2nd Annual Undergraduate Student Research Symposium  
President’s Conference Center  
Friday, April 4, 2014 

10:30-10:45am  Welcome  
Larry Grieshaber, Ph.D.  
Director, Sponsored Programs and Accreditation  

Opening Remarks  
Adam Hoeft  
President of Student Innovation Club  
Undergraduate Student  

Chair for Paper Panels  
Zach Hemann  
Undergraduate Student  

10:45-11:30am  Paper Presentation Panel I  
President's Conference Center  

Samantha Gach  
College of Health Professions / Bascom Honors Program Member  
Major: Physical Therapy  
Title: The Obesity Epidemic  
Supervising Professor: Dr. Nadine Ball  
Student’s Adviser: Dr. Pradip Ghoush  
Abstract: In this paper, I examine how obesity has taken over American culture and what we can do about it. I look at the statistics and just how much of our population is obese. Then I consider some of the causes of obesity, such as restaurants providing too large portions and poor safety on city streets that deter people from walking or playing outside. I discuss possible solutions to the rising obesity issue and discuss what the government is trying to do as well.  
Twitter: @SamGach05

Audra DeMariano  
College of Arts & Sciences  
Major: Biology  
Title: Historical Pollen Data as a Comparative Tool in Climate Change Studies  
Supervising Professor: Dr. Kyra Krakos  
Student’s Adviser: Dr. Kyra Krakos  
Abstract: One of the challenges with understanding how climate has impacted the present world is uncovering more information about climate throughout history. Analysis of comparative historical data can help predict future plant-pollinator associations as the climate continues to change community dynamics of an ecosystem. Unfortunately, detailed records on past pollination interactions to evaluate these potential problems are rare and incomplete. However, pollen loads from historical insect collections can offer comparative data that is valuable for analyzing the changes in plant-pollinator interactions. This project assesses the use of historical pollen data as an informative comparative tool in understanding the impact of climate change on pollination.

Ryan Hulsey  
College of Arts & Sciences  
Major: Biology  
Title: Reproductive Ecology of A Rare Western Prairie Species  
Supervising Professor: Dr. Kyra Krakos  
Student’s Adviser: Dr. Kyra Krakos  
Abstract: This research focused on the reproductive ecology of the rare prairie species Oenothera coloradoensis spp. coloradoensis. Breeding system was described using various hand pollination and exclusion treatments. 20 minute pollinator observations were performed and visitation rate taken into account to determine pollen flow. This study is the first to address pollination and breeding system in this species. This research provided key details for newly published work on the genus Oenothera.
Samantha Gach  
College of Health Professions / Bascom Honors Program Member  
Major: Physical Therapy  
Title: Antonio Gaudí: Architecture and Culture  
Supervising Professor: Professor Todd Brenningmeyer  
Student’s Adviser: Dr. Pradip Ghosh  
Abstract: Antonio Gaudí used his architectural designs to tell the story of the Catalan history. This presentation explores the details of Parc Güell, Casa Batllí, and Casa Milà and their relationship with the history and culture of Catalonia. Gaudí’s buildings tell the story of Catalan through his careful choices of colors, materials, and the symbols used in their construction. His work, inspired by nature’s pure, organic forms, takes his audience through the history of the locations symbolized in his work.  
Twitter: @SamGach05

Adam P. Hoeft  
College of Arts & Sciences  
Major: Biology  
Title: A Comparative Study on the Reproductive Biology of Three Missouri Native Tradescantia ssp. (Commelinaceae)  
Supervising Professor: Dr. Kyra Krakos  
Student’s Adviser: Dr. Kyra Krakos  
Abstract: The purpose of our study focused on the reproductive biology of three species from the genus Tradescantia spp. Specifically, we compared plant morphology and pollination systems of each species with previous studies to look for variation across species ranges over a seasonal breeding period. Our results indicate that these species are utilizing partially overlapping pollination systems and are not experiencing pollen limitation. The identification of bees from the family group Halicadae as the main pollinators for two of the plant species does not agree with previous observations made for the genus 50 years earlier. While two of these species share numerous overlapping characteristics, the identification of a natural hybrid has yet to be discovered at this study site.

Ayla Gurgel  
College of Arts & Sciences  
Major: Psychology (Concentration in Rehabilitation)  
Title: Human trafficking: a comparison of levels of awareness between Brazilian and Americans college Student in the issue of human trafficking  
Supervising Professor: Dr. Peter Green  
Student’s Adviser: Dr. Chammie Austin  
Abstract: Human trafficking is a worldwide phenomenon known as the modern-day slavery, and involves the use of force or coercion to exploit human beings for some type of labor or commercial sex purpose. Each year millions of men, women and children are trapped by traffickers, who lure them with false promises of a better life or high-paying jobs, but instead force them into prostitution or forced labor. However, little seems to have been done to improve awareness among university students about this issue. This study will survey university students to measure and compare levels of awareness and knowledge of human trafficking among Brazilian college students versus American college students. Due to the lack of research available on the topic of awareness among Brazilian students it can be hypothesized that there will be a difference between the level of awareness between Brazilian and American college students.
Alyssa Cradic  
College of Arts & Sciences  
Major: Biology  
Title: A Comparative Study on Phenology shifts of P. digitalis and V. virginicum  
Supervising Professor: Dr. Kyra Krakos  
Student’s Adviser: Dr. Kyra Krakos  
Abstract: The purpose of this research is to understand how plant phenology has shifted over the past fifteen years, and to understand how plant-pollinator roles have changed over that time. Pollinator observations were taken for two different plant species and were then compared to pollinator observations taken from 15 years ago. Hand pollination treatments (self, open, geitonogamy, and outcross) were used to determine if P. digitalis was experiencing pollen limitation. Bagged seed sets, from both self and open treatments, were collected for V. virginicum. Results indicate that the primary pollinator groups have not changed in fifteen years. P. digitalis is not currently experiencing pollen limitation. Although both P. digitalis and V. virginicum have shifted in bloom time, their pollen systems have remained stable.

Miranda Scarborough and Ethan Vaughan  
College of Arts & Sciences / Bascom Honors Program Members  
Major: Forensic Science and Pre-Engineering  
Title: Construction and Characterization of a Micro-Fluorescence Spectrometer  
Supervising Professor: Dr. Tom Spudich  
Students’ Adviser: Dr. Tom Spudich  
Abstract: This project involved the construction and characterization of a small Fluorescence Spectrometer. A Fluorescence Spectrometer is an instrument that measures the light given off by a compound after it is excited by a light source. The instrument was built to be small, portable, and cost effective for use in field work. The data is collected and sent to an iPhone/iPad application that Ethan Vaughan designed.

Miranda Scarborough  
College of Arts & Sciences / Bascom Honors Program Member  
Major: Forensic Science  
Title: Determination of the Weight Percent of Dye in Peeps  
Supervising Professor: Dr. Tom Spudich  
Student’s Adviser: Dr. Tom Spudich  
Abstract: This project involved using the analytical chemistry methods of standard additions and external standards to determine the weight percent of dye in Peeps. This weight percent was then compared to the FDA allowed standards for food dye in order to see if Peeps were safe for consumption. In addition to the FDA comparison, a lab procedure documenting the steps in the analysis was written. This lab procedure was used in the Quantitative Analysis Lab last fall.

Emerald Heembrock, Victoria Griffith, and Ryan Cockerham  
College of Arts & Sciences  
Major: Communication: (Strategic Communications/Applied Media Studies)  
Title: The 7 Micro-expressions You Need to Know  
Supervising Professor: Dr. Dustin York  
Students’ Adviser: Dr. Rebecca Dohrman  
Abstract: A micro expression is a subtle facial muscle movement associated with an emotion. Seven emotions have their own respective micro expression. These micro expressions are the same for someone living in New York City, the midwest, Tanzania or anywhere else. Unfortunately, these micro expressions last less than half of a second, making them difficult to assess. With knowledge and practice, you could have a window into the internal emotion of your listener.  
Twitter: @eheembrock, @VGriffith_
Taylor Rhode and Amanda Sebastian  
College of Arts & Sciences  
Major: Psychology; Criminal Justice/Criminology and Psychology  
Title: The Effects of Appearance, Taste, and Quality on Cracker Choice: Generic versus Name Brand  
Supervising Professor: Dr. Peter Green  
Students’ Advisers: Dr. Chammie Austin, Professor Geri Brandt, and Dr. Peter Green  
Abstract: The purpose of this research was to examine preferences of generic and name brand cheese baked crackers. Using a blind design, participants were asked to rate several crackers based on appearance, taste, and overall quality. By manipulating the packaging, results will determine whether participants were able to accurately determine what type of cracker they were eating. Results will also examine which cracker type was preferred.

Samantha Martin, Derrick Ward, and Holly Dewerff  
College of Arts & Sciences  
Major: Psychology  
Title: Improving Student Academic Performance Using Attribution Therapy  
Supervising Professor: Dr. Brian Bergstrom  
Student’s Adviser: Dr. Chammie Austin  
Abstract: Transitioning into college life from high school is a new and challenging experience. Some students can make the transition with ease while others struggle tremendously. Attribution theory, or how people think about and attribute their behavior, can be used to explain why some students continue to fail while others succeed. By making students aware of this process through hard facts and actual upperclassmen student experience, we aimed to demonstrate that simply changing the way people think can improve academic performance.

Kyle Deeken  
College of Arts & Sciences  
Major: Psychology/Sociology  
Title: Do High School Teachers Really Know? Bullying and the Student-Teacher Discrepancy  
Supervising Professor: Dr. Brian Bergstrom  
Student’s Adviser: Professor Ellie Wieman  
Abstract: The present project was motivated by the reasoning that teachers who do not perceive bullying where it exists would not be able to deal comprehensively and competently with the problem. As such, the goal of the present investigation was to explore whether or not student reports of the actual frequency and magnitude of bullying in schools are matched by teacher perceptions of the frequency and magnitude of bullying. Based on existing research, teachers appear to be grossly undertrained to deal with students’ reports of bullying and the bullying issues they witness. Additionally, current anti-bullying policies appear relatively ineffective and in some cases actually stimulate further bullying activity in schools. Thus, I predicted that teacher perceptions would be different than student reports, and specifically hypothesized that teachers would significantly underestimate the frequency and magnitude of bullying in their own schools.  
Twitter: @DeekenKyle

Jeremy Weter, Matthew Baker, and Ethan Vaughan  
College of Arts & Sciences  
Major: Biochemistry  
Title: The Development and Characterization of a Micro-Vis Spectrophotometer with Wireless Communication Connection  
Supervising Professor: Dr. Tom Spudich  
Students’ Adviser: Dr. Jennifer Yukna  
Abstract: The Micro-Vis is a low cost, battery powered and portable Vis-spectrophotometer which uses a tiny microcontroller board that operates entirely by wireless communication via a tablet/phone application. The working size of our spectrophotometer is 4cm³. The Micro-Vis is made with inexpensive materials. The Micro-Vis covers nearly the entire visible spectrum by using low cost LEDs at specific wavelengths in the visible spectrum along with matching photodiodes for photon detection. With the Micro-Vis spectrometer anyone can access results from a secondary location and upload...
the results to an online file-sharing account. The data is in a format in which it can be viewed in any spreadsheet program. This low-cost, small scale, wireless communication controlled spectrometer has been characterized using red, blue and yellow dyes in standard solutions to generate calibration curves with R2 values of 0.99 or better in all cases.

Heather Sprengel and Tiffany Dang  
College of Arts & Sciences / Bascom Honors Program Members  
Major: Biochemistry  
Title: Antimicrobial Effects of the Alternative Bio-sweetener: Agave Nectar  
Supervising Professor: Dr. Gabe Colbeck  
Students’ Adviser: Dr. Jason Telford  
Abstract: We studied the effects of agave nectar, a bio-sweetener (a sweetener derived from nature), on bacterial growth, looked for inhibitory (growth diminishing or preventative) effects on bacterial growth, and established a minimum inhibitory concentration (MIC), the minimum concentration of sweetener needed to prevent bacterial growth. We measured the turbidity of bacteria cultured in test tubes in a mixture of nutrient broth and various sweetener concentrations and the zones of inhibition (ZOI), the areas around sweetener-soaked discs planted on nutrient agar plates of bacteria that showed no growth. The turbidity of bacteria and ZOI results suggested a relationship between the level of processing and inhibitory effects. The greatest inhibition was observed in raw agave (the least processed) and the smallest inhibition was observed in amber agave (the most processed).

Myles LaMont Jerrett  
College of Arts & Sciences  
Major: Biochemistry  
Title: Tactical Light Emission System  
Supervising Professor: Dr. Tom Spudich  
Student’s Adviser: Dr. Tom Spudich  
Abstract: Current technology has not yet yielded the development of an effective mechanism of identifying personnel with night vision systems in a cost efficient manner. The goal of this research was to develop a device capable of positive personnel identification, target acquisition, signaling, and communication at long distances through the use of infra-red electromagnetic radiation and variable night vision systems. The development and testing of our device was conducted through the summer of 2013, fall semester, and into the spring semester of 2014. Our device has many applications aimed towards military forces, police and fire departments, government agencies, and first responder search and rescue teams.

Jessica Tayloe  
College of Arts & Sciences  
Major: Psychology  
Title: What Makes a Successful Senior Center?  
Supervising Professor: Dr. Peter Green  
Student’s Adviser: Dr. Peter Green  
Abstract: With the knowledge of the impending senior population increase due to the Baby Boomers, senior centers around the nation need to understand what their clientele want and expect from them. For the purpose of gaining this insight, I will be working closely with the Mid-East Area Agency on Aging and their clientele. The method of data collection will involve a simple eight (8) question survey asking the client’s opinion on importance of things such as: socialization, food, games, physical activities, and other. They will also be asked what they would like to see in a senior center, and what they feel a successful senior center should look like. I hope the end results will assist the Executive Director and the MEAAA, in their short and long term planning.

Meghan Rackers  
College of Arts & Sciences / Bascom Honors Program Member  
Major: Psychology  
Title: Hot or Not: The Science of Attraction  
Supervising Professor: Dr. Peter Green  
Student’s Adviser: Dr. Dan Sparling
Abstract: This study measures the impact of clothing on perceived attraction and sexual intent of a female confederate. The survey consisted of twenty photos with 3 sets of 3 photos featuring the same girl and 11 control photos. The three sets of photos show the same woman, face and hair blurred, but one photo featured the confederate in conservative clothing (No exposure of chest, legs or midriff and no tight clothing), the second photo featured the same individual but in less conservative clothing (exposed chest, legs or midriff or tight clothing) and the third shows the same individual in swimwear. Participants indicated their perceived attractiveness and promiscuity of the confederate. The hypothesis suggests that the less clothing the person in the photo is wearing, the higher the rating of attraction and the rating of promiscuity will be.

Jessica Cozad and Kellie Paul (Bascom Honors Program Member)
College of Arts & Sciences
Major: Biology
Title: Crystallization of Lysozyme with Anthranilic Acid
Supervising Professor: Dr. Jason Telford
Students' Adviser: Dr. Kristen Bruzzini
Abstract: The protein lysozyme was doped with anthranilic acid and crystallized. These crystals were polarized and were checked for fluorescence. The protein crystals that contain lysozyme will be sent to Monsanto for the structure to be solved. It will then be compared to the normal structure of lysozyme to determine any differences in folding.

Melisa Hendrix
College of Arts & Sciences
Major: Environmental Science
Title: Pollination Success of Ruellia strepens and Ruellia humilis
Supervising Professor: Dr. Kyra Krakos
Student's Adviser: Dr. Thomas Bratkowski
Abstract: This study looked at reproductive behavior and what factors influence reproductive success in R. strepens and R. humilis. Individual plants (n = 10) of each species were evaluated and measured for growth and development, flowering, fruiting and pollinator species. To determine the main pollinators, plants were observed in 20 minute intervals (n = 230). Visitation duration, foraging patterns, and stigma contact were recorded. Insects were collected to determine primary pollinators and gauge the movement of pollen. Our observations indicated both species of Ruellia require specific habitats to survive and are primarily dependant on specific species of insects for adequate cross pollination.

Daejon Street
College of Arts & Sciences / Bascom Honors Program Member
Major: Biomedical Sciences
Title: Evaluating the management techniques of juvenile and adult honeysuckle
Supervising Professor: Dr. Kyra Krakos
Student's Adviser: Dr. Kyra Krakos
Abstract: This project was designed to manage the spread of invasive honeysuckle on the college campus by testing management techniques for both adult and juvenile plants. To determine if girdling was an effective way to reduce fruit development, we conducted an experiment with 5 sets of paired trees, one girdled, one double girdled and one control, at 5 sites. We monitored bud production during the spring and summer to help determine if the plants would produce viable fruits in the fall.
Twitter: @Daejon1110

Swapnadip Ghosh
College of Arts & Sciences
Major: Biology
Title: The examination of temperature dependence on wzi promoter of Klebsiella pneumoniae
Supervising Professor: Dr. Christopher O'Connor
Student's Adviser: Dr. Gabe Colbeck
Abstract: Klebsiella pneumoniae is an encapsulated, rod shaped, gram negative bacteria which causes infectious diseases in hosts with a weakened immune system. It is responsible for nosocomial infections resulting in pneumonia, urinary tract, and blood infections and it's capsule is crucial to the virulence factor K. pneumoniae which grow optimally at 37 °C. Capsule biosynthesis gene clusters (cps) are responsible for capsule assembly and contains a conserved ORF, wzi, which is considered to play a late role in the assembly of capsular polysaccharides. The effect of temperature on the function of the wzi promoter was examined by cloning the sequence on to a plasmid and performing bacterial transformation with E. coli competent cells. The expression of the reporter genes were then observed under varying in temperature.

Cassara Cook
College of Arts & Sciences
Major: Biomedical Science
Title: A Characterization and Analysis of Bioactivity in Lonicera maackii Flower Extracts
Supervising Professor: Dr. Kyra Krakos
Student’s Adviser: Dr. Jason Telford
Abstract: Bush Honeysuckle (Lonicera maackii ) is a widespread invasive species on the Maryville University campus. This project serves as a subset of the Honeysuckle project. Specifically, the goal of this project is to research the chemical components of the honeysuckle flowers. Extracts showed a large number of peaks indicating the presence of bioactive compounds. The chromatograms obtained provide the retention times of the various components, which will allow isolation of the compounds for further analysis, and will give information regarding percent composition and structure.

Eduardo Magdaleno
College of Arts & Sciences
Major: Biology
Title: Comparing and Contrasting the Effects of Various Nutraceuticals on Helicobacter pylori, Using E. coli as a Model Organism
Supervising Professor: Dr. Gabriel Colbeck
Student’s Adviser: Dr. Gabriel Colbeck
Abstract: The research is a set of experiments using nutraceuticals on E. coli, to compare and contrast their inhibitory effects on the growth. The nutraceuticals being used are peppers, rosemary, garlic, oregano, and turmeric, and will be extracted, and used in combinations to find the most optimal, if any, combination that produces the most inhibition of E. coli growth. E. coli is being used in this experiment in the place of H. pylori, the bacteria responsible for ulcers and an array of gastrointestinal disease.

Danielle Breece and Emily Butris
College of Arts & Sciences
Major: Forensic Science with Chemistry Concentration, Biochemistry
Title: Synthesizing and Characterizing Surface-enhanced Raman Spectroscopy (SERS) Gold Nanoparticles
Supervising Professor: Dr. Stacy Donovan and Dr. Tom Spudich
Students’ Advisers: Dr. Stacy Donovan and Dr. Tom Spudich
Abstract: The goal of the project is to examine drug diffusion rates outside of a cell, in a simulated environment to gather information to develop a non-invasive diagnostic tool to measure drug diffusion rates in the human body. An approach that is being considered uses a spectroscopic technique (surface-enhanced Raman scattering, SERS) to track reaction kinetics of nanoprobes in these settings. Nanoprobes for SERS are prepared in a three-step process that includes making the gold nanoparticle (GNP) core (~ 40 nm diameter), attaching a Raman active compound and chemically stabilizing the nanoprobe. GNPs were synthesized and analyzed their properties using UV-Vis spectroscopy; an observed a maximum absorption peak at 535 nm, which is consistent with GNPs that are ~ 40 nm in diameter. The next step is to create a protocol to attach a Raman active compound to the GNPs that will function as a nanoprobe.