17TH ANNUAL

CELEBRATION OF STUDENT RESEARCH, SCHOLARSHIP & CREATIVE WORK

JANUARY 27, 2017 | WABASH COLLEGE
DETCHON CENTER

Welcome and Introduction

Welcome to the 17th Annual Celebration of Student Research, Scholarship, and Creative Work at Wabash College. For the past 16 years, the College has recognized in a proud and public way the creative accomplishments of Wabash students. We celebrate not only the particular achievements of individual students, but also a deeply embedded ethos of the College. The impressive breadth and quality of student creative work is evidence of the challenge and change that marks the Wabash experience.

This program is dedicated to the memory of Paul Caylor McKinney, '52, who passed away in 2003 after a courageous battle with cancer. Dr. McKinney proudly served the College for more than half a century as chemistry teacher, department chair, division chair, and Dean of the College. He was an exemplar of the liberally educated person whose interests ranged from quantum mechanics to Plato, from playing the piano to pondering Nietzsche. He acted in Wabash College Theater productions and was often found backstage working on difficult equations in his notebook. He was my mentor and friend, a master teacher who helped countless Wabash students develop their creativity and love of the liberal arts. Among Wabash men, he would well understand and appreciate everything presented today; he would be the first to celebrate the successes of Wabash students and faculty members.

Close collaboration between Wabash students and faculty across the College is a hallmark of our culture, a labor of pedagogy and love that makes a difference for our students. It is a special pleasure to introduce some of the results of that collaboration in these presentations. Our thanks go to the students who are prepared to teach the Wabash community about their good work and to the faculty and staff members who have devoted considerable time helping students in their research and creative productions.

A conference of this size and scope would not be possible without the dedicated work of many people. I want personally to express my thanks to the planning committee: Chair Lon Porter, Jeff Beck, Matthew Carlson, Michelle Janssen, Martin Madsen, Colin McKinney, and Walter Novak. Kitty Rutledge and her students contributed to the poster production, as have other Educational Technology Center and IT Services staff; Becky Wendt formatted and prepared the program for printing; Campus Services, and Mary Jo Johnston and her Bon Appetit staff make the logistical support appear effortless. We also extend gratitude to Chris Duff for her help. We are grateful to all of you whose attendance supports this community Celebration.

—Scott Feller, Dean of the College

Schedule for Oral Presentations
Oral presentations will begin at 1:10 p.m. and continue every 20 minutes with a ten-minute break at 2:30 p.m. The last sessions begin at 3:20 p.m. In general, students will present information for 12-15 minutes with a few minutes for questions and passing time. Please see the following two pages for a list of oral presentations by room location and time slot. Names of the presenters, as well as their sponsors and abstracts, are listed in alphabetical order beginning on page eight.

Schedule for Posters and Exhibits
Students will present and discuss their posters and exhibits in 90-minute increments beginning at 1:00 p.m. across Detchon International Hall. You will find a list of presenters and their locations — sorted by poster number and alphabetically by lead presenter — beginning on page six. Names of the poster presenters and co-presenters, as well as their sponsors and abstracts, are listed by poster number beginning on page 20.

Schedule of Oral Presentations by Time Slot and Location

Detchon 111

1:10	Aaron Wirthwein	Dark States Enhance Photocell Power via Phononic Dissipation
1:30	Yang Yang	Flowing and Jamming of Granular Particles in a Disordered Landscape
1:50	Charles Mettler	Warming Effects on Porewater Chemistry and Carbon Flux in Marsh C3 and C4 Communities
2:10	Noah Levi	Understanding the Link between Obesity and Infertility: Palmitic Acid as an Inducer of Endoplasmic Reticulum Stress in Hypothalamic Neurons
2:30	Break	----------
2:40	David Vavrinak & Miguel Aguirre-Morales	Using Python and Jupyter Notebooks in Scientific Data Analysis
3:00	Free Kashon	Ecological Correlates of Variation in Boldness in a Box Turtle Population

Detchon 112

1:10	Kaz Koehring	Critical Rhetoric and Dave Chappelle's Black White Supremacist Skit
1:30	Bilal Jawed	Representations of Mental Illness in the Works of Horacio Quiroga
1:50	Stephan Jones	*Estrellas muertas:* The Destruction of "the Port of the Pacific"
2:10	Grant Wolf	Songs of the Spanish Civil War
2:30	Break	----------
2:40	Daniel Azar	Candomblé to Communism: The Catholic Church and Society in Latin American Film
3:00	Dalton Miller	Earthly Interactions: The Creation of South African Identity
3:20	Darren DeRome	Classical Traditions and Science Fiction: The Golden Age in *Childhood's End* and *The Time Machine*

Detchon 209

1:10	Taner Kiral & Jonathan Murdock	The Four Curves of Alexis Clairaut
1:30	Zachary Anderson	Analyzing the Relationship between Theater and Autism Spectrum Disorder
1:50	Immanuel Sodipe	Towards an Epistemology of Liberation
2:10	Buddy Lobermann	The Language of Phenomenology
2:30	Break	----------
2:40	Logan Taylor	Me and My Avatar: Player-Character as Fictional Proxy
3:00	Adam Kashin	"To Dignify their Jobs": A New Look at the Plight of the Pullman Porter
3:20	Christopher Barker	Origins and Diversity of Caribbean Music

Detchon 211

1:10	Adam Burtner	Baudrillard and *House of Cards:* An Unfortunate Simulation of American Politics
1:30	Alex Wimber	Presidential Crisis Rhetoric: Obama's Ideological Polarization between Government Institutions and the Validity of African American Lives
1:50	Felipe Cuatecontzi	Trump's Campaign Rhetoric and the American People's Domination
2:10	Cole Crouch	Major League Baseball's *This is Baseball* Advertising Campaign: Redefining Baseball in America
2:30	Break	----------
2:40	Jordan Smith	Who Really has Control: The Emotional Ride of Video Games
3:00	Kyle Stucker	Ted Cruz: The Prophet at the 2016 Republican National Convention
3:20	Gregory Sklar	*Breaking the Cross:* A Rhetorical Analysis of Islamic Sate Propaganda

Detchon 212

1:10	Rory Willats	*The Furies:* Political and Creative Implications in a Post-Trump US
1:30	Jared Cottingham	Shaw: The Promises within the "Superman"
1:50	Aaron Becker	*This War of Mine:* Interactive Media's Role in the 21st Century
2:10	Wesley Brown	Yankee Rebels: The Motivation behind Sectional Identity
2:30	Break	----------
2:40	Brand Selvia	Axis Nationalism: The Alliance Between Subhas Bose and the Third Reich, and the Unfulfilled Vision of the Indian Legion
3:00	Walker Hedgepath	From Kaundinya to Cambodia: Analyzing the Decline of Indianization in Cambodia
3:20	Ian Finley	The Argentine Dirty War

Detchon 220

1:10	Boyd Haley	Reconstructing an Ancient Greek *Aspis* Shield
1:30	Reno Jamison	Slinging Mud in 140 Characters or Less: How Competitiveness Influences When Candidates Go Negative on Twitter
1:50	W. Levi Chitty	The Future of Nitrogen Management in Agriculture
2:10	Zac Maciejewski	Covering the Torture Issue: Liberal and Conservative Media Predilections of Abu Ghraib and Guantanamo Bay
2:30	Break	----------
2:40	William Kelly	A Transcendental Critique of Economic Reasoning
3:00	Thomas Kenney	The Bible of Thomas Jefferson
3:20	Franklin Russel	Should we Provide a Legal Defense to Suspected Terrorists?

Schedule of Poster Presentations and Exhibits

Session 1 — 1:00 p.m. to 2:30 p.m.

No	Presenters	Title
1	Jacob Alaniz & Connor Smith.	An Automated Method for the Correction of Unsubstantiated Ramachandran Outliers in Protein Structures
3	Sergio-Steven Cobos	Synthesis of Various 5' & 6'-carboxyfluorescein Derivatives as a Tracer Dye for Cytochrome P450 Enzymes
5	Dillon Cron	Gene expression in regeneration of *Nematostella vectensis*
7	Wesley Deutscher	Optimization of a Model Photoredox Reaction using Copper Catalysts
9	Andy Dong & Tyler Mix	Interaction between Short Pulsed-Field and Type-II Superconducting Ring
11	Jayvis Gonsalves	*Accepta* Software App: Efficient Accounting Solution
13	Austin Harrison, Connor Stumm, Holten Warriner, Conner Rice, & Logan Taylor	Humans of Montgomery County: Audio Interviews with Montgomery County Residents
15	Sam Hayes	Optimizing a Protocol for RNA Extraction from Plants
17	Kenton Hicks	Electron-Rich Organometallics: Featuring Multiple Isocyanoazulene Ligands Terminated with Thiol Anchoring Groups
19	Patrick Jahnke & Luke Soliday	Teaching and Typhoons
21	Joey Lenkey & Cody Grzybowski	Palmitic Acid Induces Inflammatory and Unfolded Protein Responses in Hypothalamic Neuron
23	Cordell Lewis	Puzzle Bee: Learn the Species as You Construct Your Own Hive!
25	Carson Powell	Full-field vs. Grating Stimuli to Reveal Non-Cardinal Colors
27	William Robinson	Coloration and Box Turtle Boldness
29	Nicholas Vedo & Daniel Azar	*Caenorhabditis elegans* Response to Antibiotics
31	Christopher Wilson	Mindfulness and Cognitive Skills: How Facets of Mindfulness Relate to Insight Problem Solving and other Cognitive Abilities
33	Justin Woodard	Optimization of qPCR for Detection of PPO in Apples

Schedule of Poster Presentations and Exhibits

Session 2 — 2:30 p.m. to 4:00 p.m.

No	Presenter	Title
2	Tung Bui, Kaleb Hobgood, & Neil Dittmann	The Relationship between Trait Mindfulness, Specific Cognitive Skills and Health Outcomes: Mediation by Decentering
4	Ben Cramer	J.M. Coetzee's *Disgrace* and a New Nationalism
6	Nigel Dao	Online Mindfulness-Based Stress Reduction Program and the use of Hippocampal-Dependent Spatial Navigation
8	Wesley Deutscher	Characterization of the Catalytic Oxidation of Alcohols via a Nickel (II) Diphosphine Complex
10	Derek Fox & Brennan Davenport	Early Studies in Synthesis of Water-Stable Alkaline Phosphatase Fluorescein-Based Indicator
12	Mazin Hakim & Douglas Rourke	Inexpensive Laboratory Instruments via Desktop Manufacturing: Design and Testing of a 3D Printed Filter Fluorometer
14	Zack Havlin & Luke Rowles	Trait Mindfulness and Cognition: Relationship to False Memory
16	Rithy Sakk Heng	Quantum Chemical and Molecular Dynamics Studies of Methyl Rotation in Retinal
18	Hasan Irtija & Earnest Banks	Rapid Instrument Fabrication via Laser Cutting & Engraving: Prototyping a Simple and Inexpensive Colorimeter from 2D Designs
20	Patrick Kenney, Trevor Fitzpatrick, & Timothy Riley	Four-Cycle Nitrogen Gas Engine
22	Noah Levi	Implications of the Mucus Layer Microbiome and Innate Immune Parameters on Overall Health of Wild versus Captive Common Snook *(Centropomus undecimalis)*
24	Nicholas Morin	Utilization of Shell Stable Isotope Values and Sclerochronology to Depict Threatened Freshwater Species Lives
26	Andrew Puente	The Effect of Polyunsaturation on Transmembrane Protein Interactions
28	Rodolfo Solis	Refugees, "Narco-refugees," & Displaced Peoples: Violence & Its Effects on Emigration and Internal Migration Trends
30	Benjamin Washer	Chemical Modification of Trypsin Improves Digestion Efficiency
32	Aaron Wirthwein & Yang Yang	Measuring Acceleration via Laser Interferometry with Rolling Spherical Mirrors
34	Shaun Khoo	A Study of the Box Turtle Population at Allee Memorial Woods (AMW), Indiana with Emphasis on Sex Ratios and Age Structure

Oral Presentations (Alphabetical by Presenter)

Presenter: Zachary Anderson
Sponsor: Michele Pittard (Educational Studies)
Title: Analyzing the Relationship between Theater and Autism Spectrum Disorder

In laboratories and theaters across America educators, theater practitioners, and psychologists have been improving and studying the relationship between the communities of Autism Spectrum Disorder and theater. This presentation will identify the key methods educators, theater practitioners, and psychologists use to include members of the ASD community in their theater projects, and how inclusion help individuals adapt into mainstream environments, provide therapeutic care, and generally enhance the lives of each participant. The directional focus of the organizations these individuals work for can be divided into two: the research of theater as a therapeutic tool for those with ASD (therapeutic-minded), or for the exercise of artistic expression by and for those with ASD (artistic-minded). This presentation, in addition to analyzing the relationship between ASD and theater, will make a claim for which group, therapeutic or artistic, is in more need. This research has informed how a non-profit organization, the Reality Room Theatre Company, handles work with ASD participants in their theater programs.

Presenter: Daniel Azar
Sponsor: Gilberto Gómez (Modern Languages and Literatures)
Title: Candomblé to Communism: The Catholic Church and Society in Latin American Film

My research focused on contrasting two separate Latin American films to study the impact of Roman Catholicism in the region. The first movie is Brazilian filmmaker Walter Salles's *Central Station,* which uses a religious allegory to tell the story of young Josué and his friend Dora who cares for him. Josué and Dora encounter a form of contemporary Catholicism as well as other religious encounters in the film. In contrast, Chilean film director Andrés Wood's *Machuca* is set during the 1973 military coup in Chile. Two friends attend St. Patrick's School in Santiago where the rector, Father McEnroe, is viewed as a communist sympathizer by allowing children of differing social classes to learn in the same institution. Central Station exemplifies the contemporary Christian practice of *candomblé,* an Afro-Brazilian religious practice that mixes with Catholicism. It also draws on Catholic orthodoxy, which is expanded on further in Machuca, where we see the clash between Father McEnroe and Catholic fundamentalism. Both films touch on the contemporary aspects of faith as well as the conservative aspects which, I conclude, both directors criticize.

Presenter: Christopher Barker
Sponsor: James Makubuya (Music)
Title: Origins and Diversity of Caribbean Music

All musical cultures around the world have their unique way of performing music to offer to others. As people travel to different states and areas, these cultures interact with one another. Through these interactions, people of different cultures share their ideas with one another, and they learn about each other's cultures. Sometimes, a culture will adopt these newly acquired traits and incorporate them into their culture. This wide diversity in music culture is what the North American-Caribbean region is best known for. The music and culture of the Caribbean region have developed and transformed throughout time because of many different factors. The area's rich history tells stories about the many foreign influences that have arrived and enhanced the musical culture of the islands. The region's wide varieties of instruments further add creativity and diversity to the musical styles and their specific characteristics. These different factors of Caribbean music are further enhanced because their music has its own special purpose/s for being played.

Presenter: Aaron Becker
Sponsor: Michael Abbott (Theater)
Title: *This War of Mine:* Interactive Media's Role in the 21st Century

The video gaming industry has evolved since it originated in the 20th century. From its humble beginnings, it has become a billion dollar industry, and continues to grow in prominence among homes around the world. One of the most common

themes in video games today is warfare. *This War of Mine* takes the unique approach of placing the player in the shoes of civilians attempting to survive amidst the chaos of a city under siege. In my presentation I will analyze *This War of Mine's* depiction of contemporary warfare and illustrate how it counters the presentation of warfare found in many other games. Furthermore, I will showcase my use of the designer's newly implemented scenario editor, and what this tool has meant for the gaming community.

Presenter: Wesley Brown
Sponsor: Sabrina Thomas (History)
Title: Yankee Rebels: The Motivation behind Sectional Identity

Historians have devoted an enormous amount of research and analysis towards the personal motivations of Union and Confederate soldiers who fought for their home section during the American Civil War. However, the historiography of Civil War motivation contemporarily lacks scholarly attention devoted to interpreting and analyzing the motivations of a small number of native northerners who chose to fight for their adopted southern communities during the Civil War, often absent of any previous ties or allegiances to southern people or culture. This paper argues that most "Northern Confederates" were primarily motivated to protect their positions of economic security and social power by preserving the racial hierarchy and social order within the antebellum South's slavery based society. Although some Northern Confederates seem unique because they did not have a direct economic investment in slavery, many ultimately expressed the same traditional arguments of motivation presented by southerners. Many of these themes are evident throughout the personal discourse and socioeconomic evidence of Wabash College and Asbury (now DePauw) University students who fought for the Confederacy during the Civil War.

Presenter: Adam Burtner
Sponsor: Jeffrey Drury (Rhetoric)
Title: Baudrillard and *House of Cards:* An Unfortunate Simulation of American Politics

Citizen distrust and dissatisfaction in American government is at an all-time high. Similarly, the Netflix original series *House of Cards* continues to experience record setting viewership and critical acclaim. In this essay, the author rhetorically connects the two, and offers timely thoughts on the implications of such an artifact, both societally and academically. By using Jean Baudrillard's theory of simulations, the author analyzes a diverse subset of storylines and character developments within *House of Cards,* to locate those that craft an alternative reality of American government and politics to the viewer. After analyzing three categories of simulations; unrealistic policymaking, demented tactics and motivations by politicians, and extreme examples of power in all sexual relationships, the author makes the case for a problematic view on this specific simulation due to its lack of space for alternative narratives and its unique ability and inherent potential to indoctrinate the minds of American voters with negative assumptions towards their government, which further deteriorates trust in the national institutions that are necessary for democratic success.

Presenter: W. Levi Chitty
Sponsor: Shamira Gelbman (Political Science)
Title: The Future of Nitrogen Management in Agriculture

Currently the agriculture industry is in the hot seat. Reckless nitrogen management techniques in agriculture production have landed them here and the Environmental Protection Agency is ready to intervene. The EPA's potential intervention could forever change farming practices, the profitability of farming, water quality, and the role that government plays in agriculture production. My ambition for my paper and presentation was to break ground by digging into the question, could potential EPA legislation regarding nitrogen management in agriculture be damaging to the agriculture industry as a whole? To achieve this I have looked into similar instances where the government has gotten involved with agriculture. I have also conducted interviews with respectable members of the agricultural industry, farmers, business owners, governmental lobbyists, and individuals working in the industry of environmental protection.

Presenter: Jared Cottingham
Sponsor: Michael Abbott (Theater)
Title: Shaw: The Promises within the "Superman"

George Bernard Shaw represents perhaps the greatest, and most controversial English dramatist since Shakespeare. His dramatic cannon consists primarily of sociopolitical critiques, often involving Shaw's justification of his own jaded views. *Man and Superman,* arguably his greatest work, is an amalgamation of Shaw's social commentary. From gender roles to marriage and politics, Shaw takes a myriad of extreme stances on these subjects throughout the text. As serendipitous as his lectures may seem, they are all rather planned. Within the preface, *A Letter to Arthur Bingham Walkely,* Shaw lays out his exact vision and promises for the piece—to create his own, controversial take on the Don Juan narrative. Throughout the preface, Shaw states his various talking points and his primary thesis: To make the modern theatrical audience very uncomfortable. To do so, Shaw created a protagonist, Jack Tanner, that physically and intellectually mirrored himself. Within this presentation, I will investigate whether or not Shaw remains true to the promises made within the play's preface. Additionally, I will analyze Shaw's protagonist, to make clear that his physical and ideological similarities to Shaw himself are deliberate.

Presenter: Cole Crouch
Sponsor: Jeffrey Drury (Rhetoric) & Sara Drury (Rhetoric)
Title: Major League Baseball's *This is Baseball* Advertising Campaign: Redefining Baseball in America

Baseball has long been tied with its social, cultural, and physical roots in America. In 2015, MLB announced that it would be introducing a new baseball to the new America through its *This is Baseball* advertising campaign. How does this advertising campaign redefine baseball in America? Through applying definitional strategies of association, dissociation, frame shifting, and transformation, this analysis will demonstrate how the *This is Baseball* advertising campaign redefines baseball as an interactive community re-experienced everyday on and off the field. The significance of this presentation will demonstrate how this new and overlooked conversation about baseball in America differs but does not necessarily compete with the existing conversations about baseball in America.

Presenters: Felipe Cuatecontzi
Sponsor: Sara Drury (Rhetoric)
Title: Trump's Campaign Rhetoric and the American People's Domination

In June of 2015, Donald Trump formally announced that he would seek to become the 45th President of the United States. Over the course of the following year, Trump's rhetoric acquired him the support of millions of Americans, securing him the Republican Presidential Nomination. While Trump's campaign discourse contained controversial and divisive remarks, such rhetoric did not prevent Trump from being elected to serve as the country's next commander-in-chief. This analysis will examine Trump's *Our Country Needs a Great Leader* and his Republican Nomination Acceptance speech. In applying critical rhetoric, this rhetorical criticism aspires to demystify how Trump dominates his audience into supporting the Trump campaign and his proposed policy solutions. By analyzing Trump's assertion of power, this analysis reveals that demagogic campaign discourse, such as Trump's, conflicts with the country's democratic principles. To emancipate the audience of Trump's domination, this criticism also presents alternative discursive possibilities to allow the audience to contest Trump's campaign and challenge his policy proposals.

Presenter: Darren DeRome
Sponsor: Agata Szczeszak-Brewer (English)
Title: Classical Traditions and Science Fiction: The Golden Age in *Childhood's End* and *The Time Machine*

A relatively new movement in classical scholarship is the analysis of classical traditions in science fiction films and novels. While seemingly opposed by nature, science fiction does borrow and adapt many themes that find their origin in ancient texts. One such theme that is common in science fiction is utopia, or as it usually appears, dystopia. The author H.G. Wells was well known for exploring dystopia within utopia through his works. His novel *The Time Machine* explores this theme in a subtle way that draws on descriptions of the Golden Age of Man in classical literature. Though best known for the hard science fiction novel 2001: A Space Odyssey, Arthur C. Clarke also wrote on utopia using this myth in his early novel

Childhood's End. Both authors depict utopia as a dystopia in a similar way by inverting the myth of the Golden Age. I will show how these authors use the Golden Age as described by Hesiod and Ovid to point out the inherent flaws in utopia.

Presenter: Ian Finley
Sponsor: Richard Warner (History)
Title: The Argentine Dirty War

This presentation discusses the history of military rule of Argentina in the late 20th century, and focuses on the resisting efforts a group of women called the Mothers of the Plaza de Mayo. The paper will describe and analyze the rise of the military government in the 1970s and the subsequent activities of the security state. Furthermore, the historical memory of this regime and the *desaparecidos* continues today, as does the work of the Mothers. Thus the presentation will culminate in an analysis and discussion of Argentine memory of these events. The discussion will be a reflection upon my research and personal experience in Argentina, including my visits to various sites of memory, political protests, and my interview with one of the leaders of the Mothers of the Plaza de Mayo.

Presenter: Boyd Haley
Sponsor: Jeremy Hartnett (Classics)
Title: Reconstructing an Ancient Greek *Aspis* Shield

The geometry and composition of the *Aspis* was ground breaking for the Ancient Greeks when it first came into action, as the Aspis formed the basis for the phalanx formation that the Greeks fought with and, some have argued, played an integral part in the development of city-states. This study had two primary goals. The first was to analyze primary sources, both in literary records and material culture, to determine how Greek Aspis shields, the iconic round shields, were constructed. Second, on the basis of this information, the project involved making recreations of the shields to gain a "real feel" for the experience of carrying an Aspis shield. Though this was done with modern materials and tools, the goal was to be as realistic as possible. Now students can engage with history in a much more interactive way, for example by allowing them to feel an accurate weight for the shields as well as to gain the experience of fighting in a phalanx formation, in which reliance on one's fellow hoplites was key. Since each shield covered half of its bearer's body as well as half of the body of their neighbor, teamwork was essential.

Presenter: Walker Hedgepath
Sponsor: Sundar Vadlamudi (History)
Title: From Kaundinya to Cambodia: Analyzing the Decline of Indianization in Cambodia

Recent research findings suggest that Angkor, in present-day Cambodia, was perhaps the largest city in the medieval world. These conclusions raise important questions about the reasons for the collapse of Angkor and the classical Khmer Empire by the fourteenth century. An important thesis for change appears to be predicated upon a decline in Indianization: that is, a cessation in the spread of cultural elements from India to Southeast Asia. This termination of influence from India is believed to have ushered in the formation of modern Southeast Asian Khmer culture. Currently, four theories seek to explain the decline of Indianization in the Khmer Empire: the emergence of Muslim rule in India beginning in the twelfth century, the rise of Theravada Buddhism and its displacement of older Hindu-Mahayana Buddhist beliefs across the Khmer Empire, invasions from Siam resulting in the sacking and eventual depopulation of Angkor, and ecological factors that undermined the sociological structure of Angkorean society. In this paper, I will examine these four theories of decline and provide a depiction of the reality that promulgated the transformation of a prosperous, extensive Indianized society into the Southeast Asian trading kingdom from which modern Cambodia emerged.

Presenter: Reno Jamison
Sponsors: Shamira Gelbman (Political Science)
Title: Slinging Mud in 140 Characters or Less: How Competitiveness Influences When Candidates Go Negative on Twitter

Over the last couple of years, we have begun to see social media, especially Twitter used in ways once never thought possible including in political campaigns. In 2016, nearly every member of Congress has a social media presence. In fact, many members of Congress have multiple Twitter accounts, one for "official business" and a separate one for campaigning. This project examines how congressional candidates from Iowa and Nevada used Twitter in their campaigns. This was done by analyzing over 300 "tweets" from these 18 candidates over a time span of two weeks during the general election. Each tweet was individually coded and was subcategorized as an attack, issue, mobilization, or combination tweet. These tweets were all sorted and analyzed using a number of categories including the party, incumbency, gender, and competitiveness of the race. I was specifically interested in finding whether or not the competitiveness of a race influenced how frequently candidates went negative on Twitter. From my research, it appears as though candidates in competitive races may be moving away from attacking each other on Twitter.

Presenter: Bilal Jawed
Sponsor: Ivette Wilson (Modern Languages & Literatures)
Title: Representations of Mental Illness in the Works of Horacio Quirog

Horacio Quiroga, the Uruguayan writer nicknamed the "Edgar Allan Poe of the South" once said, "identifying with insanity is an art form." In his short stories, *Los perseguidos* (1908), *La gallina degollada* (1909), and *El hijo* (1935), Quiroga was able to combine his experience with mental health with his literary talent to represent mental illness both effectively and with scientific accuracy. His works spanned to presumably represent illnesses and symptoms such as schizophrenia, autism, denial defense mechanism, obsessive-compulsive disorder, hallucination, and paranoia. By using scientifically accurate information to propel his literary techniques such as repetition, first person narrative, and parataxis, Quiroga was able to express complex psychology in an accessible format through literature.

Presenter: Stephan Jones
Sponsor: Ivette Wilson (Modern Languages & Literatures)
Title: *Estrellas muertas:* The Destruction of "the Port of the Pacific"

Valparaíso, Chile is on UNESCO's World Heritage List, so this means that there is a beauty within its patrimony that distinguishes itself from other cities around the world. However, the Valparaíso that Álvaro Bisama portrays in *Estrellas muertas* is contrary to what UNESCO describes. One sees a city that is figuratively and literally being destroyed before the main characters' eyes. What is more interesting is Bisama's use of the urban environment to show how this destruction affects how the characters perceive their city. Since the city experiences "destruction," the characters perception become destructive as well, especially for the protagonist. She adopts this world view due to all the "destruction" that surrounds her: her failed relationships, her friends' destructive relationship, the fire consuming the city, etc. It appears that she has no desire to try change this perception considering she only makes decisions that encourage more destruction such as, listening to punk music and abusing prescription cough syrup. She never changes her outlook, and her ex-boyfriend—the true narrator—adopts her perception. Bisama's work portrays Valparaíso's actuality: that it is no longer "the Port of the Pacific."

Presenters: Adam Kashin
Sponsor: Adriel Trott (Philosophy)
Title: "To Dignify their Jobs": A New Look at the Plight of the Pullman Porter

At the end of the Civil War, the racial fabric of the United States was thoroughly in contention. However, pioneering industrialists soon stitched together what was apparently torn apart in the bloodiest conflict the country would ever see. Individuals such as George Pullman, the founder of the Pullman Company, recreated the racial hierarchies of the antebellum, and in doing so, cemented the central role of race in both labor and social history. The struggles of the African American porters of the Pullman Company are exemplary of the necessary intersection of these two historical

avenues and serve as a window into the larger history of racialized economic stratification in this country. Between 1925 and 1935, the Brotherhood of Sleeping Car Porters worked to formally organize as a separate entity away from the influence and economic vice of the Pullman Company. The porters that comprised this first black independent labor union sought to escape a harsh system of control and management that permeated the Pullman Company. Through paternalistic oversight and the monopolization of economic opportunity, the Pullman Company sought to control and subjugate its population of black porters to the point of economic servitude, one of the company's foundational tenets.

Presenter: Free Kashon
Sponsor: Bradley Carlson (Biology)
Title: Ecological Correlates of Variation in Boldness in a Box Turtle Population

Behavioral variation in animals is common, but its ecological and evolutionary implications are often hard to define. By examining Eastern Box Turtles, an easy to track reptile of conservational concern, we were able to examine the effects of consistent variation in behavior between individuals and examine the effects these behavioral patterns had on individuals, such as injury levels, body temperatures and time to move after a perceived threat. Through work performed at Allee Woods in the summer of 2016, Dr. Carlson and I were able to discover that turtles show consistent variation in levels of boldness in response to a stressful situation. We also discovered that turtles who took longer to reveal their heads had more injuries, suggesting they survived more attacks. We also discovered that turtles who took longer to remove themselves from the site of the stressor had less injuries, suggesting that those who moved sooner than others may have experienced more attacks and higher fatalities. We also discovered that bolder turtles are warmer turtles when comparing head emergence latencies and body temperatures.

Presenter: William Kelly
Sponsor: Lorraine McCrary (Political Science)
Title: A Transcendental Critique of Economic Reasoning

With the assassination of John F. Kennedy in November 1963 came the death of traditional Americanism. Prior to 1963, the ends of American government and American political thought were largely thought of as liberty, equality, and virtue. After 1963, the ends of American government shifted towards economic ends: developing a growing economy, increase in employment, and better trade. These economic ends became the primary ends of American government, and liberty, equality, and virtue were secondary. We cannot go back to the past; therefore, I contend that a transcendentalist critique (an approach to traditional Americanism within the individual) guided by the works of Ralph Waldo Emerson and Henry David Thoreau, is the most effective way to reignite traditional American ideals and thought at the individual level.

Presenter: Thomas Kenney
Sponsor: Scott Himsel (Political Science)
Title: The Bible of Thomas Jefferson

Two hundred years ago, Thomas Jefferson took a razor blade to the New Testament of the Holy Bible and cut it up. More specifically, he was removing excerpts that he thought perverted the historical figure of Jesus of Nazareth. These 'perverted' excerpts were actually the lines that described Jesus as the Son of God, who performed the numerous miracles throughout the four Holy Gospels of Matthew, Mark, Luke, and John. Why did Thomas Jefferson, the third President and a prominent Founding Father of the United States of America do this? Was it a treacherous act of blasphemy and do Jefferson's faith and Bible affect and relate to the United States two hundred years later? These questions are important today because people are still persecuted, profiled, and judged because of their religion, even though our Constitution "protects" our right to exercise our religion freely. For example, consider how people have labeled, stereotyped, and persecuted the Mormon community over the past century, with Mitt Romney as a prominent example.

Presenter: Taner Kiral & Jonathan Murdock
Sponsor: Colin McKinney (Mathematics & Computer Science)
Title: The Four Curves of Alexis Clairaut

Alexis Clairaut, born in 1713 to mathematician and teacher Jean-Baptiste Clairaut and mother Catherine, was a mathematician who showed promise from a very young age. In 1726, Alexis presented on four new families of curves and their properties to the Royal Academy of Sciences. In 1734, Clairaut published these findings in *Quatre Problèmes sur de Nouvelles Courbes.* His paper, published in French, has not yet been translated to English. We present a dual language edition- French and English - to make Clairaut's paper readable by a modern audience. Clairaut investigates four families algebraic curves, each partly motivated by the classical Greek problem of finding mean proportionals between two given line segments. Clairaut also investigates the analytic properties of his curves by finding tangents, inflection points, and quadratures.

Presenters: Kaz Koehring
Sponsor: Jennifer Abbott (Rhetoric)
Title: Critical Rhetoric and Dave Chappelle's Black White Supremacist Skit

Using McKerrow's theory of Critical Rhetoric to analyze Dave Chappelle's Black White Supremacist Skit is an example of how we can engage with communication to unmask discourses of power within our world and hash out their effects. In doing so, this presentation compares white supremacist and racist discourse from two main features: free usage of the N word, and purposeful pauses to invoke laughter. By considering these features in both a critique of domination and freedom we're able to expose how Chappelle's comedy is able to simultaneously resist or strengthen a discourse of white supremacy and racism. By juxtaposing these critiques, I argue how reinforcement of racist and white supremacist discourse overwhelms subversion, which leads to an evaluation of who is hurt by the negative implications this discourse allows. This research took place during Professor Jennifer Abbott's Rhetoric 350 Class in the Fall of 2016.

Presenter: Noah Levi
Sponsor: Heidi Walsh (Biology)
Title: Understanding the Link between Obesity and Infertility: Palmitic Acid as an Inducer of Endoplasmic Reticulum Stress in Hypothalamic Neurons

Gonadotropin-Releasing Hormone, GnRH, is the primary signal for reproduction. The Gnrh1 gene is expressed in specific hypothalamic neurons, and dysfunction of these cells can cause infertility. In obesity, inflammation and endoplasmic reticulum (ER) stress can create a vicious cycle of cellular stress in the brain. The ER synthesizes membrane and secretory proteins, and protein misfolding in this organelle triggers the unfolded protein response (UPR). The UPR activates a specific transcriptional program that may either help cells adapt to protein misfolding or trigger apoptosis. In GT1-7 cells, Gnrh1 transcription decreased when cells were exposed to ER stress, via tunicamycin. We conducted similar experiments using a physiologically relevant molecule, palmitic acid (PA), which resulted in similar transcriptional changes associated with the UPR. Future work will focus on specificity of PA induced ER stress, and whether other nutrient molecules could activate the UPR.

Presenter: Buddy Lobermann
Sponsor: Matthew Carlson (Philosophy)
Title: The Language of Phenomenology

Many philosophers and scientists have chosen to describe the mind purely in physical terms, essentially claiming that the "mind" is really just the brain, and that consciousness is no more complicated than other physical processes. But some philosophers have been dissatisfied with this view, feeling that it leaves a lot unsaid regarding the way in which we experience the world subjectively. My paper begins with an analysis of the ways in which subjective experience seems to influence how we think, and how those experiences can be shared communally. Applying the arguments of Ludwig Wittgenstein, I will argue that it is not possible to construct statements about private experience that are meaningful to

others, and thus, impossible to construct an understanding of consciousness founded in private experiences. I follow these arguments by considering Wittgenstein's suggestion that the ability to understand subjective experience comes from public language, asking us to consider that human mental life may actually take place primarily in our language, instead of our brains.

Presenter: Zac Maciejewski
Sponsor: Shamira Gelbman (Political Science)
Title: Covering the Torture Issue: Liberal and Conservative Media Predilections of Abu Ghraib and Guantanamo Bay

Following 9/11, the Bush Administration implemented an enhanced interrogation program to extract vital national security information from suspected terrorists. Today, we know these strategies simply as torture. On April 29, 2004, *60 Minutes II* aired a gripping documentary accusing the U.S. Military of torturing over 70 Iraqi civilians at the Abu Ghraib military prison in Baghdad. To no surprise, the Bush Administration denied knowledge of the allegations. Seven months later, the *New York Times* published an article charging the Military of similar illegalities at the Guantanamo Bay naval base in Southeast Cuba. Once again, the Bush Administration denied the claims. In this presentation, I will explore how the media portrayed the heinous acts that our political and military "leaders" committed. Specifically, I will analyze the *New York Times* – which is often associated with the left – and the *Wall Street Journal* – which sits closer to the political right. Was President-Elect Donald Trump right when he accused the *Times* of biased, unfair reporting? Should the right be lambasted as well for inaccurate and shortsighted journalism? And how do the implications of partisan reporting affect the American citizenry? I will investigate these – and many more – questions that influence the American voter.

Presenter: Charles Mettler
Sponsor: Amanda Ingram (Biology)
Title: Warming Effects on Porewater Chemistry and Carbon Flux in Marsh C3 and C4 Communities

Tidal marshes are important estuarine ecosystems due to their potential for carbon sequestration. These ecosystems are therefore also incredibly productive because their flooded soils create anoxic conditions in which biomass remains non-labile where anaerobic and heterotrophic rhizobia dominate. The metabolism of the rhizobia in tidal marshes is occasionally competitive for substrate in the case of sulfate and carbon-reducing microbes, leading to unpredictable carbon fluxes. Furthermore, plant metabolism is also of interest due to their input of carbon to the soil (and hence the microbial community) through root turnover that is dependent upon temperature, carbon dioxide concentration, and other abiotic and biotic factors. The effects of elevated carbon dioxide upon these systems is fairly well-understood; however, the effects of elevated temperature are quite under-represented in the literature and the combined effects of these factors is even more poorly characterized. In order to understand the metabolic dynamics of the marsh, plots of marsh land were heated above and below ground in both C3 and C4 plant communities to simulate a warmer climate. Porewater from the plots were analyzed for sulfide, methane, and dissolved inorganic carbon. Gaseous carbon fluxes were also recorded to assess net carbon loss from the system.

Presenters: Dalton Miller
Sponsor: Agata Szczeszak-Brewer (English)
Title: Earthly Interactions: The Creation of South African Identity

This paper addresses two South African novels, Bessie Head's *When Rain Clouds Gather* and Richard Rive's *Emergency,* in their ability to create a newly required South African identity Apartheid rule. I examine how main characters in each novel are physically and socially exiled from South African society due to the political, racial, and societal oppression imposed by the minority Afrikaner government. I also discuss how each author explores and manipulates liminal space—societal spaces that allow for cross-cultural interaction and transmission of practices—that allows for the rooting of this identity in the land that was physically and metaphorically taken from them. Through literary and cultural research, I analyze the agricultural interaction and physical relationship with land as it relates to the creation of a South African, but more specifically, an African identity. I argue that the liminal spaces constructed by each character's social and physical exile allow for the creation of a new South African identity in relation to geographic and physical African land through political and agricultural involvement.

Presenter: Franklin Russel
Sponsor: Scott Himsel (Political Science)
Title: Should we Provide a Legal Defense to Suspected Terrorists?

Should we provide a legal defense to suspected terrorists? John Adam's should serve as a role model for us. He defended the British soldiers accused of murder in the Boston massacre. Adams stepped up in the face of adversity and defended the most hated men in the colonies. By doing so, Adams put his life and his family's in harm's way. Adams successfully upheld our countries ideal of due process. On September 11, 2001, a terrorist organization flew planes into the World Trade center, and the Pentagon, killing thousands of innocent civilians. More recently another terrorist group has beheaded journalists and soldiers alike. The men behind these acts have not followed a single rule of international warfare. Despite the fear these groups cause the United States must still provide a defense for these men. It is our duty to uphold our principles of due process by giving these men a fair trial. We cannot call ourselves the land of the free when we deny basic human rights to others. The United States must uphold our values of due process in these dark times because it is those values that make us great.

Presenter: Brand Selvia
Sponsor: Sundar Vadlamudi (History)
Title: Axis Nationalism: The Alliance Between Subhas Bose and the Third Reich, and the Unfulfilled Vision of the Indian Legion

In May of 1941, Subhas Chandra Bose, an established Indian nationalist leader, spoke with Adolf Hitler's foreign minister about creating an Indian-centered national army, comprised of Indian soldiers captured by German forces. Bose wanted to position these prisoners of war to encourage rebellion against the British Raj, and sought to use this army to force India's independence with the Third Reich's support. However, after a frustrating recruitment campaign, coupled with an uneasy faith in Nazi Germany's ultimate intentions, Bose went east to Japanese-occupied territory in 1943 to establish the more successful Indian National Army. Despite its eventual failure, the Indian Legion played a role as an inspiration for Bose to pursue the same result in cooperation with Imperial Japan. This presentation will examine the overlooked history of the Indian Legion, and discuss its importance in the wider struggle for India's freedom. In doing so, this presentation will also highlight the complicated nature of participation of soldiers from colonized countries in World War II.

Presenter: Gregory Sklar
Sponsor: Jeffrey Drury (Rhetoric) & Sara Drury (Rhetoric)
Title: *Breaking the Cross:* A Rhetorical Analysis of Islamic Sate Propaganda

The Islamic State (SISI) terrorist organization poses a serious threat on the world through rhetorically forcing its members to preform extreme acts of violence. ISIS has claimed responsibility for a multitude of chaos and destruction around the world since its emergence on the global stage in 2013. This analysis aims to combat the oppressive nature of the Islamic State by demystifying the discourse of power present in their propaganda magazine the DABIQ. Through merging critical rhetoric and visual analyses, I show that Issue 15: *Breaking the Cross* employs religion in order to pressure loyal Muslims to submit to their will. In addition, I argue the Islamic State incites aggression by holding followers accountable for eradicating the western society for the villainous actions they have performed. Moreover, this analysis draws attention to the coercive function of the visuals and language in *Breaking the Cross*. This essay does not claim to provide a strategy for defeating the Islamic State, however it does suggest ways in which rhetoric and social change can begin to emancipate those under Islamic State control.

Presenter: Jordan Smith
Sponsor: Sara Drury (Rhetoric) & Jeffrey Drury (Rhetoric)
Title: Who really has Control: The Emotional Ride of Video Games

Video games are one of the most popular forms of entertainment. Vast worlds and stunning visuals, it is easy to see why. Video games offer a world, or in some cases, universes where the player is told they are free to do whatever they want. Create, destroy, save, or kill whatever they want whenever they want. Though this is true in in multiplayer games, this does not hold up in single player driven games. In this essay, using the 2013 Game of the Year *The Last of Us* as my example, the ideology that the player is an all-powerful being that can take on any foe is challenged by the game itself. Taking away control on pivotal scenes only to give it back after a valuable ally has died or you have been purposely put in a weakened state. These actions the game takes on the player proves that video games give you the false ideology that the player is in control of the world when the fact is that the player cannot do whatever in the game's world. Triggering an emotional response in the player that is often the feeling of sadness or even complete shock.

Presenter: Immanuel Sodipe
Sponsor: Matthew Carlson (Philosophy)
Title: Towards an Epistemology of Liberation

In my paper, I explain how Hegemonic Ignorance, a sort of epistemic normativity engendered by a society organized by systems of dominance and subordination, poses a problem for us as we try to know things about the world. I understand Hegemonic Ignorance to be problematic for two main reasons: 1.) it cannot correct itself and 2.) it results in material harm. Hegemonic Ignorance produces a hegemonic/colonial ideology and by extension a colonial logic as well. Consequently, when we are talking about the Black Lives Matter movement and liberatory ideologies or politics, we must also be concerned that our politics are not simply a reformation of the same logic of Ignorance (Coloniality). Thus, we must be keen on recognizing our "socio-epistemic" standpoint and work to craft an epistemology of liberation. Because Hegemonic Ignorance is a problem for social epistemology, it necessitates a social solution. Thus I explain that the point of departure for an epistemology of liberation must be ideological and material revolt.

Presenter: Kyle Stucker
Sponsor: Jeffrey Drury (Rhetoric) & Sara Drury (Rhetoric)
Title: Ted Cruz: The Prophet at the 2016 Republican National Convention

Senator Ted Cruz found himself in an interesting predicament after the Republican National Convention in June 2016. He had been booed off the convention stage and faced national rebuke after refraining from endorsing the Republican Presidential Nominee Donald J. Trump. This analysis examines Cruz's convention speech and attempts to understand the mechanics within the address the resulted in the observed reaction from Cruz's national audience. I conduct a generic analysis that explores Cruz's use of the rhetorical form of Jeremiad, his establishment of prophetic ethos, and his violation of many generic constraints of the nominating convention genre. By examining these different characteristics I argue that Cruz properly constructed and fulfilled the generic constraints of the modern American Conservative Jeremiad, but he did not properly establish prophetic ethos and egregiously violated the requirements of presidential nominating convention genre. I conclude by discussing how his failures in these areas ultimately lead to the audience's rejection of his message.

Presenter: Logan Taylor
Sponsor: Matthew Carlson (Philosophy)
Title: Me and My Avatar: Player-Character as Fictional Proxy

Players of videogames describe their gameplay in the first person, e.g. "I shot a splicer with a shotgun." Such descriptions are natural because videogames are interactive fictions. But this is puzzling since the player is actually pushing a button, not shooting anything. According to a popular view, which I call the fictional identity view, the puzzle is solved by claiming that the player-character is the player's identity in the game's fiction. On this view, it is correct to say that I fired a shotgun in *BioShock* because Jack fired a shotgun and Jack fictionally is me. However, the identity view does not make sense of players' gameplay experiences and descriptions of them. I develop an alternative account on which the player-character serves as the player's fictional proxy, and argue that this account of the relationship between the player and player-character makes better sense of our experiences playing videogames.

Presenter: David Vavrinak & Miguel Aguirre-Morales
Sponsor: Charles Weiss (Chemistry)
Title: Using Python and Jupyter Notebooks in Scientific Data Analysis

The Python programming language, Python scientific libraries, and Jupyter notebooks are valuable tools in scientific research to automate data analysis, run simulations, and extract information from data that is not otherwise easily obtained. This talk presents two final projects completed in CHE471: Scientific Computation for Chemists. David Vavrinak's project focuses on solving a problem that arose in a physics lab over the summer: numerically and objectively quantifying the roundness of objects in photographs. Miguel Aguirre-Morales's project uses Biopython for the comparison and analysis of nucleotide sequences.

Presenter: Rory Willats
Sponsor: Dwight Watson (Theater)
Title: *The Furies:* Political and Creative Implications in a Post-Trump US

As a socially conscious theater director, I am responsible for the message my art carries. Knowing that in theater, creative decisions and their application takes time, from designing, building and weeks to months of rehearsals, how, then, do I understand and take responsibility for the contemporary political implications of a theater production in a time of political unrest? Furthermore, what are the creative implications of a piece of political theater when the landscape shifts during the production process? The 2016 election of President-elect Trump fundamentally changed the political relevance and production design of the 2017 Wabash College Theater Department staging of *The Furies*. This talk explores how this event altered the themes and design of the show and the interplay between artistic responsibility, political engagement, design thinking and the process of making theater.

Presenter: Alex Wimber
Sponsor: Sara Drury (Rhetoric)
Title: Presidential Crisis Rhetoric: Obama's Ideological Polarization between Government Institutions and the Validity of African American Lives

As of recent times the presidential crisis address has shifted from predominately foreign issues to domestic issues. With this evolution of presidential crisis rhetoric, I will use presidential crisis rhetoric and an ideological critique to examine President Obama's speech addressing the deaths of Alston Sterling and Philando Castile. Both men were shot and killed by police officers, which sparked political outrage addressing the validity of African American lives. Additionally, on the same day that Obama gave his address there was a peaceful protest held in Dallas, Texas to memorialize both Alston Sterling and Philando Castile. At this event a citizen, Micah Xavier Johnson, opened gunfire on the police officers protecting the crowd. This event led to political figures criticizing Obama's speech. I claim the crisis rhetoric used by President Obama failed to appropriately address the crisis of domestic gun-violence in America. Furthermore, I provide an insight into the danger of a president pitting two competing ideologies against one another under the same nation.

Presenter: Aaron Wirthwein
Sponsor: Dennis Krause (Physics)
Title: Dark States Enhance Photocell Power via Phononic Dissipation

Recent experimental studies of the energy transfer mechanisms in photosynthesis have shown that coherent quantum dynamics play a key role in improving energy transfer efficiency. Mimicking photosynthesis therefore presents a promising route to improving solar cell devices and has attracted considerable theoretical interest. Taking inspiration from these discoveries, we consider light-absorbing donor systems consisting of two-level optical emitters coupled via dipole-dipole interactions. Light energy from the donor system is transferred to an acceptor which acts as a work load to convert exciton energy to electrical power. We evaluate the photoelectric output of our proposed photocell models according to the theory of Quantum Heat Engines (QHE's), with the light-to-charge conversion process treated as a continuous Carnot-like cycle. For various donor geometries, we show that certain dark states can enhance photocell power with the aid of intra-band phononic dissipation. Further improvements can be achieved by incorporating more emitters in the donor system.

Presenter: Grant Wolf
Sponsor: Ivette Wilson (Modern Languages & Literatures)
Title: Songs of the Spanish Civil War

The songs of the Spanish Civil War exemplify the power of music in society. Music serves as a reflection of the world around us. It is an opportunity for the artist to influence his audience, and critique society. Because music has the ability to create this powerful commentary, this artistic form regularly functions as propaganda, which promotes a particular ideology while demeaning others. This study seeks to classify the songs the Spanish Civil War within two subgenres, each of which took on this propagandistic role in different ways. Specifically, these subgenres reflect the historic view of the Civil War as a war of two fronts-- the internal, and the external. Although the Civil War was naturally an internal conflict, which was driven by the political and economic turmoil in Spain, international attention created a second narrative of this war. According to those who were external to the war, this conflict was an ideological battle, which pitted government systems against one another.

Presenter: Yang Yang
Sponsor: Danielle McDermott (Physics)
Title: Flowing and Jamming of Granular Particles in a Disordered Landscape

Granular particles are everyday materials such as sand, soybeans, and cornflakes. These hard objects interact through simple short-range forces such as friction, which leads to behavior quite unlike fundamental particles like electrons. Anyone who has poured cereal from the box understands that granular materials may flow or jam depending on the exact circumstances. I will present a very simple model of cereal poured from a box: two-dimensional numerical simulations of hard disk-shaped particles driven over randomly distributed traps. By varying the density of particles and the strength of the driving force, the granular particles exhibit distinct dynamic phase states and interesting diffusion characteristics. To conclude, I will explain how these flow characteristics of granular particles are unique when compared with other particle flows.

Poster Presentations (Listed by Poster Number)

Poster #1
Presenter: Jacob Alaniz & Connor Smith
Sponsor: Walter Novak (Chemistry)
Title: An Automated Method for the Correction of Unsubstantiated Ramachandran Outliers in Protein Structures

Ramachandran outliers are amino acid residues with phi and psi dihedral angles that result in energetically unfavorable conformations. While some of these conformations are supported by the data and provide key information regarding protein structure and functionality, it is currently not known how many of these outliers are actually supported by the data and how many are simply errors in the structural model. Unfortunately, in the Protein Data Bank, there exists a large number of protein structures that contain an excessive number of these outliers (>0.2%). We have developed an algorithm capable of the automated correction of unsubstantiated Ramachandran outliers. This program was built with the Python programming language using the capabilities of the protein determination software PHENIX for outlier detection and refinement.

Poster #2
Presenter: Tung Bui, Kaleb Hobgood, & Neil Dittmann
Sponsor: Neil Schmitzer-Torbert (Psychology)
Title: The Relationship between Trait Mindfulness, Specific Cognitive Skills and Health Outcomes: Mediation by Decentering

The goal of the current study was to try and replicate the findings by Brown and colleagues (2014), that four of the five mindfulness facets predicted higher decentering, which in turn was correlated to psychological health outcomes. The goal was to also investigate how mindfulness, a deeper awareness of one's existence and their surroundings, is associated with decentering, the ability to detach with one's thoughts and emotions. We asked the participants to complete a series of surveys set to assess the participants' five facets of mindfulness, their level of decentering, self-control, and measures of psychological health (worry, stress, depression). We found that mindfulness was correlated with better psychological health, and that when decentering is controlled for, mindfulness does not have a significant correlation with psychological symptoms, but that decentering does not mediate the relationship between mindfulness and other cognitive measures.

Poster #3
Presenter: Sergio-Steven Cobos
Sponsor: Laura Wysocki (Chemistry)
Title: Synthesis of Various 5' & 6'-carboxyfluorescein Derivatives as a Tracer Dye for Cytochrome P450 Enzymes

Cytochrome P450 is family of enzymes involved in the metabolism of drugs and the rate can change according to the specific type of enzyme. The primary goal of this summer internship was to synthesize water-soluble fluorogenic substrates for cytochrome P450 to help us understand this important process. Key aspects of this synthesis included selective reaction to get a diether substrate and strategic placement of a solubilizing group so the enzyme can be studied in an aqueous environment. Now that these molecules have been synthesized, the next steps of this project would be to test the water-solubility of the derivatives, and testing with different types of cytochrome P450 enzymes.

Poster #4
Presenter: Ben Cramer
Sponsor: Agata Szczeszak-Brewer (English)
Title: J.M. Coetzee's *Disgrace* and a New Nationalism

This paper examines the ways in which J. M. Coetzee's *Disgrace* creates, contests, and subverts South African nationalism through the character David Lurie. Lurie's interactions with women and a faculty committee indicate parallels between his journey through *Disgrace* and the socio-political change experienced by South Africa at the end of Apartheid. Through a postcolonial and feminist reading of the book that the ANC denounced as racist due to its reproduction of a 'black peril' farm attack, I examine the ways in which sexual violence historically is linked with the founding myths of nations through the work of Van Wyk Smith and McClintock. I ultimately seek to determine whether or not Lucy Lurie's decision to keep the child and not to report the rape is indicative of a positive outlook for the future of South Africa.

Poster #5
Presenter: Dillon Cron
Sponsor: Patrick Burton (Biology)
Title: Gene expression in regeneration of *Nematostella vectensis*

DNA contains information that creates and allows function of every organism. Genes are segments of DNA. Expression of genes dictates the functions of both the individual cell and the organism as a whole. Varying gene expression at specific time points an organism is able to perform bodily functions such as movement, digestion, and even regeneration. Understanding gene expression creates a much clearer understanding of the molecular processes in an organism. *Nematostella vectensis* is a Cnidarian that has the ability to regenerate both its oral and aboral poles. Previous experiments have identified Wnt signaling as an important pathway in regeneration of *Nematostella vectensis*. Previous experiments also identified unknown genes of interest important to regeneration. Using drug treatments of Alsterpaulone and XAV, which up regulate and down regulate Wnt signaling respectively, this experiment investigated the expression of specific genes found in *Nematostella vectensis* regeneration. The results showed Alsterpaulone in many cases caused the gene expression to be more similar to oral regeneration. XAV caused expression to generally be the opposite of Alsterpaulone. The results of this experiment gained valuable information on a set of unknown genes present in *Nematostella vectensis*. These data will help to better understand both these genes and regeneration.

Poster #6
Presenter: Nigel Dao
Sponsor: Neil Schmitzer-Torbert (Psychology)
Title: Online Mindfulness-Based Stress Reduction Program and the Use of Hippocampal-Dependent Spatial Navigation

The hippocampus and the ventral striatum have been demonstrated to involve in different spontaneous strategies in human navigation. Young healthy adults who used spatial memory strategies, in which they employed the relationship between landmarks to navigate around the environment, showed increased activity in the hippocampus. Conversely, subjects who used stimulus response strategies, in which they employ a fixed pattern of turns at precise decision points, showed increased activity in the caudate nucleus. Furthermore, stress has been indicated to disrupt the spontaneity of the two navigational strategies, where subjects who experienced prolonged stress favored the caudate-dependent strategy. The current study examined whether a behavioral stress-reduction training program could return the spontaneous usage of the two navigational strategies. Participants were collected via Amazon Mechanical Turk (mTurk) and screened for their stress levels. Subjects participated in a computer-generated version of the 4-on-8 virtual maze and their initial strategies were coded based on their written report after participating in. Pre-test results showed a relationship between stress groups and their navigation strategies, such that there were more spatial-learners in the low stress group and more response-learners in the high-stress group. The data however were not significant. High-stress males and females continued to the 8-week Mindfulness-based Stress Reduction Program (MBSRP). At the end of the behavioral training, both low-stress and high-stress subjects partook in another 4-on-8 task and report their navigation strategies again. We reported here that the post-MBSRP participants showed a reduction in stress and an increase in mindfulness levels, although the data did not reach significance. MBSR training did not return the use of hippocampal-dependent spatial strategy, relatively to caudate-dependent response strategy. The small sample size in the MBSR group was a major drawback in this study and should be sufficiently addressed in future projects.

Poster #7
Presenter: Wesley Deutscher
Sponsor: Katrina Jensen (Black Hills State University)
Title: Optimization of a Model Photoredox Reaction using Copper Catalysts

Photoredox reactions use energy from light to initiate the reaction, usually by exciting a metal-based catalyst. The reaction under investigation uses a copper photoredox catalyst in conjunction with a chiral catalyst to stereoselectively functionalize the α-carbon of octanal. Different copper catalysts were synthesized using different substituted phenanthroline and/or diphosphine ligands. For each copper catalyst, the percent yield was determined and the enantiomeric excess was found using HPLC with a chiral column.

Poster #8
Presenters: Wesley Deutscher
Sponsor: Charles Weiss (Chemistry)
Title: Characterization of the Catalytic Oxidation of Alcohols via a Nickel (II) Diphosphine Complex

Alcohol oxidation is an important reaction in many fields, including synthesis, pharmaceuticals, green energy, and many more. To study this, a nickel complex with formula $Ni(dcpe)(CH_3CN)_2(BF_4)_2$ was synthesized that is capable of oxidizing primary and secondary alcohols into their respective ketones, aldehydes, esters, or a mixture of aldehydes and esters. Reactions were monitored and products quantified by 1H NMR spectroscopy, and it was found that this catalyst is effective in oxidizing a range aliphatic and aromatic alcohols. It is believed that the complex proceeds by transfer-hydrogenating the acetonitrile solvent, generating imines and/or amines as a byproduct, but attempts to observe this by GC/MS were unsuccessful.

Poster #9
Presenters: Andy Dong & Tyler Mix
Sponsor: Martin Madsen (Physics)
Title: Interaction between Short Pulsed-Field and Type-II Superconducting Ring

Pulsed-field magnetization (PFM) has been demonstrated to be the most effective method to magnetize high-temperature superconductors (HTS) and most experiments so far have been done using a disk geometry to characterize it. In this study, we applied different amplitude pulsed-fields with width one millisecond to characterize the behavior of the trapped magnetic flux of a thin superconducting ring. We found that the behavior of the trapped magnetic flux of our superconducting ring agrees with one of a thin superconducting disk.

Poster #10
Presenters: Derek Fox & Brennan Davenport
Sponsor: Laura Wysocki (Chemistry)
Title: Early Studies in Synthesis of Water-Stable Alkaline Phosphatase Fluorescein-Based Indicator

The reaction between alkaline phosphatase and a fluorogenic substrate like fluorescein diphosphate (FDP) is commonly used to accurately measure biochemical species. Unfortunately, FDP spontaneously reacts in water, which gives it background fluorescence. This project involves the design, synthesis, and testing of a more stable, and therefore more efficient molecule, FDPME. Testing reveals this molecule is stable and nonfluorescent in water, reacts well in the presence of enzyme, and has potential to be useful in studying acid phosphatase as well.

Poster #11
Presenter: Jayvis Gonsalves
Sponsor: Roland Morin (CIBE)
Title: *Accepta* Software App: Efficient Accounting Solution

Efficiency is the key to running a successful business. *Accepta* is a software app that helps businesses improve their accounting efficiency by using a mobile phone and a centralized database to gather information. The gathered data enables businesses to perform audits and smart data analytics on the expenses. The app was developed by a student from the Wabash Center for Innovation, Business and Entrepreneurship (CIBE) and is currently being used by the Wabash Student Senate and Business Office to maintain Purchase Card (P-Card) expenses. This poster walks through the LEAN process used to identify and solve an existing business problem that is addressed by the *Accepta* app, and how one could use a similar process to problem-solve any given issue.

Poster #12
Presenter: Mazin Hakim & Douglas Rourke
Sponsor: Lon Porter (Chemistry)
Title: Inexpensive Laboratory Instruments via Desktop Manufacturing: Design and Testing of a 3D Printed Filter Fluorometer

The powerful combination of digital design and 3D printing has become an accessible resource for students and educators to utilize in the pursuit innovative scientific learning. We report the design and fabrication of a simple 3D printed filter fluorometer for use in the laboratory and other applications. Previous models utilized an open design to challenge the "black box" perception of typical analytical instrumentation, however with user feedback, these models were improved using accessible computer-aided design (CAD) software such as *Tinkercad* and *Inventor Professional*. The new instruments employ a completely contained and ergonomic 3D printed housing to increase portability and ease of data collection. The standalone design features a housing with a lid, interchangeable filters, and simple electronics. While the devices serve well as teaching tools for student understanding of instrument design and function, they also perform well in a variety of laboratory activities including the quantitative determination of luminescent analytes at the ppm and ppb level. Proving useful not only in the research lab, they also serve as an excellent tool for teaching the fundamentals of 3D printing, circuitry, and analytical chemistry. Though the devices are appropriate for teaching and outreach at the high school and undergraduate level, they are not meant as a replacement for commercial instruments. Produced for around $30 each, these devices allow for increased student engagement with the instrument rather than sharing one across the entire class. The 3D printed filter fluorometer provides a low-cost tool for use in student engagement across many levels of scientific inquiry and hands-on quantitative analysis.

Poster #13
Presenter: Austin Harrison, Connor Stumm, Holten Warriner, Conner Rice, & Logan Taylor
Sponsor: Jill Lamberton (English)
Title: Humans of Montgomery County: Audio Interviews with Montgomery County Residents

During the Spring of 2016, the students in the Audio Rhetoric and Creative Writing course each sat down with a resident of Montgomery County, Indiana, and recorded that resident's stories in an audio interview. The goal was simple: for Wabash students to have a meaningful interaction with a Montgomery County resident who is not formally affiliated with Wabash College. Through listening and story-telling, students had a chance to see Crawfordsville as more than the location of a college they chose to attend; they heard about Crawfordsville and Montgomery County as a place people choose to live, raise families, and build community. In turn, Montgomery County residents had a thoughtful conversation with two Wabash men, one who acted as interviewer and the other as photographer. The interviews and portraits have been collected by Steve Charles on a website titled Humans of Montgomery County, modeled after Brandon Stanton's nationally-acclaimed project Humans of New York. In this poster-style session, students who conducted interviews will have computer stations and headphones available, and Celebration attendees can explore the Humans of Montgomery County website, listen to the audio interviews, and discuss with students what they learned from the project.

Poster #14
Presenters: Zack Havlin & Luke Rowles
Sponsor: Neil Schmitzer-Torbert (Psychology)
Title: Trait Mindfulness and Cognition: Relationship to False Memory

Previous research has demonstrated that brief mindfulness inductions can increase a person's risk of developing a false memory. In our experiment we examine the relationship of trait mindfulness (assessed using the Five Facet Mindfulness Questionnaire, which measures five dimensions of mindfulness), cognitive abilities and false memory susceptibility. We expected that participants with high levels of mindfulness would be more susceptible to creating false memories because mindfulness involves judgment-free attention on the current moment. So, we hypothesized that people with higher mindfulness would be more prone to creating false memories. In an experiment involving (N = 169) participants, our results did not support any of our hypotheses. However, false memory susceptibility was related to performance on measures of two separate cognitive tasks (assessing perceptual ability and cognitive control), which have previously been found to be associated with mindfulness.

Poster #15
Presenters: Sam Hayes
Sponsor: Ann Taylor (Chemistry)
Title: Optimizing a Protocol for RNA Extraction from Plants

In the past 10 years, genetically-modified organisms have increased in popularity and attention. Ribonucleic acid (RNA), a common genetic molecule, is very important in the ability of a cell to function correctly due to its role in protein synthesis. RNA interference, a biological process used to alter gene expression, can be used in the process of producing genetically-modified plants. In order to study RNA interference, one needs to have access to a method of RNA extraction. Different protocols for RNA extraction from plants exist in many different kits from various manufacturers. These kits were tested and compared to one another in order to determine which kit was most reliable for the extraction of RNA from apples *(Malus domestica)*. The most reliable procedure was then used to extract RNA from apples and tobacco *(Nicotiana benthamiana)* to be used in RT-PCR in order to synthesize complementary DNA. The cDNA was then amplified using primers designed for the polyphenol oxidase (PPO) gene in quantitative polymerase chain reaction (qPCR). We were ultimately able to isolate high quality RNA from apples, and that RNA was used to isolate the PPO gene that may further be used in other RNA interference experiments.

Poster #16
Presenters: Rithy Sakk Heng
Sponsor: Scott Feller (Chemistry)
Title: Quantum Chemical and Molecular Dynamics Studies of Methyl Rotation in Retinal

Retinal is the chromophore of the vertebrate visual pigment; it is a covalently bound ligand attached to Rhodopsin, the protein responsible for vision in low-light conditions. Upon absorption of a photon of light, retinal changes its configuration from 11-*cis* to all *trans*. A subsequent step in Rhodopsin activation is the deprotonation of the Schiff base. Experimentally, the Rhodopsin activation process is sensitive to changes in the structure of retinal. In this study, we examined native and modified retinals to quantify the effect of methylation and demethylation on the dynamics of retinal, in particular the rotation of the beta-ionone ring and the rotation of the methyl groups, using quantum chemical calculations and molecular dynamics calculations.

Poster #17
Presenters: Kenton Hicks
Sponsor: Mikhail Barybin (University of Kansas)
Title: Electron-Rich Organometallics: Featuring Multiple Isocyanoazulene Ligands Terminated with Thiol Anchoring Groups

Azulene, a non-benzonoid aromatic isomer of naphthalene, is comprised of fused five- and seven-embered rings. This molecule and its derivatives possess relatively low band gaps. Furthermore, its structure gives rise to an intramolecular charge transfer which results in a permanent dipole moment along the molecular axis. This research aims to synthesize a novel organometallic complex capable of taking advantage of these unique electrochemical properties for use in advanced materials. This project builds upon previous work using a linearly functionalized azulenic linker with an isocyano junction group bound to a zero valent chromium by modifying the chromium complex to have two isocyano-mercaptoazulenyl ligands oriented in a cis conformation. This new complex will be characterized using 1H NMR, 13C NMR, FTIR, and electrochemistry before being used to investigate interactions with a gold surface.

Poster #18
Presenters: Hasan Irtija & Earnest Banks
Sponsor: Lon Porter (Chemistry)
Title: Rapid Instrument Fabrication via Laser Cutting & Engraving: Prototyping a Simple and Inexpensive Colorimeter from 2D Designs

3D printing offers great flexibility and precision in transforming computer-aided design (CAD) models into physical reality. However, it is a relatively slow process, often requiring hours to fabricate reasonably sized objects. In turn, we report a subtractive manufacturing technique that implements creative 2D cross-sectional designs of 3D models. With the use of this method, it is possible to produce simple and inexpensive analytical instruments. While the devices serve well as teaching tools for the basic understanding of instrument design and function, they also perform well in a variety of laboratory activities including absorption gradient of common food dyes, acid-base indicators, and heavy metal complexes. Each model kit can be constructed for around $30. These are not replacements for commercial instruments, rather a resourceful and available alternative for hands-on experience. This rapid and inexpensive means of instrument design and development will make it possible to share and study innovative ideas as an educational community.

Poster #19
Presenter: Patrick Jahnke & Luke Soliday
Sponsor: Yao Li (Modern Languages & Literatures)
Title: Teaching and Typhoons

Every year, elementary school English teachers try to help American students perfect their country's language. The English language is complex and can be hard to teach, but it is even harder when teaching it in another country. During the summer of 2016, a group of students from Wabash and DePauw spent two months in Taiwan helping teach English at different Elementary and Middle Schools. After two months full of experiencing a completely different culture and language, sleeping on the floors of schools, and keeping themselves safe from a super typhoon, the students gained a new understanding of language, culture, children, and life as a whole.

Poster #20
Presenters: Patrick Kenney, Trevor Fitzpatrick, & Timothy Riley
Sponsor: Martin Madsen (Physics)
Title: Four-Cycle Nitrogen Gas Engine

The goal of our experiment was to create a 3D printed, four-cycle nitrogen gas engine. We calculated a formula to either vary the temperature of our thermal reservoir or the amount of nitrogen gas added in order to find the total work done on the environment by our system. In both cases, we found that at 373 K with 51.5 cubic centimeters of nitrogen gas that the final volume of the piston chamber would be 130 cubic centimeters.

Poster #21
Presenters: Joey Lenkey & Cody Grzybowski
Sponsor: Heidi Walsh (Biology)
Title: Palmitic Acid Induces Inflammatory and Unfolded Protein Responses in Hypothalamic Neuron

In today's society, a rise in easy access to high-fat and high-calorie foods has posed a problem with managing obesity. In an obese individual, excess circulating free fatty acids (FFA) cause endoplasmic reticulum (ER) stress, or an accumulation of misfolded or unfolded proteins, in the brain; chronic ER stress can induce a mechanism that attempts to resolve these conditions called the unfolded-protein response (UPR). We investigated cross talk between the UPR and the inflammatory response in response to the FFA palmitic acid (PA) on gonadotropin-releasing hormone (GnRH)–producing GT1-7 cells. Cells treated with the ER stress-inducing drug tunicamycin (TM) exhibited increased phosphorylation of the signaling protein JNK as well as the inflammatory transcription factor NF-kB. Treatment of GT1-7 cells with PA also increased NF-kB phosphorylation, as well as the secretion of the pro-inflammatory cytokine interleukin-6 (IL-6). Furthermore, we found that PA treatments increased levels of the UPR-regulated transcription factor CHOP, indicating potential cross talk between inflammation and ER stress during excess FFA. Preliminary data show that cells treated with PA had decreased

expression of the Gnrh1 gene and upregulation of Fos, a gene that encodes the transcription factor c-Fos and inhibits GnRH transcription. This could potentially indicate that there is a connection between ER stress and the inflammatory response. In the future, we believe further investigation of the presence of the TLR-4 receptor where PA is perceived to bind would be beneficial as well as carrying out gene knockdown or knockout experiments on genes involved in the UPR and inflammatory pathways.

Poster #22
Presenter: Noah Levi
Sponsor: Amanda Ingram (Biology)
Title: Implications of the Mucus Layer Microbiome and Innate Immune Parameters on Overall Health of Wild versus Captive Common Snook *(Centropomus undecimalis)*

An organism's innate immune function and microbiome structure are two indicators of overall health that are highly influenced by the environment; thus we investigated innate immune function and microbial diversity between wild and captive Common Snook. We hypothesized the wild fish would have more diverse bacterial populations and higher levels of enzyme activity due to their exposure to a more stressful environment. Apparent bacterial diversity was higher in wild fish, while captive fish had much higher abundances of opportunistic Vibrio. Additionally, wild levels of SOD activity were statistically higher than that of captive fish, while captive AP levels trended higher than that of wild fish. These data suggest a substantial impact of captivity on bacterial diversity and enzyme activity, providing insight into areas of concern in aquaculture systems.

Poster #23
Presenter: Cordell Lewis
Sponsor: Matt Weedman (Art)
Title: Puzzle Bee: Learn the Species as You Construct Your Own Hive!

Identification is a key principle to resolving a problem. With the case of the massive die-off of bumble bees, identification of the species in existence within a specific area is the first step to a solution. Researchers must understand relative numbers of species that are prevalent in a region for comparison with previous records. This offers a grounding for examining environmental changes that can be affecting the bees. Utilizing a culmination of science, technology, and art, we have developed a bumble bee model that is interactive, interchangeable, and educational. The purpose of the model is to create a physical object to aid in the education process of understanding identifying markers of different species of bees. As opposed to studying photos, individuals can engage with their learning. The user can construct a specific species of bee or construct a bee of their imagination. Hands on learning has been shown to develop a deeper understanding as well as increase a student's motivation to learn and problem solve; critical thinking.

Poster #24
Presenters: Nicholas Morin
Sponsor: Bradley Carlson (Biology)
Title: Utilization of Shell Stable Isotope Values and Sclerochronology to Depict Threatened Freshwater Species Lives

Populations of freshwater mussel species *Quadrula. aurea* and *Quadrula. petrina* have greatly declined in Texas. Sclerochronology, the study of growth patterns in hard tissues of animals, could help determine the cause of the decline by reconstructing historical population-wide growth patterns and integrating them with climate data. This approach requires correct identification of annual increments in the prismatic layer of the mussel shells. Stable isotopes of oxygen (δ18O) and carbon (δ13C) were used to assess if visually identified increment boundaries on the mussel shells represented annual growth rings. Oscillations in isotope values likely reflect seasonal climate variation, with higher δ18O and δ13C values during winter. Extracted samples along the prismatic growth axis in mussel shells were analyzed for δ18O and δ13C. The isotopes were significantly correlated in *Q. aurea* suggesting that climate drivers affect both isotopes. However, *Q. petrina* did not exhibit this correlation. The seasonality of the isotopes did not match with visually identified growth increments, indicating these might not represent annual growth. However, when averaging isotope values within visually identified ring boundaries, weak trends were found between temperature and isotope values, consistent with previous work. Overall, it seems that these species have low potential for use in sclerochronology.

Poster #25
Presenter: Carson Powell
Sponsor: Karen Gunther (Psychology)
Title: Full-field vs. Grating Stimuli to Reveal Non-Cardinal Colors

Neurons early in visual processing prefer what are known as the "cardinal" colors: red, green, bluish, yellowish, black, and white. Neurons tuned to respond to other colors (e.g., orange, purple, burgundy), known as the "non-cardinal" colors, don't emerge until the cortex. Neurons early in visual processing respond best to full-field stimuli, while cortical neurons respond better to gratings (striped stimuli). Thus, gratings should better reveal non-cardinal colors than do full-field stimuli. If independent color mechanisms exist, their performance should be impaired by same-colored noise but not opposite-colored noise. We tested this in all 3 color planes of color space (red-green/blue-yellow [RG/BY], red-green/luminance [RG/LUM], and blue-yellow/luminance [BY/LUM]). Two-way repeated measures analyses of variance (ANOVA) on color axis (cardinal, non-cardinal) by stimulus type (full-field, grating) were conducted in each color plane. We found that the full-field spots do not show evidence for non-cardinal mechanisms, the gratings do. These findings represent preliminary results in an ongoing experiment – we plan to study 10 subjects in each color plane.

Poster #26
Presenter: Andrew Puente
Sponsor: Scott Feller (Chemistry)
Title: The Effect of Polyunsaturation on Transmembrane Protein Interactions

Cell membranes in the nervous system are known to have high concentrations of docosahexaenoic acid, a polyunsaturated fatty acid (PUFA) found in fish oil. Numerous health studies have shown that PUFAs play an important role in both cognitive and visual development. Membrane bilayers in the nervous system contain important transmembrane proteins that are responsible for sending and receiving signals between cells. Using the Rocks cluster on campus, we programmed and ran molecular dynamics computer simulations in order to examine the role of PUFAs on transmembrane helix association. By running comparable cell bilayer simulations with different levels of unsaturation, we show that the overall effect of polyunsaturation is to destabilize transmembrane protein-protein interactions.

Poster #27
Presenter: William Robinson
Sponsor: Bradley Carlson (Biology)
Title: Coloration and Box Turtle Boldness

Darker animals within a species are often bolder than their lighter counterparts. For example, darker Hermann's tortoises tend to be more aggressive towards other males and more fearless of humans. The POMC gene is responsible for a peptide chain that is spliced into 5 melanocortin hormones. One of these, ACTH, is released from the pituitary glands to increase stress hormone levels, affecting behavior. ACTH can be further modified to produce MSH hormone, increasing melanization. Therefore, stress hormones and melanin are tied. We examined eastern box turtles *(Terrapene carolina carolina)* to see if boldness and melanin are related. Box turtles have distinct behavioral and color variation and are related to a tortoise species in which this relationship was previously. We are also examining corticosterone levels in these turtles. We hypothesize that darker turtles will be bolder, with shorter head emergence and movement times, In addition, bolder turtles should have a lower change in corticosterone after stress. All turtles had their coloration measured in ImageJ. Blood was drawn before and after stress to measure corticosterone. We found no significant results, however, between coloration, boldness, or corticosterone levels.

Poster #28
Presenter: Rodolfo Solis
Sponsor: Shamira Gelbman (Political Science)
Title: Refugees, "Narco-refugees," & Displaced Peoples: Violence & Its Effects on Emigration and Internal Migration Trends

In this paper, I examine the true relationship between Drug Trafficking Organization-caused violence and migration. I developed a set of hypotheses in which I link migration to DTO-caused violence and use the Social Conflict Analysis Database and the Census data from (1995-2015) to test such postulations. Using an Ordinary Least-Squares (OLS) model, I come to conclude that DTO-caused violence is the dominating element for the causes of internal migration in recent years. Violence, however, was not found statistically significant when analyzing emigration trends. These conclusions support the theoretical postulations that individuals migrate when they find themselves in regions suffering from DTO-caused violence. Unfortunately, these findings did not support emigration-related theoretical propositions. That is, these findings do not provide support for the hypotheses indicating that civilians migrate to other countries when their regions are terrorized by violence instigated by DTOs. found no significant results, however, between coloration, boldness, or corticosterone levels.

Poster #29
Presenters: Nicholas Vedo & Daniel Azar
Sponsor: Anne Bost (Biology)
Title: *Caenorhabditis elegans* Response to Antibiotics

Our lab seeks to better understand (a) how bacteria use quorum sensing to turn on antibiotic synthesis, and (b) the extent to which eukaryotic organisms "listen" to and respond to bacterial communication. In 2009, Kaplan et. al. discovered that the small, free-living soil nematode *Caenorhabditis elegans* could recognize and chemotax toward bacterial AHL's. However, little is known about whether the worms detect or engage the bacterial gene products that are regulated by the AHL's. Because antibiotics regularly are introduced into agricultural environments by animal urine run-off, it is important to understand whether soil nematodes' behavior is impacted by antibiotic gradients. To investigate *C. elegans'* ability to detect antibiotics, we examined the structures of eight commercially available drugs. Since Ward had demonstrated that *C. elegans* preferentially chemotaxes toward anions (Cl-, Br-, I-), cyclic nucleotides, and alkaline pH values, we hypothesized that *C. elegans* would detect and behaviorally respond to basic/anionic antibiotics. We therefore performed chemotaxis assays (Figure 2) using a variety of antibiotics. To identify potentially novel antibiotics mediated by quorum sensing, we also sampled bacterial field isolates from plants at Wabash College (Figure 7).

Poster #30
Presenter: Benjamin Washer
Sponsor: Kevin Meyer (Perfinity Biosciences)
Title: Chemical Modification of Trypsin Improves Digestion Efficiency

Proteins are molecules of great interest, since their prevalence and diversity of functionality are so profound. Due to this, proteins are widely used as catalysts in biological reactions, used as probes in biological systems, etc. One example, trypsin, a well characterized serine protease, is a protein used in the cleaving or "digestion" of proteins for use in mass spectrometry and structural analysis. Unfortunately, like other proteins, trypsin often functions only under a very limited range of conditions and experiences a reduction in activity outside of this range. In collaboration with Perfinity Biosciences, experiments focusing on the chemical modification of trypsin with the intention of improving the enzymatic activity and digestion efficiency of trypsin under various conditions were done. Modification experiments were tested by varying conditions such as buffer, temperature, thermal stress and matrix complexity under which the modified trypsin was used to digest both a simple protein (native human insulin) and a more complex antibody (Human Immunoglobin G). Results indicate that the modified trypsin performs better than the unmodified trypsin under standard conditions and also maintains a relatively high level of activity under other, more stressful conditions.

Poster #31
Presenter: Christopher Wilson
Sponsor: Neil Schmitzer-Torbert (Psychology)
Title: Mindfulness and Cognitive Skills: How Facets of Mindfulness Relate to Insight Problem Solving and other Cognitive Abilities

Individual differences in mindfulness and its facets have recently been found to correlate with performance on cognitive tasks (i.e. those involving cognitive control, problem solving and perceptual abilities). In this study, we tested if performance on these tasks was related to specific dimensions of mindfulness (assessed using the Five Facet Mindfulness Questionnaire). These hypotheses were examined across one study (total N = 169). Contrary to previous research, mindfulness did not strongly predict performance on a perceptual accuracy task or cognitive control task. However, mindfulness (specifically the acting with awareness dimension) was correlated with the ability to solve insight problems.

Poster #32
Presenter: Aaron Wirthwein & Yang Yang
Sponsor: Martin Madsen (Physics)
Title: Measuring Acceleration via Laser Interferometry with Rolling Spherical Mirrors

Our goal is to build a Michelson interferometer capable of measuring the acceleration difference of two metallic spherical balls. Using a HeNe laser source, we construct an interferometer with two moving spherical mirrors on inclined rails. We find that is possible to observe an interference pattern with our system, and the results agree qualitatively with our theoretical model. From fitting our data to a theoretical model, we estimate an acceleration difference at the magnitude of 10-3 m/s2 between our metallic balls.

Poster #33
Presenter: Justin Woodard
Sponsor: Ann Taylor (Chemistry)
Title: Optimization of qPCR for Detection of PPO in Apples

We began the experiment with the goal of discovering the amount of Polyphenol Oxidase (PPO) in apples. The gene of interest, PPO, causes apples to brown and in some plants, acts as a defense mechanism. In order to determine the amount of PPO present we first had to optimize Quantitative Polymerase Chain Reaction, or qPCR, which is a method of DNA replication that quantitatively allows for the determination of the starting amount of DNA. qPCR uses a fluorescent dye that attaches to double-stranded DNA, and a fluorescence reader in the instrument is able to detect different levels of DNA. To optimize qPCR, we designed primers from literature and performed temperature gradients and serial dilutions. These two experiments were performed to examine the optimal conditions under which to perform qPCR, and which control primer to move forward with in conjunction with PPO. The control primers designed and tested were Actin, glyceraldehyde 3-phosphate dehydrogenase (GAPDH), and Elongation Factor 1α (EF). From these three primers, EF was selected as the optimal control to use in comparison with PPO. After optimizing the qPCR with the aforementioned primers, the future goal is to examine how wounding apples and tobacco plants impact PPO levels.

Poster #34
Presenter: Shaun Khoo
Sponsor: Bradley Carlson (Biology)
Title: A Study of the Box Turtle Population at Allee Memorial Woods (AMW), Indiana with Emphasis on Sex Ratios and Age Structure

Eastern box turtles (*Terrapene carolina*) are terrestrial turtles native to the eastern parts of the United States. Previous studies on these turtles in Maryland and Allee Woods have shown a decline in population sizes over time. Our goal for this study is to describe the current size of the box turtle population at Allee Memorial Woods and the characteristics of said population. We found that the population numbers of the box turtle at Allee Woods appear to be stable or have a slight increase which could be attributed to the low natural death rates of these animals. More males were captured compared to females, and the females that were caught were observed to be travelling to nearby corn fields to lay their eggs. One possible reason for the lower number of females could be because of the need to travel during mating seasons would place them at a larger risk to predation or accidents. There were significantly less juveniles found in this study than the study in 1987. The small number of juveniles could be problematic because it might reflect the population's low successful reproduction rates or low juvenile to adult survival rates.


WABASH • COLLEGE • INDIANA
SCIENTIAE ET VIRTUTI
1832