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## 12th Annual Research in the Capitol [Program], March 28, 2017

University of Northern Iowa. University Honors Program.

University of Iowa. Honors Program.

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



Iowa Regent Universities present the

# 12th Annual Research in the Capitol

Tuesday, March 28, 2017

11:30am - 1:30pm

Iowa State House, Rotunda

Des Moines, Iowa

# Schedule

## 11:30am Opening Remarks

- Bob Kirby - Director, Iowa Center for Research by Undergraduates
- Student Speaker

## 11:45am-1:30pm

- Student Poster Presentations





# Welcome



Welcome to our **twelfth 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

# Iowa Regents Universities

## Contacts

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# Student Presenters

1. Yena Balekyani - University of Northern Iowa
2. Terryl Bandy - University of Iowa
3. Heather Bavido - University Northern Iowa
4. Jasmine Beecham - University of Northern Iowa
5. Courtney Beringer, Sam Vande Loo - Iowa State University
6. Eileen Campbell - University of Iowa
7. Andrea Colton
8. Caitlyn Coonts, Kaylee Hahn, Carter Reed - Iowa State University
9. Rae Anne Corrigan - University of Iowa
10. Logan Cress - Iowa State University
11. Laura Fischer - University of Iowa
12. Jason Fly - University of Northern Iowa
13. Carter Francis - Iowa State University
14. Byron Fritch - University of Northern Iowa
15. Max Gangestead - Iowa State University

# Student Presenters

16. Josiah Green - Iowa State University
17. Maddie Grimm - University of Northern Iowa
18. Maribel Guevara-Myers - University of Northern Iowa
19. Lance Heady - University of Iowa
20. Juliana Herran - University of Northern Iowa
21. Jacob Hill - Iowa State University
22. Mads Hoofnagle - University of Iowa
23. Casey Inman - University of Iowa
24. Clair Jacobson - University of Iowa
25. Rebecca Johnson - Iowa State University
26. Natalie Kaufman - University of Northern Iowa
27. Jordan Kersey - Iowa State University
28. Sarah Kurtz - Iowa State University
29. Evan Lamb - University of Iowa
30. Josie Laska - Iowa State University



31. Clare Lubenthal - University of Northern Iowa
32. Zach Lillquist - University of Northern Iowa
33. Zach Luppen - University of Iowa
34. Kaleb Luse - University of Northern Iowa
35. Erica Mack - Iowa State University
36. Mikaela Mallin - University of Iowa
37. Jessica Meseck and Kaitlyn Murphy - Iowa State University
38. Eric Mittauer - University of Iowa
39. Andrew Olson - University of Northern Iowa
40. Angela Olvera - University of Iowa
41. Elizabeth Petran, Emma VanSickle - Iowa State University
42. Jennifer Poncelet - Iowa State University
43. Irvin Rodriguez, Nicole Nucaro - University of Iowa
44. Alexandra Saulsbury - University of Northern Iowa
45. Angela Schab - University of Iowa

# Student Presenters

46. Lauren Schutz - University of Iowa

47. Victoria Settanni - University of Northern Iowa

48. Emily Southard - Iowa State University

49. Dan Stroud - Iowa State University

50. Maja Sunleaf - University of Iowa

51. Emily Tinguely - Iowa State University

52. Kellie Walters - Iowa State University

53. Nathaniel Weger - University of Iowa

54. Bailey Wetherell - University of Northern Iowa

55. Alyssa Williams - University of Northern Iowa

56. Allison Wold - University of Northern Iowa



## **1. Yena Balekyani - University of Northern Iowa**

Hometown - Urbandale, IA

Majors - Sociology and Political Science

Mentor - Marybeth Stalp

### **Skin Bleaching in the African Community**

Bleaching of skin is the action in which person(s) apply chemical substances on their body to chemically alter (e.g., in this case, lighten) their skin pigmentation. The purpose of the study is to gain ground in understanding how and why this phenomenon of skin bleaching is occurring in the African Community in the U.S., as well as how skin bleaching affects them. In person interviews are conducted to collect qualitative data on women and men of color in the African diaspora, in the United States who decide to engage in the bleaching of their skin. Previous prominent research in skin bleaching is used to understand the phenomenon of skin bleaching in a global perspective, in terms of its roots in colonial past and how it has manifested in the 21st century.

## **2. Terryl Bandy - University of Iowa**

Hometown - Oxford, IA

Major - Geoscience

Mentor - Bill Barnhart

### **High-Resolution Topographic Mapping of Active Faults in Southern California with Satellite Optical Imagery**

Digital elevation maps (DEMs) help in a high range of important roles in studying active faults and Quaternary Faults (i.e. present day to 2.6 ma). These topographic models provide core input of mapping active geologic structures and quantifying co-seismic displacements. Here, we present preliminary high-resolutions DEMs (0.3-3 m per pixel) generated from satellite stereo electro-optical imagery from the WorldView constellation of satellites. We generate DEMs over the active faults of southern California in an effort to supplement current high-resolution topography data sets from LiDAR, expand the spatial coverage of high-resolution DEMs where LiDAR observations are currently unavailable, and develop workflows for the rapid generation of post-earthquake DEMs in anticipation of geodetic analysis of forthcoming surface rupturing earthquakes. The DEMs are generated through NASA's Ames Stereo Pipeline algorithm and SETSM. Our preliminary work focuses on the Ventura fault and the San Geronio Pass of the San Andreas fault regions identified as special fault study zones by the Southern California Earthquake Center.

### **3. Heather Bavidó - University Northern Iowa**

Hometown - Mundelein, IL

Majors - Applied Economic Analysis and Mathematics

Mentor - Shahina Amin

#### **The Effect of Childhood Siblings on Adult Income**

As evidenced by the decreased US fertility rate, families are having fewer children. As productivity has risen, the opportunity cost of having children has risen; and as wealth has increased the need to have children to provide income in old age has fallen. Research shows that with family income held constant, parents face a tradeoff between how many children they have and the perceived quality of the children. My research explores the relationship between the number of siblings an individual grows up with and adult wages. Using the National Longitudinal Survey of Youth 1979, my results show individuals with seven or more siblings, compared to those with zero or one, negatively affect earnings in his/her adulthood.

### **4. Jasmine Beecham - University of Northern Iowa**

Hometown - Ankeny, IA

Major - Psychology

Mentor - Adam Butler

#### **Alcohol and Its Relationship to Family Work Conflict**

Alcohol has tension reducing properties, and there is evidence that people consume alcohol to reduce stressors in their lives. Conflict between work and family is a common stressor for workers. This project analyzes the relationship between work-family conflict and alcohol consumption in a sample of 81 non-professional working parents. Contrary to our hypothesis, work-family conflict was not related to either the quantity or frequency of alcohol consumption. In contrast, family-to-work conflict was related to lower alcohol consumption.

## **5. Courtney Beringer and Sam Vande Loo - Iowa State University**

Hometown - Dubuque, IA and Stewartville, MN

Major - Mechanical Engineering

Mentor - Eulanda Sanders

### **Exploring Wearable Technology: Solar Powered Bookbags**

Abstract: The purpose of this study was to gauge public opinion on wearable technology, with an extra focus on solar panel integration. Thus, the researchers gathered the information needed to develop a useful wearable technology product. Despite growing interest in wearable technology, the use of solar panels in commercial products seems to be non-existent. Some companies have experimented with the integration of solar panels in clothing but have not been successful. This is due to multiple factors including aesthetics, efficiency, functionality, and price (Dunne, 2010). This mixed method research design is composed of two parts: 1) a student focus group interview 2) campus-wide online survey. The data gathered from this information was then used to develop a prototype that modeled the needs of potential consumers. Materials included conductive threads and flexible solar panels. The prototype provides an example to companies of a product that would likely take off in the market, because it was designed from consumer input. The results of this study contribute to bridging the gap between the product developers and consumers concerning wearable technology.

## **6. Eileen Campbell - University of Iowa**

Hometown - Wayne, IL

Major - Theatre Arts and Spanish

Mentor - Lisa Schlesinger

### **State of Undress**

*State of Undress* is a full-length play that began with a few kernels of information involving relationships between women in Victorian England. Based on research about the time period, the role of women, the fashion industry, and the various relationships people held, a plot and characters were developed with a note-card mapping technique. The first draft is complete and has been workshopped with faculty and peers. Further development will arise from a staged reading. In its final form, ideally as a full gallery production here at the university, it will seek to explore the intersection of love, sexuality, and beauty through a historical lens.

## 7. Andrea Colton - Iowa State University

Hometown - Indianola, IA

Major - Biology

Mentor - Haldre Rogers

### Patterns of Woody Encroachment Establishment in Restored Prairies

Abstract: Tallgrass prairies, a key feature of Iowa's landscapes, are susceptible to woody encroachment. When undisturbed, this natural process makes it easy for woody species to invade open prairies and slowly transition them to forested areas. This study tests how herbivory and prairie diversity affect establishment of woody species in an experimental restored prairie within Ames, Iowa. We identified and measured all woody stems  $>0.5$  m within four plots surrounded by fencing to exclude common herbivores (deer and voles) and in four plots without fencing. Each region contained areas with high and low diversity of prairie seedlings. Plots allowing herbivore access have fewer woody stems in both high and low diversity treatments than plots excluding herbivores, likely due to non-discriminant browsing by herbivores. Plots excluding herbivory had higher numbers of establishment in low diversity only and this was dominated by four species: *Acer saccharinum*, *Cornus drummondii*, *Vitis riparia*, and *Pyrus calleryana*. *C. drummondii*, *V. riparia*, and *P. calleryana* have fruiting seeds, which indicates that the more successful species tend to be frugivore dispersed. Overall, this study shows that areas with a lower diversity of non-woody prairie plants that exclude herbivory provide for higher establishment of invading woody seedlings.



## **8. Caitlyn Coonts, Kaylee Hahn, and Carter Reed - Iowa State University**

Hometown - Eldridge, IA, Ames, IA, and West Burlington, IA

Major - Dietetics, Nutritional Science, and Kinesiology & Health

Mentor - Kevin Schalinske & Matt Rowling

### **Whole Egg Consumption Attenuates Weight Gain in Obese Type 2 Diabetic Rats**

Obesity is a national epidemic that can increase an individual's risk for a multitude of health complications, including type 2 diabetes (T2D). In individuals already diagnosed with the disease, even small amounts of weight loss can help prevent diabetic complications. Due to the relationship between obesity and T2D, and the link between obesity and diet, a better understanding of how dietary factors affect those with T2D is necessary. Currently, the consumption of whole eggs by those with T2D is controversial. Here, we investigated the relationship between the consumption of whole eggs and obesity in both a genetic-mediated and diet-induced (i.e., high fat feeding) T2D obese rat model. The genetic T2D model fed a whole egg-based diet exhibited a 40% decrease in weight gain, as well as a 4-5% decrease in total body fat. Similarly, the diet-induced T2D model showed a 22% decrease in weight gain in response to the consumption of whole egg. While egg consumption was without effect on the control rats in both studies. Therefore, we have shown that whole egg consumption is an effective dietary strategy to attenuate the obese phenotype in both a diet-induced and a genetic rat model of type 2 diabetes.

## **9. Rae Anne Corrigan - University of Iowa**

Hometown - Norwalk, IA

Major - Biomedical Engineering

Mentor - Michael Schnieders

### **Computer-Based Modeling of Chemotherapy Drugs**

This project focuses on understanding how chemotherapy drugs interact with cancer-causing proteins. PolType is a program that determines the chemical features of small biomolecules, however, it lacks the ability to analyze large biomolecules, such as drugs. Two programs, Fragmenter and Stitch, were designed to help overcome PolType's size constraint when evaluating large molecules. Fragmenter splits the drug of interest into small fragments to be parameterized by PolType, and Stitch puts these fragments back together to reform the full molecule. Working together, these two programs output a chemically complete model for the drug as a whole. Such drug models can then be used to help predict drug-protein interactions.

## **10. Logan Crees - Iowa State University**

Hometown - Hinton, IA

Major - Environmental Science

Mentor - Diane Debinski

### **Moth Diversity of the Grand River Grasslands of South Central Iowa**

Moths play important roles in local ecosystems and many species have important economic impacts. Moths are some of the most diverse organisms on Earth, composing about 10% of all known species. Eastern North America alone is home to thousands of species. Though they are incredibly diverse, and have large economic impacts, there is still little knowledge regarding the geographic distribution or population size for most of these species. Iowa is one of most diverse states for moths as it is situated between several broad areas with regionally endemic species including: the North, the Northeast, the Plains, and the annual migration of species from the South. In this study lights were used to attract specimens that were photographed and released. Over two seasons, more than 250 species were encountered from six different locations in Ringgold and Decatur counties. Several species encountered in this research project represent species that had previously never been observed in Iowa.

## **11. Laura Fischer - University of Iowa**

Hometown - Cedar Rapids, IA

Major - Mechanical Engineering

Mentor - Marc Wold

### **Creating a Hybrid Protein to More Efficiently Study Huntington's Disease**

Huntington's disease is a neurological disorder caused by genetic mutations in DNA. Recently, a link was discovered between Huntington's disease and a protein that stabilizes DNA in brain tissue. This protein, called Alternate Replication Protein A (Alt-RPA), could be the key to preventing or curing Huntington's disease. However, studying this protein is difficult because it is only found in humans, and it is unethical to experiment on people. To better understand the role of Alt-RPA, we are making mouse-human hybrid proteins. Currently, I am creating different forms of this hybrid and evaluating how they each function compared to non-hybrid proteins. Ultimately, we will insert the hybrid Alt-RPA into mice that exhibit Huntington's disease. This will create a more efficient method of studying Huntington's disease and could lead to novel treatment or prevention strategies.



## **12. Jason Fly - University of Northern Iowa**

Hometown - Brooklyn, NY

Major - Psychology

Mentor - Catherine DeSoto

### **Some Evidence of Youthful Aging: Elevated Cortisol and the Association with DNA Damage**

Chronic psychological stress as measured by the elevation of the stress hormone cortisol is thought to play a crucial role in the biological mechanisms involved in disease and accelerated aging. In 2011, a critical connection was reported between cortisol and the oxidative damage to DNA in a study of elderly participants (ages 63-83) via 24-hour urinary samples (Joergensen, et. al., 2011). This connection, if verified, has implications for how stress may accelerate aging and the onset of disease. The possible relationship between psychological stress and the cellular damage that underlies aging and disease is explored here, replicating the prior study with a sample of 49 young adults (ages 18-26) via direct salivary assay. A significant association was also found, suggesting a link between elevated cortisol and DNA damage at earlier ages.

## **13. Carter Francis - Iowa State University**

Hometown - Prior Lake, MN

Major - Materials Engineering

Mentor - Steve Martin

### **Using Glass Structure to Build Better Batteries**

As the energy needs of the world steadily climb, the need for an efficient and reliable method for storage is increasingly apparent. Using glass as a major component for next generation all solid state batteries shows promise in creating cheap, large, safe batteries which can revolutionize grid energy storage as well as work in tandem with nonrenewable resources to create a stable energy future. Through the study of how atoms bond and interact, glasses can be created which have similar properties to the liquids currently being used in batteries. The particulars of this study were performed at Iowa State in coordination with Corning and Rutgers Universities. The goal being to take an in depth look into how through a more complete understanding of glass structure we can move towards batteries of the future.

## **14. Byron Fritch - University of Northern Iowa**

Hometown - Dike, IA

Major - Physics

Mentor - Tim Kidd

### **TiO<sub>2</sub> Coating Method for Nanocellulose Aerogel**

Titanium dioxide has been shown to be an effective catalyst for splitting water into hydrogen and oxygen gas. By increasing the surface area of the titanium dioxide catalyst, the rate of water splitting may increase. A possible method to increase the splitting of water uses a high surface area composite material formed by coating nanocellulose aerogels with titanium dioxide. Different coating methods were studied using titanium isopropoxide as the titanium dioxide source to create such composites. It was found that the most consistent titanium dioxide coatings were formed during a 12 hour titanium isopropoxide vapor bath. Other coating methods collapsed the aerogel structure destroying the properties needed for an efficient catalyst. Further study will be needed to determine if this material is viable for enhanced water splitting. If successful, the hydrogen gas can be collected and used as a clean energy source for reducing pollution in existing technologies.

## **15. Max Gangestad - Iowa State University**

Hometown - Clarion, IA

Major - Agricultural Engineering

Mentor - Martin Gross

### **New Algae Treatment Technology Addresses Stricter Wastewater Regulations for Rural Iowa**

The Iowa DNR are enforcing new stricter wastewater treatment limits for communities throughout Iowa. The communities that these new permits affect the most are rural communities because of the high costs associated with meeting the new limits. Our research, which is funded by ISU CIRAS and a private company Gross-Wen Technologies, is investigating a new algae based wastewater treatment technology. This technology is known as the revolving algal biofilm (RAB) treatment system and was invented by ISU researchers in 2012. Our current tests using a pilot scale RAB treatment system in Dallas Center, IA is a critical step before full-scale commercialization of the technology. In this pilot-scale research we have installed our pilot RAB reactor at the Dallas Center lagoon treatment system. Before the wastewater enters the lagoon, it first passes through the RAB system. Following RAB treatment, it enters the lagoon. We take measurements before and after the RAB to identify nitrogen and phosphorus removal. In the first three months of the pilot, we have seen, on average, a 90% reduction in ammonia, 50% reduction in total nitrogen, and 30% reduction in phosphorus. The algae biomass that is produced during treatment can be made into biofuels, bioplastics, and fertilizers.

## **16. Josiah Green - Iowa State University**

Hometown - Litchfield, MN

Major - Industrial Engineering

Mentor - Caroline Krejci

### **Simulation Modeling of Human Behavior in Production Systems and Team Dynamics**

Companies in a variety of industries rely on their employees to work together effectively in teams to achieve their objectives. However, finding ways to encourage collaborative behavior to optimize a team's performance is often challenging. In particular, managers would like to be able to increase the likelihood that team members decide to help each other, in the event of workload imbalances (e.g., due to worker absences). Such behavior could be encouraged by leveraging the inherent characteristics of individual team members (e.g., their personality traits) such that the decision to help is driven by internal motivations, rather than external rewards. This research seeks to explore the potential for increasing team helping behavior through the development of an agent-based simulation model of a team of assembly line workers. Model inputs were derived from previous experiments with human participants, in which data on participants' personalities, perceptions, and decisions to help team members complete a task were captured. The model enables a variety of "what-if" scenarios to be performed to test the impacts of personality and perceptions on helping behavior, with a goal of providing a practical tool that will help managers better understand how to maximize workforce performance.

## **17. Maddie Grimm - University of Northern Iowa**

Hometown - Decorah, IA

Major - Health Promotion

Mentor - Disa Cornish

### **Disparities in Infant Mortality: Are Sociocultural Risk Factors Shaped by Institutionalized Racism?**

The United States has one of the highest infant mortality rates among countries with similar economies. In addition, significant disparities are present between races within this health indicator. According to the CDC, the infant mortality rate in 2013 among non-Hispanic whites was 5.06 infant deaths per 1,000 live births; the infant mortality rate for Black Americans was 11.11 - more than double. The purpose of this research is to explore a) sociocultural risk factors for disparities in infant mortality rates and b) whether institutionalized racism contributes to those risk factors. The social ecological model will be used as a theoretical framework. Literature was examined to determine whether and how experiences related to racism contribute to this health disparity in infant mortality. A better understanding of the possible ways institutionalized racism affects infant mortality and our nation's health will help communities develop health promotion efforts to end this disparity.

## **18. Maribel Guevara-Myers - University of Northern Iowa**

Hometown - Marshalltown, IA  
Major - Psychology  
Mentor - Helen Harton

### **Cultural Influences on Time Pressure in the U.S. and Taiwan**

Levine and Norenzayan's (1999) multicountry observational study investigated differences in time pressure due to cultural differences (individualism vs. collectivism). They found people in New York City walked more quickly down a sidewalk than people in Taipei, Taiwan. In this study, I investigated whether there would be a difference in walking pace in a smaller United States city (Des Moines, Iowa) compared to Taipei, Taiwan. I examined whether pace would differ by location—an outdoor shopping area vs. downtown. I also examined possible differences in time of day (12pm and 5pm) and day of week (Monday and Friday). The results were that men walked faster than women, younger people walked faster than middle age, or older people. There was no difference in pace by day of week. Controlling for gender and age, people downtown walked faster than those in shopping areas but, there was no significant difference in pace by country.

## **19. Lance Heady - University of Iowa**

Hometown - Quincy, IL  
Major - Biochemistry and Neurobiology  
Mentor - Andrew Pieper

### **Visualization of neuronal response to treatment with a neuroprotective molecule.**

Parkinson's disease causes dopamine-producing neurons in the brain to die, which leads to related motor symptoms. The new P7C3 class of neuroprotective molecules has recently been shown to protect against these symptoms in multiple preclinical models of Parkinson's disease. Here, we examined differences in growth and maturation of cultured neurons as a function of exposure to this class of neuroprotective agents. We achieved this by carefully photographing the same cells on a daily basis in order to produce time-lapse imaging of neuronal maturation. The overall goal is to facilitate investigation of the underlying mechanism of action of the P7C3 neuroprotective molecules, in hopes of fostering development of new treatment strategies for patients suffering from Parkinson's disease.

## **20. Juliana Herran - University of Northern Iowa**

Hometown - Cedar Falls, IA

Majors - Chemistry and Mathematics and Philosophy

Mentor - Pavel Lukashev

### **Effect of structural disorder on magnetic properties of MnCrVAI**

Operation of virtually any modern electronic device relies on magnetic materials. In particular, these materials are the cornerstone of data storage and processing in computer hardware elements, such as hard drives and random access memories. Here, we theoretically study an interplay between structural and magnetic properties of MnCrVAI, a material which recently attracted significant attention due to its rather exotic electronic structure. In particular, this material behaves either as an insulator or as a metal, depending on which "spin" (an intrinsic property of any fundamental particle) of the electron is considered. Using advanced computer simulation techniques (density functional calculations on a supercomputer), we show that structural disorder (i.e. displacement of atoms from their regular positions) in this material has a decisive impact on its magnetic properties. Our theoretical findings are in excellent agreement with recently published experimental results, and may open new avenues in an emerging field of spin-based electronics.

## **21. Jacob Hill - Iowa State University**

Hometown - Newton, IA

Major - Environmental Science; Biology

Mentor - Lisa Schulte-Moore

### **Nitrogen composition of cup plant changes with growth stage and differs from neighboring species in response to varying plant community diversity**

Diverse grassland ecosystems such as Midwestern tallgrass prairies often exhibit increased biomass production and nutrient use relative to monocultures due to complementarity between species and disproportionate influences of highly productive individual species. By comparing responses of the highly productive forb cup plant (*Silphium perfoliatum*) and less productive neighboring species to increasing diversity in reconstructed prairie plots, this study sought to understand the mechanisms responsible for such positive relationships between species diversity and ecosystem function in an agricultural context. Carbon:nitrogen ratio, a simple indicator of nitrogen acquisition patterns, and total aboveground tissue were measured in leaves of cup plant and neighboring species across the growing season. Results suggest that the nitrogen composition of highly productive prairie plants such as cup plant varies over the growing season and responds significantly to intraspecific competition while less productive neighboring species respond significantly to community diversity. These findings suggest that complementarity in resource uptake and biased effects of the focal species operate simultaneously in agricultural environments. The differential response of co-occurring productive and less productive species are potentially important considerations for restoration projects in agricultural contexts.

## **22. Mads Hoofnagle - University of Iowa**

Hometown - Cedar Falls, IA

Majors - Anthropology and Psychology

Mentor - John Doershuk

### **Identifying Ceramic Artifacts in Iowa's Prairie Lakes Region: A Case for Holistic Approaches**

Archaeologists have depended on ceramic analysis as a way to understand subsistence strategies, habitation patterns, and cultural features. However, ceramic analysis can be a field shrouded in mystery, where an analyst's instinct is often as important as scientific analysis. Archaeologists have differing opinions; some argue in favor of quantitative measures such as statistical or chemical analysis, others defend current qualitative measures as necessary forms of artifact analysis. A compromise exists: Our understanding of "ware types", or identifiable forms of pottery that are geographically specific, can be structured around analytical pillars that are easily replicated by other researchers. These pillars include design themes, chemical analysis of residues, and petrographic approaches such as temper point counting. This approach is currently being applied to 13DK96, a Woodland period site in the Prairie Lakes Region of Iowa, where application of existing ceramic ware types proved frustrating and a re-consideration of definitions is proving fruitful.

## **23. Casey Inman - University of Iowa**

Hometown - Boone, IA

Major - Human Physiology

Mentor - Chun-Fang Wu

### **Social interaction in fly model of Huntington's disease: a longitudinal study of survival and motor coordination**

Many genes linked to human neurodegenerative diseases are also found in the fruit fly *Drosophila melanogaster*. Included among these are the superoxide dismutase (Sod) gene, which has been implicated in Amyotrophic Lateral Sclerosis (ALS, or Lou Gehrig's disease), and the huntingtin (Htt) gene, which is known to cause Huntington's disease (HD) when mutated. Sod mutations have been shown to drastically reduce lifespan in flies. Interestingly, partial rescue of this lifespan deficiency was achieved by co-housing Sod mutants with healthy, active wildtype flies. We tested for the presence of a similar phenomenon in flies expressing a genetic mutation linked to HD. Using special genetic techniques, we selectively expressed a pathogenic human Htt gene in targeted cell types in *Drosophila* to create three experimental conditions: Htt expressed only in neurons, glia, and muscle. Preliminary data suggests co-housing with healthy wildtype flies may actually be detrimental to flies expressing Htt in certain tissues.

## **24. Claire Jacobson - University of Iowa**

Hometown - Iowa City, IA

Majors - French & Arabic

Mentor - Natasa Durovicova

### **Snapshots of Syria**

Stories have a unique capacity to help people of different cultures to understand one another. The story "An ordinary day" taken from the collection *Dry Rain* by Syrian author Haifa Bitar, is a snapshot of pre-revolution Syrian society translated from Arabic into English. Arabic literature is not commonly read by Western audiences, which is a lost opportunity for cultural interaction and understanding. But there are significant barriers to translation between Arabic and English, including different grammar structures (i.e. a lack of punctuation leading to lengthy sentences). A bigger difference, though, is the narrative arc: While in English stories tend to have a cohesive plot with clear development and a conclusion, Ms. Bitar's story does not. The "heroine" is a victim and doesn't do anything about it. This translation is an attempt to bridge a gap in understanding between two cultures, hoping that there are readers willing to cross it.

## **25. Rebecca Johnson - Iowa State University**

Hometown - Earlham, IA

Major - Agronomy and Horticulture

Mentor - Kathleen Delate

### **Improving Soil Conservation and Crop Performance through Reduced Tillage and Cover-Crop-Based Rotations in Organic Squash Production**

Recently there has been a surge in organic vegetable production in Iowa, increasing to 1,264 acres and yielding \$2.5 million in annual sales. Reduced tillage in vegetable operations provides environmental benefits for soil conservation and reduces machinery, labor and fuel costs. On organic farms, a roller/crimper is used instead of herbicides to terminate cover crops. Cover crops of hairy vetch and rye were planted on October 18, 2015, at the ISU Neely-Kinyon Farm, Greenfield, Iowa, and terminated the following spring with a roller/crimper. Organic squash was transplanted on June 14, 2016. Cover crop biomass averaged 5,323 lb/acre. Treatments were organic no-till and tilled cover crops, along with compost and mulch. Over two harvest periods, squash from tilled, compost and mulch treatments had the greatest numerical yields, averaging 18,023 lb/acre, while no-till plots averaged 4,590 lb/acre. Yields from no-till plots receiving compost, however, were not statistically different from tilled compost plots. Mulch provided additional yield benefits when compared to no mulch treatments. Previous soil quality results showed higher soil quality in no-till plots, including more soil nitrate-N and greater macroaggregation compared to tilled plots. Cover crops also added higher

## **26. Natalie Kaufman - University of Northern Iowa**

Hometown - Robins, IA

Majors - Psychology and Philosophy

Mentor - Helen Harton

### **Predictors of Attitudes toward Transgender Men and Women**

Discrimination and negative attitudes toward transgender individuals lead to much higher suicide rates among this population (41% vs. national average of 2%; Haas, Rodgers, & Herman, 2014), and fears for their safety (Perry & Dyck, 2014). In this study, we investigated whether inducing empathy would improve attitudes toward transgender men vs. women. 242 participants read one of four vignettes (i.e., a definition of "transgender," a personal story of a transgender female or male, or a control story), rated their empathy and attitudes toward transgender individuals, and completed demographic and personality measures. The vignettes did not increase empathy, but participants who were more religious or conservative reported more negative views of transgender people, regardless of the transgender person's gender. Participants higher in general levels of empathy reported more positive attitudes. A focus on biological underpinnings of transgenderism (i.e., that it is not a "choice") may improve attitudes more than empathy alone.

## **27. Jordan Kersey - Iowa State University**

Hometown - Des Moines, IA

Major - Environmental Science and Biology

Mentor - Mike Castellano

### **Crop rotation diversity to improve water quality and increase soil health**

Extended crop rotations that include a perennial forage crop are a key component of the Iowa Nutrient Reduction Strategy. In addition to reducing nitrate loss to Iowa waterways, extended crop rotations can also increase soil organic carbon content in surface and subsoils. Greater C storage in extended crop rotations may be attributed to greater root inputs, which can form organic matter more efficiently than aboveground inputs. The purpose of this study was to compare the biochemical composition of soil organic matter between an extended rotation (corn-corn-oat/alfalfa-alfalfa) and a simple rotation (corn-soybean). We hypothesized that the soil organic matter would reflect greater contribution of root inputs in the extended crop rotation. We collected soil samples from extended and simple crop rotations at four depths. We measured total fatty acids and fatty acid biomarkers that represent root and shoot compounds using pyrolysis-gas chromatography-mass spectrometry and extraction by cupric oxide. Results indicate fatty acids dominate subsoil carbon pools. Ongoing research using the cupric oxide method will quantify root and shoot biomarkers. High levels of root inputs are desirable because they promote resilience and stability of Iowa crop production.



## **28. Sarah Kurtz - Iowa State University**

Hometown - Waverly, IA

Major - Biology and Horticulture

Mentor - Silvia Cianzio

### **Hydroponic Testing of Iron Deficiency Chlorosis in Soybeans**

In many Iowa soybean fields, Iron Deficiency Chlorosis (IDC) is a problem that causes stunting in plants and yield loss. IDC resistance in soybeans is currently not being screened for in the greenhouse. The objective of this project is to efficiently test soybeans for IDC resistance in the greenhouse in a hydroponic system. This allows for yearlong testing, which saves time, money, and space. To accomplish this, previous work with hydroponic IDC testing was modified to screen hundreds of lines rather than a small amount. Ten different forms of media were tested for iron content and IDC symptoms. It has been concluded that LECA, Growstones, and pumice have shown desirable symptoms while being the most efficient media when hydroponically testing iron deficiency chlorosis resistance in soybeans.

## **29. Evan Lamb - University of Iowa**

Hometown - Robins, IA

Majors - Microbiology and Human Physiology

Mentor - Diane Slusarski

### **Characterization of Visual Defects of Bardet-Biedl Syndrome Mutations Using the Zebrafish Model System**

Bardet-Biedl Syndrome (BBS) is a rare human genetic disorder which is characterized by extreme obesity, cardiovascular defects, abnormal limb development, mental impairment and visual disorders. Modeling this disease in the zebrafish has proven beneficial to our understanding of the disease's impact on different body systems. To analyze the impact mutations have on the function of the eye, we have developed a high-throughput, automated assay which tests the fish for vision loss. We also examine how the cells in the eyes are changed by the mutations. The zebrafish are an ideal model for our research because they are very similar to humans genetically and their eye structure and functions are nearly identical. Additionally, the zebrafish develop rapidly and produce large numbers of offspring which allow us to quickly gather results and share this with physicians and other researchers.

### **30. Josie Laska - Iowa State University**

Hometown - Cedar Rapids, IA

Major - Elementary Education

Mentor - Carla McNelly

#### **Engaging Pre-Service Teachers in Community-based Research Projects**

Teachers entering our nation's classrooms need to be prepared to teach students in an inclusive way. This poster documents the importance of matching pre-service teachers with community based organizations as learning and cultural bridges with their students, families, and community. Drawing on the critical reflections of pre-service teachers matched with an urban community-based organization, this poster details how this experience has enhanced their educational and professional understanding by participating in an interdisciplinary research project. This collaborative and engaging research project, called Design Dialogues, is in response to the ISU 4U Promise program that awards tuition scholarships to graduates of King and Moulton Elementary Schools that reside within Iowa's 35th District of Des Moines. The poster explains the significance of institutions of higher education providing out-of-class experiences to undergraduates, specifically pre-service teachers, for the benefit of becoming better prepared future teachers. This is important because the gap generally found in pre-service teacher programs is that new teachers assume responsibility of classrooms without the sufficient hands-on practitioner experiences and without the knowledge of the students they serve.

### **31. Clare Laubenthal - University of Northern Iowa**

Hometown - Davenport, IA

Major - Biochemistry

Mentor - Joshua Sebree

#### **New insights into the "Manna from Heaven" hypothesis**

Titan's atmosphere is unique in that its atmospheric chemistry is thought to be similar to that of the Earth's atmosphere before the development of life. Aerosols form as a result of the radiation of organic gases by ultraviolet light. These aerosols are thought to be similar to the prebiotic hazes that formed in the atmosphere of Earth during the Archean Era and which allowed for the eventual development of microbial life. We are investigating whether Earth soil bacteria can grow, using these aerosol analogs as a nutrient source. This study is based on microbial metabolism study done by Carl Sagan, which detailed bacterial growth using Titan-analog tholins as the sole carbon source. We are building upon this study, using aerosol analogs that more closely match those of modern-day Titan coupled with modern day detection techniques. The tholins used in this study will be made from carbon-13 spiked gases, in order to quantitatively evaluate our results via a metabolic NMR study. The results of this study will provide new insights as to how Earth's atmosphere could have supported primordial life.

## **32. Zach Lillquist - University of Northern Iowa**

Hometown - Forest City, IA

Major - Science Education

Mentors - Benjamin Forsyth, Benjamin Olsen

### **Effects of Role-Goal Methods on Student Engagement: A Case Study**

The purpose of this study is to explore how classroom contexts and instructional methods influence student participation and engagement through the "Role-Goal" model. This model gives students a "role" to take on to meet an end "goal," or a desired outcome of a given classroom activity. In the case study, students will be given the role of a roller coaster engineer and are tasked to build a paper roller coaster for an amusement park coming to the Cedar Valley area. Students will be interviewed after the unit to determine their engagement and excitement levels. The overall goal of this study is to see how the contextual methods teachers possess in the classroom can have a positive effect on student learning and engagement. Education is crucial for everyone's future, and finding new ways to engage students is vital.

## **33. Zach Luppen - University of Iowa**

Hometown - Omaha, NE

Major - Astronomy and Physics

Mentor - Cornelia Lang

### **Hawkeyes in Space Exhibit**

The Hawkeyes in Space exhibit is a museum exhibit currently on display at the Old Capitol Museum, curated over the summer by Cornelia Lang and Zachary Luppen, alongside university libraries and museum staff. The exhibit covers the entire history of the University of Iowa's Department of Physics & Astronomy, split into three distinct sections. The first covers the history of the department, from its very beginnings, through the life of Iowa professor and world-renowned space scientist James Van Allen and his team's work on the first US satellite Explorer 1 which led to the discovery of the Van Allen Radiation Belts, to the point where the university was manufacturing entire spacecraft. The exhibit then transitions to the science of space, examining the actual work that's been done on so many of the missions. It makes use of a plasma-generating "planeterra" to simulate radiation belts and aurora, and also teaches plasma-wave physics by using real data that has been translated into sound. Lastly, the exhibit details the continuing legacy of the department, how with even such a rich history, there are still so many Hawkeyes in Space heavily-involved in current and future spacecraft missions, astrophysical research and space science.

### **34. Kaleb Luse - University of Northern Iowa**

Hometown - Eldora, IA

Majors - Computer Science and MIS and Economics

Mentor - Imam Alam

#### **Factors Affecting Student Graduation Rates**

Over the past few years, colleges and the United States government have become increasingly interested in raising graduation rates. This paper uses data from a survey given to students during their freshman year to analyze factors specific to an individual student that makes them more or less likely to graduate. Previous research shows that high school GPA and SAT scores are the two most statistically significant factors. In my study, I use a logit regression model to determine which factors are significant to a student's likelihood of graduating. As with previous research I found high school GPA to be the most statistically significant. Other factors found to be statistically significant were if the student is a first-generation student, how well the student feels they can pay for their next semesters costs, the students self-reported ability to prioritize, manage their time, and take notes.

### **35. Erica Mack - Iowa State University**

Hometown - Quad Cities (IA and IL)

Major - Civil Engineering

Mentor - Peter Taylor

#### **Assessment of Simple Test to Evaluate Concrete Permeability**

Permeability is often defined as "the rate of flow of a fluid into a porous solid." Permeability is a quality of concrete that affects its potential durability because most deterioration mechanisms involve fluid transport into the system. Permeability of concrete is strongly affected by the moisture state of a sample, among other factors such as the water cement ratio, composition of the cementitious system, and curing regime. Considerable research has been conducted, seeking to find an ideal permeability test for concrete. The common weakness of most tests is the difficulty of controlling and measuring the moisture condition of the sample. The subject to be investigated is the ability of a simple test to indicate relative permeability characteristics of different concrete mixtures. The time that it takes for a known, small, volume (20  $\mu\text{L}$ ) of water to be absorbed into the surface of a concrete sample in dry condition should then provide a means of giving an indication of the relative quality of a given sample. The research is aiming to assess the consistency of the test over a selection of changing parameters. If consistency is proven, the simple test can be performed to determine the relative permeability of concrete samples.

## **36. Mikaela Mallin - University of Iowa**

Hometown - Cedar Falls, IA

Majors - Biomedical Science and Dance

Mentor - Robert Cornell

### **Protein Tfap2 is essential for pigment-cell development**

Melanoma is the cancer of pigment-producing cells (melanocytes). Melanoma arises from mutations that happen while a melanocyte is developing. Many proteins monitor this process, so there are a lot of possibilities for mutations to happen. We must understand the role of each protein involved in order to achieve a holistic understanding of genetic causes of melanoma. A protein called Tfap2 has been shown to aid in melanocyte development. We hypothesize that Tfap2 is actually essential. To find out, we ask what would happen if active Tfap2 is depleted during melanocyte development. By manipulating the amount of a second protein, Kctd15a, present in a cell, we can manipulate the activity, or "on/off" status of Tfap2, so that it can no longer help with melanocyte development. We performed an experiment to express extra Kctd15a in melanocytes and found that it severely worsened their quality, suggesting that Tfap2 is important for melanocyte development.

## **37. Jessica Meseck and Kaitlyn Murphy - Iowa State University**

Hometown - Carson, IA and Charter Oak, IA

Major - Biology

Mentor - Matthew Brewer

### **Trophozoite killing assays for *Tritrichomonas foetus* parasites**

*Tritrichomonas foetus* is a sexually-transmitted protozoan parasite infecting cattle throughout the world. In cows, infection results in early embryonic death and abortion. Current control methods rely on culling infected animals and there is no curative treatment. We obtained a field strain of the parasite from an Iowa bull and isolated it in axenic culture. We then developed a trophozoite killing assay suitable for identifying compounds with anti-parasite activity. Current and future studies involve screening of antimicrobial agents and identification of lead compounds for future in vivo studies.

## **38. Eric Mittauer - University of Iowa**

Hometown - Swisher, IA

Major - Human Physiology

Mentor - Fang Lin

### **Protein GI-13 regulates signaling networks to organize heart development in embryos**

Congenital heart defects are the most prevalent birth defect, resulting from the complexity of embryonic heart development. Requiring a coordinated series of tissue migrations, any errors can produce major defects in the affected embryo. These migrations are regulated by signaling molecules responsible for the activation and deactivation of migration, chief among them GI-13. Known to interact with S1pr2, another signaling molecule, this protein was hypothesized to act by regulating important structural protein fibronectin. Using Dania Rerio (zebrafish) as a model, mutations were induced in parent genes for the proteins of interest. Both fibronectin and GI-13-deficient fish exhibited defects in cardiac morphology, indicating both act in the cardiogenesis signaling pathway. Additional effects of GI-13-deficiency, including defects in tail formation, suggest GI-13 acts upstream of fibronectin as hypothesized. Interestingly, mutations in both genes produce defects in eye development, suggesting an unstudied role for these proteins in development of other tissues and organs.

## **39. Andrew Olson - University of Northern Iowa**

Hometown - Ellsworth, IA

Major - History

Mentor - Leisl Carr-Childers

### **“Long Cold Days”: The Natural Ice Industry, 1880 to 1940**

On January 30, 1908, ice harvester Frank Osgood, who was hard at work on the Cedar River during a viciously cold day taking ice blocks cut from the river then up the elevator to the ice house, “froze his eye lids.” Common tasks in the natural ice industry required workers to be out in the coldest winter conditions to produce blocks of frozen water for sale to those who kept food fresh year-round. Hard physical labor permeates the natural ice industry’s fascinating history and is often overlooked, but the story of Osgood and those like him offers insight into the lives of thousands of Iowans, from the mid-1800s and the state’s founding through the era of industrialization to the Great Depression, who worked in these conditions. It is also a story of human technological innovation to make use of natural resources at hand and resilience to environmental adversity.

## **40. Angela Olvera - University of Iowa**

Hometown - Moline, IL

Major - Biomedical Engineering

Mentor - Renata Periera

### **The Role of Muscle-Derived Fibroblast Growth Factor 21 in Physiology**

Fibroblast Growth Factor 21 (FGF21) is a hormone found in several tissues and has multiple proposed functions, including increasing insulin sensitivity. Levels of FGF21 in the blood have been shown to be elevated upon fasting, high-fat feeding and exercise. We have recently demonstrated that skeletal muscle can produce and secrete FGF21 in response to lack of energy. However, the role of muscle-derived FGF21 in physiology is unknown. Here, we proposed to investigate the contribution of muscle-derived FGF21 to the rise in its circulating levels in two different conditions: upon 8 weeks of high-fat feeding and after an acute bout of exercise. Results are preliminary, however our data suggest that muscle-derived FGF21 does not contribute to the increase in circulating levels of FGF21 during a high-fat diet and the circulating FGF21 levels increased immediately after an exhaustion test, which correlates with increased FGF21 protein in muscle.

## **41. Elizabeth Petran and Emma VanSickle - Iowa State University**

Hometown - Eagan, MN and Bettendorf, Iowa

Major - Kinesiology and Health

Mentor - Ann Smiley-Oyen

### **Sensorimotor Brain Activity during Repetitive Finger Tapping in Young Adults with Developmental Dyslexia**

Sensory processing impairment is a symptom of developmental dyslexia (DD). To overcome the deficiency, individuals with DD function at an increased degree of conscious control (Smith et. al., 1999). Using electroencephalography (EEG), the amplitude of the theta wave bandwidth (4-7 Hz) of Fz (electrode measuring activity in the frontal lobe) is associated with focused attention, whereas the alpha (8-13 Hz) and beta (14-21 Hz) bandwidths are activated during cognitive effort (Smith et. al., 1999). The theta/beta ratio serves as an index of inattention. The purpose of this study was to measure cortical activation via EEG in 5 right-handed young adults with DD (3 women) compared to age- and gender-matched right-handed typically developing young adults (TD) when completing a finger tapping task. Single index finger tapping was used because it estimates the integrity of the neuromotor action system (Seeber et. al., 2016), and because children with DD exhibit difficulties with movement sequencing (Wolff, 2002). We hypothesized that DD will have

## **42. Jennifer Poncelet - Iowa State University**

Hometown - Spirit Lake, IA

Major - Kinesiology and Health

Mentor - Spyridoula Vazou

### **Integrating Physical Activity with Academics: Evaluation of the Efficacy of the Move for Thought Pre-K/K Curriculum**

Studies, including a recent meta-analysis, show a positive overall effect of different types of physical activities in early childhood education on cognitive functioning but also emphasize the need for further research on what types of physical activity could produce the strongest results (Vazou, Pesce, Lakes & Smiley-Oyen, 2016). This project contributes to the pool of limited studies that involve a specific intervention of combined aerobic, motor skill, and cognitively engaging activities on cognitive, social-emotional, and behavioral control in preschoolers ages 3-5. It evaluates the efficacy of the activities from the Team Nutrition Move for Thought Pre-K/K curriculum available through the Iowa Department of Education. Multiple preschool classes from Ames and other Iowa communities are or were utilizing the intervention in our study. Before and after the implementation period, teachers rated students' inattention, hyperactivity, and social skills. With help from research assistants, students completed a computerized executive function test, and picture books were used to evaluate their perceived motor and social competence, which is how well a child believes they perform in a task. Evaluation of the Move for Thought Pre-K/K program focuses on whole-child development and will help teachers better prepare preschool children for future educational success.

## **43. Irvin Rodriguez and Nicole Nucaro - University of Iowa**

Hometown - Conesville, IA and Urbandale, IA

Major - Sociology and Business

Mentor - Sarah Bruch

### **Examining Disparities in Student Experiences of School in the Iowa City Community School District**

Disparities in academic achievement, disciplinary punishment, and school experience have been well-documented across the nation, in Iowa, and in the Iowa City Community School District (ICCSA). In 2015, we began a community research partnership with the ICCSD to collaboratively address the disparities in their District. As part of the partnership, we conducted a survey of all 5th-12th grade students in the ICCSD which asked students about several types of experiences in school including their relationships with teachers, social belonging, and perceptions of discipline. The results from this year's survey will be analyzed to examine the extent of disparities by racial/ethnicity, gender, and socioeconomic status; whether there is improvement since last year; and whether disparities in student experiences are lower in schools where various equity programming initiatives have been implemented.



## **44. Alexandra Saulsbury - University of Northern Iowa**

Hometown - Sioux City, IA  
Major - Music  
Mentor - Mitra Sadeghpour

### ***Kleine Harlequinade: Synthesizing a Directing Education***

As my undergraduate education in opera stage direction comes to a close, I have designed my own final project: It is my intent to research and direct an original production of Antonio Salieri's short opera *Kleine Harlequinade*. The opera will be performed in English by UNI School of Music students, with full scenic and costume production values. Salieri, though well-known during his lifetime as a contemporary of Mozart, is rarely performed today. This research project will involve a complete analysis of the script and score, a literature review on the operas of Salieri, and the creation of a directing book for the opera including staging and set design. The dissemination of my research will primarily be at the public performances of the opera on March 6 and 7. At the conclusion of the project, I will prepare a short lecture on my findings.

## **45. Angela Schab - University of Iowa**

Hometown - Orland Park, IL  
Majors - Cell and Developmental Biology  
Mentor - Dawn Quelle

### **A Novel Gene, NIAM Found to Reduce Myc-driven B-Cell Lymphoma**

In healthy individuals, genes and their proteins prevent cells from dividing uncontrollably. In cancer cells genes become mutated, causing cells to divide continuously. Multiple myeloma and diffuse large B-cell lymphoma (DLBCL) are the most common adult blood cancers. It is known that the gene Myc commonly becomes mutated in these cancers. Greater understanding of molecular mechanisms and drug resistance will offer new avenues for treatment. Our lab has discovered a gene called NIAM that normally acts to stop cells from dividing. We hypothesize that when NIAM is lost it enhances Myc-induced cell growth. We tested our hypothesis using genetically engineered mice with absent NIAM and overexpressed Myc. Preliminary results show that mice with both low NIAM and high Myc have more tumorigenesis, larger spleens, and worse survival. This study provides compelling evidence that NIAM suppresses Myc-driven tumor development and identifies NIAM as a potential therapeutic target in mature B-cell cancers.

## **46. Lauren Schutz - University of Iowa**

Hometown - Geneva, IL

Majors - Biomedical Engineering and Dance

Mentor - Salam Rahmatalla

### **Understanding and Identifying Risk Factors of Dance Injury: A biomechanical analysis and comparison of the plié to functional variations**

Dance as an occupation is based on the physical body, and the ability to maintain a performance career is dependent on the ability to maintain physical health; in other words, to remain injury free. Despite career dependence on health, this population is unlikely to seek medical care. This could be based on a fear of losing training time, potential job loss, or a poor health insurance policy, especially considering most professional dancers work freelance moving from job to job with periods of unemployment. In this study participants, college students pursuing a BA, BFA, or MFA in Dance at the University of Iowa, preformed common training and functional dance movements. The participants wore an XSens suit, which integrates data from accelerometers, 3D gyroscopes, and magnetometers to generate accurate positioning data of the body in space. The skeletal alignment and weight distribution of participants during the tasks was analyzed using Visual3D software. Discrepancies in the data between the tasks were identified. Analyzing such discrepancies can help identify risk factors for potential injury or suggest further or modified training exercises for dancers.

## **47. Victoria Settanni - University of Northern Iowa**

Hometown - Hampshire, IL

Majors - Public Relations

Mentor - Melissa Dobosh

### **Workplace Friendship as an Antecedent of Employee Engagement**

Organizations strive to create positive and engaging work environments for their employees because this effort contributes to both employee and organizational outcomes. Many factors impacting employee engagement have been explored, but little research has examined workplace friendship as a precursor to employee engagement. Therefore, this study aims to identify the impact of workplace friendship on employee engagement. Specifically, workplace friendship is hypothesized as being positively associated with both job and organizational engagement, while negatively associated with intention to quit. Organization members are currently being surveyed about these variables. Understanding the relevance of workplace friendships and its effects on employee and job engagement can help organizations determine how to better foster employee engagement by creating an environment that encourages workplace friendships.

## **48. Emily Southard - Iowa State University**

Hometown - Des Moines, IA

Majors - Agriculture and Society and Global Resource Systems

Mentor - Carmen Bain

### **Midwestern Soybean Farmer's Perceptions and Management of Glyphosate Resistant Weeds**

Soybeans are the second most grown crop in the US, and Iowa is the top soy producing state. However, soybean farmers are facing a major problem-- weed resistance to the herbicide glyphosate. Glyphosate, sold under the tradename RoundUp, is a popular herbicide that many soybean farmers have relied on exclusively for weed control since the introduction of genetically modified glyphosate tolerant soybeans (RoundUp Ready Soybeans) in 1996. A growing number of weeds have evolved to resist glyphosate, and this resistance is challenging the economic and environmental sustainability of soy production. In March, 2016 a mail and internet survey was administered to 2,400 soybean growers in Iowa, Indiana and Illinois. The survey focused on understanding soybean grower's beliefs, attitudes, and practices concerning glyphosate weed resistance and genetically modified crops. This presentation will share the results of this survey, including the finding of dissonance between respondent's beliefs that weed management should become more integrated, and the desire to find a more cost-effective and time-saving solution to glyphosate resistance. Based on our findings, we conclude that public and private support needs to be provided to farmers to help them adopt integrated weed management practices that can prevent herbicide resistance from occurring with other herbicides.

## **49. Dan Stroud - Iowa State University**

Hometown - Urbandale, IA

Major - Genetics

Mentor - Donald Sakaguchi

### **Biocompatible Polymer Microfibers Promote Adult Neural Stem Cell Proliferation and Differentiation**

The central nervous system (CNS) has a limited ability to repair itself. In an effort to repair the CNS, stem cells can be transplanted into the damaged area. However, these cells often show limited survival and integration due to lack of support. This project explores a potential method of neural stem cell delivery to the CNS using biocompatible microfibers. Poly( $\epsilon$ -caprolactone), a FDA approved polymer, is used to make microfibers with various diameters and shapes in hopes of creating a suitable microenvironment for stem cells to grow and differentiate. The cells used are adult hippocampal progenitor cells (AHPCs), which can differentiate into neurons, astrocytes, and oligodendrocytes. This project investigates the adhesion, proliferation, and differentiation of rat AHPCs on microfibers in vitro using fluorescent microscopy. Our results indicate that PCL microfibers support cell adhesion and survival. Additionally, microfibers showed an increase in cell proliferation and astrocyte differentiation when compared to planar controls. These results suggest that the microfibers may be specifically supporting gliogenesis. In conclusion, PCL microfibers can support the adherence, proliferation, and differentiation of AHPCs in vitro. Future studies will investigate the ability of the microfibers to support transplanted stem cells in vivo.

## **50. Maja Sunleaf - University of Iowa**

Hometown - Dubuque, IA

Major - Anthropology

Mentor - Tiffany Adrian

### **Curation and Installation: Renovating Exhibitions in Trowbridge Hall**

Trowbridge Hall, located on the University of Iowa's campus, is not only home to the Department of Earth and Environmental Sciences, but is also the site of many exhibition displays, whose contents range from mineral and rock samples to various fossils. This research project centered around the re-curation of four of these cases in order to create more visually appealing and intellectually stimulating content for visitors to enjoy. Each exhibit space will display a different topic: Dinosaurs, Hominids, Paleontology Repository/Student Research, and Faculty Research. The updated dinosaur and hominids exhibits will allow the undergraduate labs "Evolution and the History of Life" and "Age of Dinosaurs" to study replicas of various specimens outside of the classroom. The Student Research and Faculty Research exhibits will highlight research being done by members of the department. The research process for creating these new cases involved consulting with University of Iowa faculty regarding information about various items on display and the study of web-based content. The gathered research was then compiled and edited for clarity and ease of understanding for future visitors to Trowbridge Hall. The process of repainting the display cases and installing the new text labels is currently underway.

## **51. Emily Tinguely - Iowa State University**

Hometown - Fort Madison, IA

Major - Nutritional Science

Mentor - Lorraine Lanningham-Foster

### **Visual estimation of dietary intake during school lunch for Iowan students**

Childhood obesity is considered to be one of the greatest public health challenges of this century, especially considering the impact of this disease on the future health and life expectancy of Iowans as well as US Citizens. School-based programs designed to improve health behaviors are one important strategy for solving obesity. Presently in Iowa we are disseminating the United States Department of Agriculture-funded SWITCH program: School Wellness Integration Targeting Child Health. The message of SWITCH is to help children to switch what they "Do, View, and Chew". From a nutrition perspective, children are encouraged to consume more fruits and vegetables. 87% of the U.S. population is not meeting the recommendation for vegetable intake, including 93% of all children. As part of the evaluation of the SWITCH program in Iowa, our research team is using visual estimation methods to understand how SWITCH might influence children's dietary intake. Dietary intake from students in SWITCH schools or non-SWITCH schools will be estimated using plate waste methodology. The current study focus is to compare different visual estimation systems. Our hypothesis is that the quarter estimation system will have greater accuracy and precision compared to the third and eighth estimation systems.

## **52. Kellie Walters - Iowa State University**

Hometown - Mt. Vernon, IA

Major - Industrial Design

Mentor - Betsy Barnhart

### **Changing the Perceptions of Making: Adjusting the Mechanics of Ideation for Multidisciplinary Success**

Traditional Industrial Design education idealizes a specific style that signifies “The Industrial Designer.” This involves a fairly finished outcome through process work and makes the designer focus on the sketch rather than concept itself, which is problematic for developing ideas. In assessing instruction practices in sponsored studios (when a corporation partners with a student design studio), we premised that students could work in the same fashion as an in-house design studio, with diminutive ideation but increasing standard for success. Because students would be concentrating on editing down a mass amount of variables with swift precision, time would not be wasted on improving the craft of an initial, potentially ill-developed concept, leading to more projects going into production. This fall, students from Industrial Design, Apparel Merchandising and Design, and Kinesiology, partnered with United Sports Brand (USB) for a sponsored studio instructed in the framework premised above. The outcomes were a monumental success with 23 projects moving forward at USB to the next phase of design and development, where only 3 moved forward to next phase of design and development previously. We want to look at what specific instruction techniques, making techniques, and resulting studio culture lead to this success.

## **53. Nathaniel Weger - University of Iowa**

Hometown – Cedar Rapids, IA

Major - Mechanical Engineering

Mentor – Albert Ratner

### **Production of Clean Energy and Fertilizer Using Miscanthus**

Researchers around the world are looking for energy alternatives that are cleaner than coal. Miscanthus, a fast-growing prairie grass, provides an opportunity to reduce coal use with little systemic changes while decreasing overall costs. I am testing Miscanthus in a gasifier. A gasifier is a large device that takes in biomass and blasts it with heat, reducing the biomass to gas and solid carbon. The hot gas is used to generate electricity, and the carbon can be mixed with dirt to improve soil quality. Specifically, I am looking into whether Miscanthus will work well in the gasifier by watching the levels of gas and carbon produced. Miscanthus burns cleaner than coal, it is more affordable, and it takes little space to grow. The possible benefits are still being explored, but the prospects of developing Miscanthus as an alternative fuel source appear valuable.

## **54. Bailey Wetherell - University of Northern Iowa**

Hometown - North Liberty, IA

Major - Biology and Chemistry

Mentor - Jordan Witmer

### **Direct Measurement of Supra-Physiological Levels of Ascorbate in Plasma using a Nanophotometer**

High dose intravenously administered vitamin C (ascorbate) is currently being tested in clinical trials as an adjuvant to current standard of care therapies in a variety of cancers. Intravenous infusion is used with a goal to achieve supra-physiological ascorbate concentrations in blood of at least 20 mM, 300 to 500 times normal healthy concentrations (0.04–0.08 mM). These trials need quick and easy access to information on the levels of ascorbate achieved in the blood to make clinical decisions. Previous methods that quantify ascorbate levels in blood require extensive preparation, time, and materials that may not always be present in clinical settings. We developed a new approach to meet this need using direct UV spectroscopy with a nanophotometer. The only preparation required is centrifugation of whole blood to separate the red blood cells from plasma. No more than 3 microliters of plasma are needed; the approach can determine the concentration of ascorbate in the range of 3 – 35 mM; the method is fast and efficient. This approach has already been deployed to gather this information in a clinical trial with lung cancer patients.

## **55. Alyssa Williams - University of Northern Iowa**

Hometown - Emmetsburg, IA

Major - Biology

Mentor - Mark Sherrard

### **Assessing productivity in prairie biomass feedstocks with different levels of diversity**

High-diversity mixtures of tallgrass prairie vegetation provide many ecosystem services and could be effective biomass feedstocks for marginal farmland in Iowa. In this study, we measured productivity in four prairie biomass feedstocks with different diversity: 1, 5, 16, and 32 species. Each feedstock was replicated four times on three soil types (48 research plots, 0.33 – 0.56 ha each). For the past seven years, we have monitored productivity in these feedstocks by harvesting tissue from randomly selected quadrats. In 2016, we examined the efficacy of remote sensing (NDVI) and leaf area index (LAI) imaging for estimating productivity. Across soil types, the 1-, 16-, and 32-species feedstocks have been equally productive and have all outperformed the 5-species feedstock. NDVI was correlated with productivity in 2016, but LAI was not. Our results suggest that remote sensing could be an effective tool for monitoring productivity in these feedstocks over time.

## 56. Allison Wold - University of Northern Iowa

Hometown - St. Ansgar, IA

Majors - Chemistry and Biology

Mentor - Joshua Sebree

### Stable Isotope Chemistry in Titan Haze Aerosol

Titan, a moon of Saturn, has a thick atmosphere made up of nitrogen and a few percent methane, with a surface pressure of 1.5x that of Earth. Titan's atmosphere is believed to be that similar to that of early Earth before the rise of O<sub>2</sub>. One significant source of information on the history and evolution of the atmosphere is the measurement of stable isotopes of elements in the molecules of major gases such as nitrogen, methane, and higher order hydrocarbons. The fractionation associated with the formation of Titan aerosol analogs are explored in the laboratory as a function of environmental parameters. Gas mixtures were flowed into a reaction chamber, where they underwent UV-irradiation via a deuterium lamp. The resulting aerosol samples were collected and analyzed using isotope-ratio mass spectrometry (IRMS). This project focused on pyridine (C<sub>5</sub>H<sub>5</sub>N) and nitrogen mixtures, with and without methane, as a function of pressure.





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