cancer cell lines. Our data demonstrated that treatment with certain types of epigenetic modulator drugs was sufficient to

restore functional PR expression. We also found a negative correlation between PR and the oncogene Myc. PR acts as a negative regulator of Myc, an oncogene that is over-expressed in many cancers. Our data reveal a previously unanticipated inverse relationship between the tumor suppressor PR and the oncogene Myc in endometrial cancer.

30. Rylee Kerper - University of Iowa

Dubuque, IA

Major(s): Anthropology

Mentor(s): Kristina Venske

The Relationship of Depressive Symptoms and Secondhand Smoke Exposure

/ Recent research has shown correlations between secondhand smoke (SHS) exposure and mental illness in adolescents. In Romania, where 37.1% of the population smokes, SHS is highly prevalent. To combat smoking uptake, a preventative intervention, called SMART, was implemented in several secondary schools throughout Cluj-Napoca, Romania. Using data obtained from this intervention, the researcher was able to find correlations between SHS exposure and the presence of self-reported depressive symptoms. This was done by the use of several statistical tests and a proxy question, "have you ever felt so sad and hopeless that you stopped doing some usual activities?" It was found that the more SHS a student was exposed to, the more likely they were to report depressive symptoms. These findings, along with previous research, show the influence SHS may have on the mental health of adolescents. Given this, future research should be conducted studying this relationship, as well as the development of tobacco intervention programs by public health professionals. /

31. Tony Ketelaar - University of Northern Iowa

Davenport, IA

Major(s): Anthropology & Religious Studies

Mentor(s): Martha Reineke

The Consumption of Zombie Culture

Monsters - specifically the zombie - play a fundamental and vital role in both ancient and modern societies. Zombies have been and continue to be culturally relevant because they represent our own personal fears and issues of societal and cultural anxiety. The purpose of this project is to show the connection between the rise of the zombie figure and the rise of anxiety in Western Culture regarding displaced peoples and outsiders. This is observed through the expansion and growth of the zombie in today's media (television, film, gaming, literature) and the high quantity of revenue associated with the zombie icon. Understanding why humans are so fascinated with the zombie figure in contemporary society allows for a reflection of the mutual deep-rooted fears (and in some cases, desires) of mankind. These fears include death, the collapse of society, and a perceived lack of autonomy and free will.

32. Anya Kim - University of Iowa

Indianola, IA

Major(s): Neurobiology, Spanish

Mentor(s): Michael Dailey

Finding Ways to Protect the Immune Cells of the Brain During Stroke

Microglia are the immune cells of the brain, and as such they patrol the brain and protect it from dangerous invaders like bacteria and even potentially harmful dead brain cells. However, microglia are susceptible to injury themselves, and during stroke the lack of oxygen and nutrients can kill these important cells at a time when the brain is already extremely vulnerable. Currently, I am studying a molecule called adenosine, and last year our experiments demonstrated that application of adenosine could significantly reduce microglial cell death in a simulated version of stroke. To discover the mechanism behind this effect, I plan to find the receptor on these cells that is responding to the adenosine and saving these cells from death. By focusing on these tiny cells in the brain, we can gain a greater understanding of stroke, a disease killing 130,000 people annually in the US alone. Additionally, by pinpointing the mechanism that appears to be protecting these cells, we hope to lead the way for potential pharmaceutical treatments or preventative drugs to protect the brain during stroke. /

33. Timothy King - Iowa State University

Ankeny, IA

Major(s): Biology and Environmental Science

Mentor(s): Dick Schultz

Greenhouse Gas Emission and Water Quality Quantification along Saturated Buffer Strip of Bear Creek

Our research is centered on quantifying the nitrate removal and identifying the processes that lead to this removal within the soil on the saturated buffer strip along Bear Creek. Also, we are studying the levels of different greenhouse gases that are emitted from the soil, including methane and carbon dioxide. We are also researching the quality of the saturated buffer stream water. By comparing the greenhouse gas emissions from the soil along with the water quality along the saturated buffer to those of an unsaturated buffer site, we hope to be able to quantify the benefits of implementing a saturated buffer on cropland.

34. Julie Kirkpatrick - University of Northern Iowa Tracy Wulfekuhle - University of Northern Iowa

Waverly, IA / Holy Cross, IA

Major(s): Mathematics / Mathematics

Mentor(s): TJ Hitchman

Bridge Numbers: A Knotty Journey

Take a long string, tie it in a complicated knot, and fuse the ends together. This gives you a mathematical knot. In your knot, you will have sections which go over other sections, and only over. These are called bridges. The least number of bridges in any drawing of a knot is called the bridge number of that knot. We can use the bridge number to tell knots apart. We are studying ways to draw the knot so that we have the fewest number of bridges. There are a large number of knots with unknown bridge numbers, including the knots with 12 crossings. Because these bridge numbers are unknown, there is a gap in the knowledge in knot theory. We are trying to fill that gap.

35. Elizabeth Kraidich - Iowa State University

Milwaukee, WI

Major(s): Apparel, Merchandising, and Design

Mentor(s): Brenda Ackerman

The Native American Jingle Dress

The role of Native Americans and their culture is very important in understanding the history of America, since they were the first inhabitants. Many people only picture Native American dress as a large headdress with feathers, leather garments with beads, and moccasins, which is not the case. The Jingle Dress is historic Native American regalia not well known outside the community. Worn only by women and young girls, the Jingle Dress comes in many styles and colors. Traditionally, 365 metal cones adorn the dress and give it a distinctive look. The Jingle Dress played an important role as a healing dress during the early 1920's and 1930's, when the community was plagued with illness. Today, the Jingle Dress dance is performed at many Powwows and is one of the most popular dances among Native Americans because it can be danced at any age.

36. Chris Levandowski - Iowa State University

Mankato, MN

Major(s): Civil Engineering

Mentor(s): Sri Sritharan

Evaluating Ultra-High Performance Concrete Properties and Wind Energy Applications

Ultra-High Performance Concrete (UHPC) is a relatively new construction material that is growing in use throughout the world due to its unique structural properties. These properties include superior strength, corrosion resistance, and durability, and they give UHPC a distinct advantage over other structural materials. For example, UHPC's compressive strength is approximately ten times that of conventional concrete. UHPC has been used in bridge beams and decks throughout the world and is being used for a tall wind turbine tower design at Iowa State University. My research focuses on the properties of UHPC and its potential applications to wind energy. Iowa is a national leader in wind generation with 28% of state electricity generated by wind turbines. Because of this, UHPC has the potential to make a significant impact on Iowa and its wind energy generation. UHPC also has potential in the design of durable and cost-effective offshore wind turbines.

37. Danny Linggonegoro - University of Iowa

Sheldon, IA

Major(s): Human Physiology

Mentor(s): Justin Grobe

Vasopressin Protein in Early-Pregnancy Initiates Preeclampsia

Preeclampsia is a life-threatening condition during pregnancy characterized by hypertension, excess protein in the urine, and eventually seizures. This disorder occurs in 5-10% of all pregnancies, and complicates roughly 4,000 pregnancies per year in Iowa alone. The cause of the disease is not known and the only cure is the delivery of the baby and placenta. Our lab found that a protein arginine vasopressin (AVP) is elevated in preeclamptic women as early as 6 weeks into pregnancy, months before clinical symptoms appear. Additionally, AVP infusion in pregnant mice throughout pregnancy causes key symptoms of preeclampsia: elevated blood pressure, excess protein in the urine, acute kidney injury, and poor fetal growth in the womb. These data, along with the known actions of AVP in vascular and renal tissues in the non-pregnant state, lead us to hypothesize that elevated AVP in early pregnancy represents an initiating factor in preeclampsia. Indeed, female mice infused with AVP only during early pregnancy exhibited the full development of symptoms. Overall, these data suggest AVP exposure only in early gestation is sufficient to initiate preeclampsia; thus we hypothesize pharmacological interference of AVP to prevent human preeclampsia will have to be initiated as early in gestation as possible.

38. Ryan Lode - University of Northern Iowa

Sheldon, IA

Major(s): Biology

Mentor(s): Michael Walter

Optimizing Sucrose Gradients for Small Bacteriophage Purification

Bacteriophages are viruses of bacteria and are abundant in nature. These viruses have differing morphologies; some have a head-tail morphology, while others have a tail-less morphology. Tail-less phages are under represented in the scientific literature and have properties of interest for certain applications. Current laboratory methods for isolating bacteriophages, however, have a strong tendency to select for larger phages with head-tail structure. The goal of this project was therefore to refine an existing method for bulk isolation of small bacteriophages from soil via sucrose density gradients. After centrifugation, these gradients were fractionated and spotted on bacterial lawns to assess infectivity. Fractions corresponding to peaks of infectivity were subject to SDS-PAGE to determine the presence of small phages. Sucrose gradients of 10-20% resolved phages better than 10-40% gradients. Finally, greater resolution of small phages was achieved with shorter periods of centrifugation.

39. Zachary Lones - Iowa State University

Des Moines, IA

Major(s): Computer Engineering

Mentor(s): Suraj Kothari

Space/Time Analysis for Cybersecurity

Attacks on software are becoming more sophisticated every day, often causing catastrophic system failures and loss of private information. STAC research aims to develop tools and methods for finding segments of code that can cause a measurable difference in run time or space consumed. These code segments can potentially allow an attacker to disable a critical system or reveal a secret contained within the program. However, the parts of the code that make the software vulnerable are small in comparison to the millions of lines of code of the larger program. RULER, a suite of software analysis tools, can accelerate the rate at which an auditor can go through a program to pinpoint a vulnerability. It does this by automating many tasks that were frequently done manually before. This allows the auditor to quickly navigate larger programs and classify areas that create a side-channel or are vulnerable to an algorithmic complexity attack.

40. Belinda Mahama - Iowa State University

Ames, IA

Major(s): Biology

Mentor(s): Wilson Rumbelha

Inflammatory Biomarkers of Hydrogen Sulfide Induced Neurotoxicity and Degeneration

Hydrogen sulfide (H₂S) has dual actions in the body as an internally produced signaling molecule and a toxin. It is a colorless, rotten egg smelling byproduct of several industries including paper-milling, and natural forms of exposure are possible for individuals living near landfills or volcanoes. Intoxication can lead to short- and long-term neurological symptoms, including neurodegeneration and motor impairment. However, the underlying mechanisms are still unknown. Our hypothesis is that neuroinflammation, characterized by a defensive response from agitated neurons, can cause cell death by invoking a damaging chemical cascade. To test this hypothesis we used staining techniques to visualize the affected tissue, then measured the chemicals

of interest in the brain and blood of exposed mice. Results show increased reactivity of neurons, starting around day 3 post exposure. Understanding the mechanisms underlying neuroinflammation contributes to our long-term objective of treating H2S-induced neurodegeneration.

41. Emily Martin - Iowa State University

Fort Dodge, IA

Major(s): Environmental Science

Mentor(s): Kurt Rosentrater

Drying Behavior and Analysis of Moisture Content in Waste Food

Over 40 percent of food purchased in the United States today goes uneaten, which is the equivalent of throwing away \$165 billion each year. Once in the landfill, food waste's high moisture content causes it to rapidly decay, producing 90 percent of total methane emissions from landfills. Processing food waste through a dryer is one method to reduce moisture content, rendering it usable for alternative products. The purpose of this study was to understand the drying characteristics, moisture content, and variability in substance of waste food. Samples from an Iowa State dining center were run through a small-scale dryer. The drying analysis showed typical biological drying rates at 50°, 150°, and 250° Celsius. Variation in food products and particle sizes and shapes will impact not only drying behavior but also the nutritional composition of these materials, which can create potential challenges in developing value-added applications.

42. Kevin McGee - University of Northern Iowa

Cresco, IA

Major(s): Economics

Mentor(s): Bryce Kanago

Determinants of NBA Average Annual Attendance by Team

My project explores which characteristics of NBA teams are significant determinants of average attendance for the 1990-91 to 2014-15 seasons. By determining which variables are significant and the direction and magnitude of their impact on a team's annual attendance, the results may be used to predict future NBA attendance figures, analyze how different teams can improve attendance and revenues, and determine whether other cities, such as Des Moines, are strong candidates for attracting new NBA teams. In the exploration of which characteristics are most important to determining NBA attendance, data has been collected and sorted by each team by year. I use variables such as local population, unemployment rate, real per capita income, and nearby entertainment substitutes to evaluate a city's feasibility to acquire an NBA team.

43. Astrid Montuclard - University of Iowa

Tahiti, French Polynesia

Major(s): Premed, Chinese

Mentor(s): Helena Laroche

Water vs. Soft Drinks: what influences undergraduates' choice in the University of Iowa All-you-can-eat, prepaid Dining Halls

Sugary soft drinks contribute to obesity and diabetes especially among the youth. In order to understand the water/soft drink consumption patterns of students in in Burge Market Place of the University of Iowa, our research team conducted an intervention study and surveys in September and November 2014. The main

questions included: Does a sign indicating the location of water increase the number of students who ever drink water in the cafeteria? Why do students not consume water? Are students who drink soft drinks in Burge Market place more likely to consume soft drinks outside the cafeteria and inversely? And how often do students plan on drinking water but eventually serve themselves with sugar-containing beverage when they are in front of the cafeteria's soda dispensers? Over three hundred students completed the survey each time. The results showed that clearly marking the location of the water dispenser in the dining hall increased the percentage of students ever drinking water with their meal. The main reason given for not drinking water was that they prefer other drinks. Since water shares the same dispenser as soda, once facing the dispenser around 1/3 of students reported switching their choice to soda over half the time.

44. Nicholas Mullen - University of Iowa

Omaha, NE

Major(s): Biochemistry BS

Mentor(s): David Price

The effects of oxidative stress on the early events of human gene expression

The use of oxygen for the metabolism of food by aerobically respiring organisms is a double-edged sword. On one hand, it greatly increases the efficiency of food metabolism and thereby provides much more energy per amount of food consumed than could be achieved by processes that don't use oxygen. On the other hand, oxygen and other chemicals that arise from the oxygen in cells can damage DNA and lead to DNA mutation, which in turn can cause cancer. / Interestingly, despite its potential to cause cancer, there are current investigations that are exploring the possibility of inducing oxidative stress in malignant tumor cells as a way to treat cancer. This is because, in addition to its previously mentioned effects, oxidative stress inhibits certain processes that are required for gene expression, namely RNA Polymerase II transcription initiation and co-transcriptional mRNA capping. Here I present an investigation of how exactly oxidative stress affects these two processes, using an in vitro system with human cancerous cell extract. These experiments have yielded mechanistic insights that will inform future research efforts and perhaps lead to the discovery of new molecular targets for anti-cancer drugs. /

45. Sarah Myers - Iowa State University

Sabula, IA

Major(s): Psychology and Animal Science

Mentor(s): Jason Chan

Leveling the playing field: Using expressive writing and a teaching intervention to reduce test anxiety effects on exam performance

Test anxiety negatively affects a significant portion (15-30%) of college students (Hill & Wigfield, 1984; Eysenck & Rachman, 1965), causing them to underperform on school exams relative to their true ability. The present research aimed to identify an in-class intervention that could alleviate the harmful effects of test anxiety on performance. We examined two interventions: a teaching intervention in which students learned basic scientific knowledge about test anxiety, and an expressive writing intervention that instructed students to write down their feelings about exams. Both interventions were done immediately before class exams. The teaching intervention proved ineffective. However, expressive writing reduced the performance gap between students who were high and low in test anxiety. The expressive writing intervention thus offers a useful approach to leveling the playing field for all students and allows exams to be better indicators of intellectual abilities.

46. Ben Nettleton - University of Northern Iowa

Kensett, IA

Major(s): Biology

Mentor(s): Kenneth Elgersma

Comparing Bee Abundance and Diversity in Candidate Biomass Crops

Over the past 50 years, wild bee populations have been declining due to combined stresses from pesticides, loss of habitat, lack of flowers, and parasites. The need to survey, stabilize and grow wild bee populations is urgent and crucial to future farming success. As the bees draw their own attention, biomass crops are emerging as potential competitors to corn ethanol and fossil fuel energy production. It is important to take into consideration the effects such a landscape change would have. This study compared bee abundance and diversity among different candidate biomass crops to estimate the small-scale effect of each crop on pollinators. Using standard sweep netting methods, we found a higher abundance and greater diversity of bees in biomass crops that were more diverse. Overall, we find that species-rich biomass crops provide better habitat to a greater number of bee species than monoculture biomass crops.

47. Justin Niday - University of Northern Iowa

Boone, IA

Major(s): Supply Chain Management

Mentor(s): John Anderson

Chinese Strategic Asset Seeking Activity in the US: A Literature Review

With the continual economic growth of China, the importance of Chinese foreign direct investment and where this investment is directed grows as well. There has been research within the last decade looking into the significance of strategic-asset-seeking (SAS) when determining the factors of Chinese foreign direct investment (FDI). SAS is classified as foreign direct investment that targets technology, patents, stocks, and human capital. Numerous studies have found differing results when measuring the significance of SAS in determining FDI. This literature review compares completed research in order to find how the measurement of SAS affects location models. For this review data of Chinese FDI in the US is used to test the significance of SAS in developed nations.

48. Chelsea Ryan - University of Iowa

Naperville, IL

Major(s): Psychology

Mentor(s): Ryan LaLumiere

The Effects of Optogenetics on Cocaine-Seeking Behavior in Rats

Drug-seeking and drug-taking behaviors are costly both for individuals with addiction and for society. Treatment for addiction is hampered by high rates of relapse and few pharmacological treatment options. This study examined the role of the infralimbic cortex (IL), a brain region of the medial prefrontal cortex, in extinguishing cocaine-seeking behavior. To do this, we used an animal model of cocaine self-administration, in which rats learn to lever press to receive infusions of cocaine. We also used a method, optogenetics, to selectively inhibit the IL during extinction training, where lever presses did not result in cocaine infusions. We then examined the temporal relationship between lever pressing, extinction learning, and IL activity. IL inhibition immediately after unreinforced lever presses during extinction training enhances ongoing lever pressing and potentiates later cocaine-seeking behavior. These results suggest that activation of the IL

immediately after an unreinforced lever press plays a role in cocaine-seeking behavior. This study improves our understanding of the brain systems responsible for addiction and may be important for future treatments of cocaine addiction.

49. Samuel Schulte - Iowa State University

West Des Moines, IA

Major(s): Biochemistry

Mentor(s): Reuben Peters

Investigating Diterpenoid Production in Plants

Humans have utilized the unique properties of plants for thousands of years. In addition to their obvious role of supplying food, plants also produce medicines. For example, the perennial Danshen has been used in Chinese traditional medicine to improve blood flow. Recent analysis has shown that extracts from Danshen also exhibit cardioprotective and anti-HIV capabilities. These astonishing properties are due to the presence of natural products known as diterpenoids. Modern medicine has already honed the use of diterpenoids as pharmaceuticals (i.e., taxol, one of the most successful anti-cancer chemotherapy drugs). Unfortunately, diterpenoids are present in low concentrations in plants and are difficult to synthesize in a laboratory, preventing widespread application. Therefore, in the Peters laboratory at Iowa State, we are working to improve diterpenoid synthesis by studying how plants produce these compounds. This is critical in enabling widespread, efficient production of diterpenoids for use in medicine and agriculture.

50. Allison Sims - Iowa State University

Natalie McCullough – Iowa State University

Fairview, TX / Marion, IA

Major(s): Interior Design / Interior Design

Mentor(s): Diane Al Shihabi

Preservation of Historical Interiors: Uniting Contemporary Function with Historical Integrity in the Cedar Rapids' Carnegie Library

In 2015, Iowa State University's Historic Preservation of Interiors class collaborated with the Cedar Rapids Museum of Art and the State Historic Preservation Office to propose rehabilitation options for the Cedar Rapids Carnegie Library. The 1905 library was funded by steel mogul Andrew Carnegie's philanthropic efforts to reduce illiteracy through free public education and is historically significant in grant amount and architecture. The primary objective of the McCullough-Sims rehabilitation proposal is to accommodate the museum's contemporary needs, while reinstating the building's historical integrity. Research methodology included on-site analysis, client interviews, archival analysis and execution of a Historic Structures Report. The proposal's recommendations comply with the Secretary of Interior's standards and include rendered images and floor plans to communicate design intent. The design solution is significant because it offers Iowans a rare glimpse of the historic library's original appearance, while facilitating functions of a twenty-first century art museum and event space.

51. Chloe Steffensmeier - Iowa State University

Mt. Pleasant, IA

Major(s): Child Adult and Family Services

Mentor(s): Peter Martin

Stressful life events, Social Provisions and Well-being in Later Life

The purpose of this study was to assess age and gender differences for stressful life events and facets of well-being in very late life and to assess predictors (recent stressful events, and social resources) of well-being in later life.

We used proxy data for 309 participants (octogenarians and centenarians) of the Georgia Centenarian study. T-tests were computed to compare age and gender differences for well-being facets, stressful life events, and social resources. Multiple regression analyses were computed for predictors of well-being: social resources and recent negative life events. The same facets of well-being were assessed in both the t-tests and linear regression analyses: cognition, depression, functional health and physical health.

The results obtained from the study indicated that octogenarians and men have higher cognitive functioning and better functional health than centenarians and women. The multiple regression analysis revealed social resources as a predictor of well-being for all facets.

52. Paul Strickler - Iowa State University

Winterset, IA

Major(s): Biology

Mentor(s): Marna Yandea-Nelson

Do different desaturase enzymes in corn silks cause variation in fatty acid accumulation?

Corn is a major Iowa crop that is exposed to high temperatures and drought during its growing season. We study lipids that accumulate on corn silks, to understand how lipids are made and how they might protect the silks against environmental stress. We are studying two candidate genes involved in producing unsaturated fatty acids and derivatives that accumulate on the silk surface. These genes seem to encode desaturases, which are enzymes that change saturated fatty acids into unsaturated fatty acids, by creating a carbon-carbon double bond. We hypothesize that differences in unsaturated lipid accumulation seen on silks from different corn inbreds are due to biological variation between desaturases. To test our hypothesis, we inserted these desaturases into bacteria and are characterizing their functions by comparing the amounts and types of fatty acids produced by each desaturase. This work also has industrial importance for the production of unsaturated fatty acid supplements.

53. Elizabeth Turcotte - University of Northern Iowa

Cedar Falls, IA

Major(s): Biology

Mentor(s): Nilda Rodriguez

Testosterone and Male Susceptibility in *Leishmania infantum chagasi* Infection

Every year millions of people are infected with the parasitic protozoa that cause Leishmaniasis. The parasite is transmitted to humans through the bite of an infected sand fly, whereupon they are internalized by macrophages, replicate and cause disease. Leishmaniasis is challenging because the pathogen subverts macrophages, part of the immune system, to disseminate infection. Children and the immunocompromised are at greater risk. There is also a male bias, but the reasons for this trend are unclear. Our previous work showed that infection with *Leishmania infantum chagasi* increases the expression of androgen receptor, the receptor for Testosterone. Herein, preliminary data suggest that addition of physiological levels of Testosterone increased the parasite load of mouse macrophages infected with *L. infantum chagasi*. All

together, these results support a model in which the parasite-driven increase in Testosterone signaling exacerbates infection and sets the basis for the increased susceptibility observed in adult males.

54. Samantha Wagner - University of Iowa

Marion, IA

Major(s): Biomedical Engineering

Mentor(s): Erik Edens

Retrospective Study of Pediatric Heart Transplants at The University of Iowa

Traditionally, steroids are used in patient care after a heart transplant operation in order to prevent the body from rejecting the new organ. However, steroid treatment may come with many negative side effects that can greatly interfere with recovery. Similarly, heart tissue biopsies are used to monitor if the body is accepting or rejecting the organ. Biopsies are extremely invasive procedures that may also interfere with recovery. Naturally, it has come into question if the cost/risks of steroid and biopsy treatment outweigh the benefits. This retrospective study examines the outcomes of 46 pediatric heart transplants performed over the last 20 years at the University of Iowa, with the gradual elimination of steroid and biopsy use in post-transplant care. Patient history and course of treatment was reviewed and used to examine the outcomes and effectiveness of the new post-operation care protocol.

55. Sean Wasion - Iowa State University

West Branch, IA

Major(s): Mechanical Engineering

Mentor(s): Ming-Chen Hsu

Optimizing Trailer-Tail Design for Drag Reduction through Computational Fluid-Structure Interaction

Class 8 tractor-trailers consume nearly 12% of all US petroleum. Aerodynamic drag is responsible for roughly half of that, resulting in extremely high fuel costs. There are many add-on devices on the market today that strive to increase fuel efficiency through drag reduction. The trailer-tail, a wing-like structure at the rear of the trailer, is one of the most promising. This work focuses on the optimization of the trailer-tail design to minimize the aerodynamic drag over a tractor-trailer. Novel computational techniques are used to simulate and analyze the flow field around a truck equipped with various trailer-tail designs. Furthermore, we consider the effects of flow-induced vibration of the trailer-tails, which could cause the surrounding air to become more turbulent, generating uncertainties in the results. To account for these potential effects, this study uses computational fluid-structure interaction to analyze the vibration, a significant improvement that makes the simulations more realistic.

56. Haley Wellman - Iowa State University

Houghton, IA

Major(s): Family & Consumer Sciences Education & Studies

Mentor(s): Jennifer Margrett

Caregivers Living in Iowa's Care Deserts

In 2014, 134,000 caregivers in Iowa provided care for individuals with Alzheimer's disease (Alzheimer's Association, 2015). Caregivers living in rural counties have limited social resources and face greater challenges in accessing assistance and supports (Goins et al., 2005). Approximately 20% of Iowa's counties are considered

rural (population less than 2,500) and 90% of adults within these counties report inadequate social support. Within each of Iowa's 99 counties, there are 6 to 35 home health care agencies; however, caregivers still have trouble accessing these agencies. To address this issue, the Health Resilience Outreach (HERO) project was created by the Alzheimer's Association to provide social support and improved access to home- and community-based services for informal caregivers of individuals with dementia. Trained volunteers provide that support via telephone contact. Providing information about resources and support will increase the care provided by caregivers.

57. Emily Wetherell - University of Northern Iowa

Cedar Rapids, IA

Major(s): Psychology

Mentor(s): Helen Harton

The Power of the Situation: Use of Approach and Avoidance Goals in Romantic Relationships

How a person handles conflict in a romantic relationship is closely linked with his or her relationship satisfaction. Seeking positive outcomes is correlated with greater satisfaction, while avoiding negative outcomes is correlated with lesser satisfaction. Whether a person tends to seek positives vs. avoid negatives is related to personality, but this study tested whether it also might be affected by aspects of the relationship itself. 114 undergraduates indicated how they were likely to respond in three romantic relationship conflict scenarios that varied the level of a person's relationship investment, their level of relationship alternatives, and perceived relationship repair/dissolution. I also measured participants' personalities, goals, and relationship experience. I will assess to what extent tendencies to avoid negative outcomes (e.g., conflict) vs. seek positive outcomes (e.g., intimacy) are affected by aspects of the situation and to what extent they are affected by personality.

