



W.

22ND ANNUAL

CELEBRATION OF

**STUDENT RESEARCH,
SCHOLARSHIP,
& CREATIVE WORK**

Congratulations!

The Celebration Planning Committee is excited to announce the winners of two prestigious awards associated with today's event.

Celebration Research, Scholarship, and Creativity Awards

These \$100 prizes are awarded to the students who most effectively articulated gains in professional development and personal growth as a result of their research, scholarship, or creative work.

This year's winners are listed below, in alphabetical order.

Adam Berg '22: *LOCKR: Using De Novo Designed Protein Switches in C. elegans*

Blake Thomas '22: *Domestic Terrorism and Voter Participation in United States*

Adan Villeda Jr. '23: *Drug Targeting on G-Quadruplex DNA*

Robert Wedgeworth Library Research, Scholarship, and Creativity Awards

These \$750 prizes are awarded to recognize effective use of library resources in the preparation of Celebration work. This year's winners are listed below, in alphabetical order.

Kenny Coleman '22: *When All Falls Down: When Talking About Race in Films Goes Wrong —An Analysis of the film Any Given Sunday*

Alexandru Mircea Rotaru '22: *Healthcare Barriers for Pregnant Teenagers in Communities that Rely on Catholic Hospitals and their Affiliated Clinics*

Welcome and Introduction

Welcome to the 22nd Annual Celebration of Student Research, Scholarship, and Creative Work at Wabash College. For the past 21 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. The intellectual and creative work of this celebration is particularly important given the challenges of the past two years, and the Celebration is a symbol of our resumption of something approximating normal campus life.

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 a master teacher who helped countless Wabash students develop their creativity and love of the liberal arts. Likewise, he encouraged new faculty to embrace the culture of the College. I fondly remember the encouragement he gave me to teach in the Wabash first-year program and his mentorship on a teaching and learning project on which we collaborated. 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 for their hard work and creativity in championing an in-person Celebration this year: Chair Lon Porter, Michelle Janssen, Beth Lindsay, Damon Mohl, Wally Novak, Bob Royalty, Erika Sorensen-Kamakian, and Peter Thompson. Chris Harshbarger and ETS students contributed to the poster production, as have other ETS and IT Services staff; Kim Johnson formatted and prepared the program; Mark Siegel authored the online event presentation application system; Violet Benge secured spaces for the postponed event date. Campus Services, and Mary Jo Johnston and her Bon Appetit staff make the logistical support appear effortless. Finally, we are grateful to all of you whose attendance supports this community Celebration.

—Todd McDorman, Acting Dean of the College

Schedule for Oral Presentations

Oral presentations will begin at 1:10 p.m. and continue every 20 minutes with a 20-minute break. The last sessions begin at 3:10 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 three 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 8.

Schedule for Posters and Exhibits

Students will present and discuss their posters and exhibits in 60-minute increments beginning at 1:10 p.m. and 2:30 p.m. on the Mall. In the event of poor weather, posters will be displayed in Detchon International Hall. You will find a list of presenters and their time slot beginning on page six. Names of the poster presenters and co-presenters, as well as their sponsors and abstracts, are listed by alphabetically beginning on page 14.

Oral Presentation Schedule

Baxter Hall 101		
1:10	Blake Thomas	The Racial and Social-Economic Implications of Voter Identification Requirements in Florida Christie Byun (Economics)
1:30	Break	
1:50	Trevor McKinney & Reese Long	Townie Talks: A Podcast on Experience and an Outlook on Life Michele Pittard (Educational Studies)
2:10	Break	
2:30	Ian Gale	<i>Songs II</i> David Blix (Religion)

Baxter Hall 202		
1:10	Alexander Naylor	Holy Wars in World History - The Maccabean Revolt Stephen Morillo (History)
1:30	Break	
1:50	Zhangquan Li	Religion and State Stephen Morillo (History)
2:10	Break	
2:30	Nicholas Carson	Polytheistic Impacts on Society in Culture in the Medieval Norse World Richard Warner (History)

Detchon Hall 109		
1:10	Dakota Baker	Aesthetics and <i>Vanderpump Rules</i> Matthew Carlson (Philosophy)
1:30	Break	
1:50	Joseph Julian	The Novice/2-Expert Problem in the Age of the Internet Matthew Carlson (Philosophy)
2:10	Break	
2:30	Elijah Schoof	Health is Wealth: Why Being Healthy is a Privilege Jeffrey Gower (Philosophy)
2:50	Break	
3:10	John Clutter	<i>Espacio y Existencialismo: La Expresión Artística de las Ideas Existencialistas en 'Nada'</i> María Cristina Monsalve (Spanish)

Detchon Hall 209

1:10	Kenny Coleman	When All Falls Down: When Talking About Race in Films Goes Wrong - An Analysis of the film <i>Any Given Sunday</i> Jennifer Abbott (Rhetoric)
1:30	Break	
1:50	Cole Bergman, Burkley McCarthy & Clayton Allen	Deliberation with Wabash Pastoral Leadership Program James Proszek & Sara Mehlretter Drury (Democracy and Public Discourse)
2:10	Break	
2:30	Hunter Seidler	Amateurism's Death in Chicago: The Supreme Court's Conservative Views of Antitrust in <i>NCAA v. Alston</i> Jeffrey Mehlretter Drury (Rhetoric)
2:50	Break	
3:10	Morgan Seagrave, Andrew McCullough & Jackson Grabill	Predicting Deliberative Outcomes: The Factors that Determine Perceived Learning and Change of Opinion in Deliberation Chris Anderson (Democracy and Public Discourse)

Hays Science Hall 003

1:10	Thomas Gastineau, Don Silas & Kody Witham	Nursing Shortage in Appalachia Kentucky Jill Rogers & Eric Wetzel (Global Health Initiative)
1:30	Break	
1:50	Alexandru Mircea Rotaru	Healthcare Barriers for Pregnant Teenagers in Communities that Rely on Catholic Hospitals and their Affiliated Clinics Agata Szczeszak-Brewer (English)
2:10	Break	
2:30	Henry Egan	Wabash College and Gender: Reflections and Suggestions Agata Szczeszak-Brewer & Elan Pavlinich (English)
2:50	Break	
3:10	James Lewis	Creative Nonfiction Writing Derek Mong & Agata Szczeszak-Brewer (English)

Hays Science Hall 104

1:10	Adam Berg, Joseph Kaefer, Connor Wakefield & Jakob Faber	LOCKR: Using De Novo Designed Protein Switches in <i>C. elegans</i> Erika Sorensen-Kamakian (Biology) & Walter Novak (Chemistry)
1:30	Break	
1:50	Alexander Koers	Adjuvant Screening Utilizing High Performance Liquid Chromatography-Single Quadrupole Mass Spectrometry Paul Schmitt (Chemistry)
2:10	Break	
2:30	Gabriel Cowley & Kihyun Kim	Rainbow Numbers in Z Katie Ansal di (Mathematics & Computer Science)

Schedule of Poster Presentations and Exhibits

Outside on Mall (Poor Weather Locations: Detchon International Hall)		
1:10–2:10	Daren Glore & Thomas Kay	Advances in Box Turtle Ecology Research Brad Carlson (Biology)
	Bradley Johnson & Jacob Penrose	Freezing Effects on Immune Assays in Eastern Box Turtles Brad Carlson (Biology)
	George Azar	Observing ER Stress in Neuronal Mouse Cells through Bioluminescence Heidi Walsh (Biology)
	Alexander Litts & Eric Green	Using Second Harmonic Generation Microscopy to Screen Fungicide Adjuvants Paul Schmitt (Chemistry)
	Adan Villeda Jr.	Drug Targeting on G-Quadruplex DNA Laura Wysocki (Chemistry)
	Wade Haesemeyer, Gabriel Cowley, James Daniken & Brayden Lentz	Ovid: A Contemporary Take Bronwen Wickkiser (Classics)
	Ace Dzurovcik	Great Lakes? Great Recession! How Homeownership in the Great Lakes Region was Affected by the 2008 Financial Crisis Sujata Saha (Economics)
	Jackson Smith	What Factors Affected the Risk Premia in the United States from 2000-2020? Sujata Saha (Economics)
	Jayden Williamson	The Effect of Household Leverage on Real Output Sujata Saha (Economics)
	Andrew Rippy	Malware Detection using Machine Learning Mark McCartin-Lim (Mathematics & Computer Science)
	Cihang Wang	Optimization of Intervention Strategies for Zika Virus Chad Westphal (Mathematics & Computer Science)
	Caleb Powell	Applications of Single Board Computers James Brown (Physics)
	Kazi Fardinul Hoque & Caleb Powell	Brinicle Pattern Formation using Point Models in Python Nate Tompkins (Physics)
2:10	Break	

Schedule of Poster Presentations and Exhibits

Outside on Mall (Poor Weather Locations: Detchon International Hall)		
2:30–3:30	Mark Magnon, Parker Gamble & Devin Jimenez	How Should Vaccines be Distributed Globally? Sara A. Mehlretter Drury (Rhetoric)
	Abraham Wade, Noah Miller, Seth Kirkpatrick, Jacob Talbert & Benjamin Mijangos Sampsell	Wabash History of Diversity, Equity, and Inclusion Chris Anderson and Sara A. Mehlretter Drury (Democracy and Public Discourse)
	Blake Thomas	Domestic Terrorism and Voter Participation in United States Ethan Hollander (Political Science)
	Isaac Temores & Alexander Naylor	Effect of Spots versus Gratings on Non-Cardinal Color Perception: Experiment 2 Karen Gunther (Psychology)
	Jacob Lawson, Youran Wang & K'tren Wilson	Relationship of Nicotine use and Cessation to Impulsivity and Foraging Neil Schmitzer-Torbert (Psychology)
	Thomas Joven Drew Bluethmann & Reese Fokine	Roma! Robert Royalty (History and Religion)
	Ethan Pine, Wade Haesemeyer, Andrew Page, Joseph Plencner & Jordan Reel	Ostia: Exploring the Import Hub of Ancient Rome Robert Royalty (History and Religion)
	William Fecht & Blaine Teeters	Catalysis of Oxygen Reduction via Cobalt Macrocycles Timothy Cook (Chemistry)
	Nhan Huynh	cODC degron Optimization to Control Protein Levels in <i>C. elegans</i> using LOCKR Walter Novak (Chemistry) & Erika Sorensen-Kamakian (Biology)
	Felix Valero-Davila, Nhan Huynh & Grant Johnson	Optimizing the cODC degron for Protein Control in Nematode Worms Walter Novak (Chemistry) & Erika Sorensen-Kamakian (Biology)
	Jakob Faber, Michael Bertram & Adam Berg	Developing De Novo Designed Protein Keys (LOCKR) in <i>C. elegans</i> Erika Sorensen-Kamakian (Biology) & Walter Novak (Chemistry)
	Mitchell Keeling, Connor Wakefield, Adam Berg & Joseph Kaefer	Designing LOCKR Protein Switch C in <i>C. elegans</i> Erika Sorensen-Kamakian (Biology) & Walter Novak (Chemistry)
	Joe Kaefer & Connor Wakefield	Insertion of De Novo Protein Switches onto Dynein Heavy Chain Erika Sorensen-Kamakian (Biology) & Walter Novak (Chemistry)

Oral Presentations (Alphabetical by Presenter)

Presenters: Dakota Baker
Sponsors: Matthew Carlson (Philosophy)
Title: Aesthetics and *Vanderpump Rules*

Reality television, with its morally suspect characters and unrealistic premises, is often designated a “guilty pleasure.” While this is often taken to mean that it is merely a waste of our time, T.W. Adorno and R.G. Collingwood have a deeper concern for such “amusement art.” In this presentation, I’ll take a look at one of my favorite reality television shows, Bravo’s *Vanderpump Rules*, and use it to explore what Adorno and Collingwood found so concerning in amusement art. Does reality television count as “art proper”? What cultural harm does it risk inflicting on its viewers? These and other questions will be explored in this presentation on aesthetics and the *Vanderpump Rules*.

Presenter: Adam Berg, Joseph Kaefer, Connor Wakefield & Jakob Faber
Sponsor: Erika Sorensen-Kamakian (Biology) & Walter Novak (Chemistry)
Title: LOCKR: Using De Novo Designed Protein Switches in *C. elegans*

The ‘Latching Orthogonal Cage/Key pRoteins’ (LOCKR) system is a novel designed protein Switch and Key. The Switch cages a protein sequence, such as a degron, in the off or “locked” state (degronSwitch). Degrons, when activated, signal for protein destruction. Upon Key addition, the degronSwitch is turned on or “unlocked,” which exposes the degron, simultaneously destroying the degronSwitch and any protein it is fused to. The location of Key expression can be tailored using promoters, which gives LOCKR the potential for exquisite tissue-specific protein control; however, LOCKR has not yet been applied to a multicellular organism. We are developing the LOCKR technology in the model organism *C. elegans*. The degronLOCKR system requires two parts: 1) a gene fused to the ‘degronSwitch’ and 2) an inducer peptide (the Key). We will fuse the degronSwitch to dynein, a protein that transports cellular material, using CRISPR-Cas9 gene editing. In parallel, we designed six tissue-specific Keys for expression in *C. elegans* (MosSci). We predict that unlocking the degronSwitch on dynein with ubiquitous Key will result in lethality, whereas germline-specific Key will permit viability but cause developmental defects. This work establishes a novel and tissue-specific method for regulating protein function in an animal model.

Presenter: Cole Bergman, Burkley McCarthy & Clayton Allen
Sponsor: James Proszek & Sara Mehlretter Drury (Democracy and Public Discourse)
Title: Deliberation with Wabash Pastoral Leadership Program

During the fall of 2021, the Wabash Democracy and Public Discourse initiative (WDPD) in collaboration with the Wabash Pastoral Leadership Program (WPLP) hosted their first in-person event since the start of the pandemic. Bringing together over 40 pastors throughout the State of Indiana, we conducted a deliberation about civic habits, which are repeated and intentional community-facing acts, to understand how COVID-19 affected the past, current, and future relationships between pastors, their congregations, and their broader local communities. During our deliberations with pastors, we gained insight into the community activities and values that were lost or altered as well as new ones that have emerged during the pandemic. In this presentation, we will provide insight about how the pandemic has affected churches in Indiana and discuss our findings about the role of civic habits in (re)building local communities.

Presenter: Nicholas Carson
Sponsors: Richard Warner (History))
Title: Polytheistic Impacts on Society in Culture in the Medieval Norse World

Renowned as raiders, sailors, and warriors, the Norse have long lived inside of the cultural consciousness of the modern American. Amongst the most enduring of their impacts on our modern lives is their religious stories and beliefs which frequently find expression in popular media but represented a vibrant system of belief historically. Thus we can ask the question, how did the polytheistic beliefs of the Norse impact their culture, society, and political expressions during the Middle Ages? I attempted to answer this question through the analysis of the religious and folkloric beliefs of the Norse during the Middle Ages while covering topics such as magic, Gods, and hospitality. Through this analysis, it became clear that the religious beliefs of the Norse impacted everything from judicial practice, societal organization, political formation, and cultural values, creating an image of the Norse that extends beyond their martial prowess and practice.

Presenter: John Clutter
Sponsor: María Cristina Monsalve (Spanish)
Title: *Espacio y existencialismo: La expresión artística de las ideas existencialistas en 'Nada'*

This is my final paper for my Spanish senior seminar. This essay is a narrative analysis of 'Nada' by Carmen Laforet. Narratology is an approach to literary theory that focuses on symbols and styles within the narrative voice. I analyze the narrative voice of the protagonist, Andrea, to make inferences of her experience and character development. With this exercise, I hope to demonstrate the relevance of the novel's themes to existentialist philosophy. I argue that the narrative style and poetic imagery of the novel portray a sociopolitical environment that qualifies as what existentialists call "the absurd." In this way, Laforet depicts a common experience for individuals in post-war Europe, which gave rise to recognition of existentialist values.

Presenter: Kenny Coleman
Sponsor: Jennifer Abbott (Rhetoric)
Title: When All Falls Down: When Talking About Race in Films Goes Wrong -- An Analysis of the film *Any Given Sunday*

Any Given Sunday was one of the most anticipated films to end 1999 and bring in the revolution of a new century. This analysis centers on what went wrong in this film and how filmmakers can learn from the different mistakes that Stone's film commits. I assert that the film incorporates the White Savior narrative, unnecessary film edits, and lack of focus on the issue of racism, causing it to uphold and reinforce racist stereotypes instead of contesting them. This film is impactful, but on an audience invested in systems of power that oppress marginalized communities via stereotypes and racist beliefs. I further argue that the film includes a conversation about racism in sports, but ineffectively focuses on this dialogue throughout the entire film. To make way for similar analyses in the future, I rely on critical rhetoric and narrative paradigm methods to further my analysis. Though this essay does not aim to provide a framework for filmmakers, it lends itself as a reference when assuring that films fulfill their intended purpose.

Presenter: Gabriel Cowley & Kihyun Kim
Sponsor: Katie Ansaldi (Mathematics & Computer Science)
Title: Rainbow Numbers in \mathbb{Z}

Suppose that we take a set of numbers and a set of colors, applying them to each number. For the equation $x-y=z^2$, we find all the solutions to it in our set of numbers. A solution to the equation will be "rainbow" if each of the numbers in the solution has a distinct color. What is the fewest number of colors we need to guarantee a rainbow solution in \mathbb{Z} for our equation? Does it vary for different prime numbers? What about for different kinds of composite numbers? We discovered a special property having to do with Fermat primes in particular, as well as uncovered particular properties of different kinds of composite numbers.

Presenter: Henry Egan
Sponsor: Agata Szczeszak-Brewer & Elan Pavlinich (English)
Title: Wabash College and Gender: Reflections and Suggestions

Wabash College is directly engaged in the practice of modeling and perpetuating masculinity. The “Wabash man” is a microcosm of masculinity, a specific model of manhood with its own set of rules and expectations. A Wabash man is a gentleman both on and off campus. He lives humanely, acts responsibly, leads effectively, and thinks critically. He is disciplined and excels academically, professionally, and personally. Any given student or professor could tell you these values. This unique relationship to gender provides numerous opportunities for Wabash to challenge traditional and often problematic models of masculinity. My presentation explores the gender implications of Wabash college. I treat Wabash as a text to analyze through the lens of Gender Studies, synthesizing gender and literary theory, past critical work concerning Wabash, texts from within Wabash, and my own experience. I am particularly interested in the homophobia on campus due to the gendered environment. I present practical suggestions for how Wabash can improve its discussion of gender campus-wide.

Presenter: Ian Gale
Sponsor: David Blix (Religion)
Title: *Songs II*

I write songs in my spare time and will be performing selections, accompanied by guitar.

Presenter: Thomas Gastineau, Don Silas & Kody Witham
Sponsors: Jill Rogers & Eric Wetzal (Global Health Initiative)
Title: Nursing Shortage in Appalachia Kentucky

For the past few years, there has been a nursing shortage within Appalachia, Kentucky. Furthermore, since the COVID-19 pandemic, a hospital in Appalachia, Kentucky, has spent over \$50 million on travel nurses. To address the nursing shortage within Appalachia, interviews were conducted with the stakeholders to determine the root cause and possible solutions. These stakeholders included administrators of colleges and universities, local hospital administrators and staff, and high school administrators. The main finding from interviews were the challenges students face to become nurses and the challenges of hospitals to find nurses. After compiling all of the data from interviews, the leading solutions were to create a nursing pathways diagram, start a career and college fair, and offer a summer academy before senior year of college. The nursing pathway diagram will allow students to determine which pathway is most appealing in nursing. The career and college fair will enable students to assess the education necessary for their career pathway. Finally, the summer academy will equip students with resources to succeed within college and nursing. As a pilot, these solutions are currently being implemented within Pikeville, Kentucky.

Presenter: Joseph Julian
Sponsor: Matthew Carlson (Philosophy)
Title: The Novice/2-Expert Problem in the Age of the Internet

The information-dense environment of the modern internet poses challenges which are difficult, but not insurmountable. Internet users face an overwhelming volume of information every time they access the web. It's easier than ever to find opinions which may support or contradict nearly any position. But when a novice (with respect to a given domain of expertise) is presented with the claims of two contradictory putative experts, they face what philosopher Alvin Goldman terms the “novice/2-expert problem.” With so much information available and so many ‘expert’ opinions out there, the internet may seem at first glance to be an inescapable epistemic minefield. Whose word can you trust? Goldman considers several potential sources of evidence novices might employ, and acknowledges difficulties associated with each. The internet may, however, prove useful for overcoming these difficulties, allowing novices to assume a fairly high degree of confidence in certain expert opinions.

Presenter: Alexander Koers
Sponsor: Paul Schmitt (Chemistry)
Title: Adjuvant Screening Utilizing High Performance Liquid Chromatography-Single Quadrupole Mass Spectrometry

HPLC-MS has been used extensively for decades in a variety of chemical fields. In the present study concentrations of an active fungicidal ingredient, fenpicoxamid and one of its metabolites, UK-2A are being investigated. Through analysis of young wheatgrass treated with a suspension concentrate of the active ingredient at several timepoints, relative efficiency of adjuvants can be anticipated with great precision utilizing HPLC-MS. The purpose of this investigation is to determine the efficiency of adjuvants in assisting plant cell uptake of active ingredients. The conclusions from this research can be used in the agrochemical industry to minimize pesticides applied to crops, lessening environmental impact, and allowing for more efficient crop production.

Presenter: James Lewis
Sponsor: Derek Mong & Agata Szczeszak-Brewer (English)
Title: Creative Nonfiction Writing

In my student of Celebration Research, I am going to read from creative nonfiction work that I have written over my four years at Wabash. The pieces are about my struggles as a man and memories with members of my family. My family has been one of the biggest things I have written about at Wabash this year and I want to express this as much as possible. Most of the pieces are a couple of pages of reading. Maybe there will be a couple of recording from the stories I have written. I plan for most of them to be series written that have inspired me to write. These will be pieces from 311 and 498/499.

Presenter: Zhangquan Li
Sponsor: Stephen Morillo (History)
Title: Religion and State

In ancient times, religion and state were often connected, like the holy war or the crusades; most of the time, it is really hard to distinguish one from the other, also take the example of crusades, you can argue they fought for religious purposes also, but the desire for land and wealth could also be viewed as the cause. Besides the connections among them, there is also a lot about the conflicts among them, the struggle between kings and the pope, or religious revolts in history. Based on this contradiction, my research focuses on three questions, is there any similarities/shared qualities between religion and the state; what role does religion play in the process of state formation that results in this weird position will conflict, and cooperation coexist, and can either of them exist separately? I will answer them by analyzing a few religious revolts in ancient China.

Presenter: Trevor McKinney & Reese Long
Sponsor: Michele Pittard (Educational Studies)
Title: Townie Talks: A Podcast on Experience and an Outlook on Life

The presentation done by Reese Long and Trevor McKinney, two high school friends turned college roommates, will attempt to understand why they have such different outlooks on highschool despite attending the same one. A conversation between the two takes an in depth look as to what factors they believe might have affected their beliefs and experiences in school. Taking time to interview each other in a casual way, the two share personal details in their adolescence that might have been major factors in their high school experience.

Presenter: Alexander Naylor
Sponsor: Stephen Morillo (History)
Title: Holy Wars in World History- The Maccabean Revolt

The term holy war is thrown around quite often throughout history. In my project I looked to define what a holy war is and have come to the conclusion it is a perception not a phenomena. This perception is shared by the entire population and their leader and guides the actions they take throughout the war. The Maccabean Revolt fits into this idea of a perceptual holy war. This revolt stemmed from the actions of the Seleucid King Antiochus IV against the Jewish religion and the actions of Jews who turned against their God. The rebels believed that the Jews who turned against God and the Greeks who desecrated his temple must be punished and they framed their war on this concept. This revolt led to the story of Hanukkah that many Jews still celebrate today as God's will triumphing over oppression.

Presenter: Alexandru Mircea Rotaru
Sponsor: Agata Szczeszak-Brewer (English)
Title: Healthcare Barriers for Pregnant Teenagers in Communities that Rely on Catholic Hospitals and their Affiliated Clinics

Teenage pregnancies are a common occurrence across the United States, and they are sometimes unpreventable. However, teenagers face plenty of barriers to receiving adequate sexual, reproductive, and maternal healthcare, particularly in Catholic hospitals, which operate under religious mandates based on the assumption that intercourse does not occur before marriage. Catholic hospitals are the most common type of religious hospital in the United States, particularly in the Midwest, and there are many communities, such as Montgomery County, Indiana, that rely solely on them. Catholic hospitals also have some of the most stringent guidelines as to what procedures are and are not permitted, called the Ethical and Religious Directives (ERDs), which limit a woman's access to contraceptive care and abortion, among many other procedures. This presentation examines the various barriers pregnant teenagers face in accessing sexual and reproductive healthcare, what communities in this situation can do to counteract these barriers, and potential avenues for further researching and tailoring the plan of action at a local (county) and potentially state level in Indiana. This is an important issue in Montgomery County and in rural Indiana at large, which is why the presentation also has an element of local focus.

Presenter: Elijah Schoof
Sponsor: Jeffrey Gower (Philosophy)
Title: Health is Wealth: Why being Healthy is a Privilege.

In the first section of this paper, we'll examine statistical data on dietary trends and food security for specific subgroups within the United States. We will then look at how and why our current Neoliberal governing-system produces barriers to healthier diets. This will entail us learning how harmful practices by food corporations are legitimized and insulated by the state. In the final section, we will look at how paternalistic intervention could help to mediate these evident discrepancies impacting minorities. Ultimately, my analysis will explain how state and corporate corruption, human behavioral attitudes, and broader socio-economic situations interact and lead to food discrepancies negatively effecting marginalized groups.

Presenter: Morgan Seagrave, Andrew McCullough & Jackson Grabill
Sponsors: Chris Anderson (Democracy and Public Discourse)
Title: Predicting Deliberative Outcomes: The Factors that Determine Perceived Learning and Change of Opinion in Deliberation

Deliberation is an important process because it weighs different community's values and expands the interconnectivity of our society in order to address the complex issues facing our time. While most people are familiar with deliberation in the form of trial juries, the process has been adopted as an alternative to traditional methods to address questions in local, state, and federal contexts. Wabash Democracy and Public Discourse (WDPD) is a student training and leadership initiative that facilitates these kinds of deliberation and dialogue events with organizations at Wabash College, in local communities, in the state of Indiana, and around the country. To better understand the deliberative process, post-event surveys were distributed at WDPD events in the Fall of 2021. The focus of this project is how varying event topics are received by people from diverse demographics, what contributes to perceptions of learning in deliberation, and how perceptions of the event's analytical and social dimensions contribute to attitude change. These questions help in understanding the development of more robust deliberative events, what contributes to true deliberative perspective taking, and how deliberation contributes to issue learning.

Presenter: Hunter Seidler
Sponsor: Jeffrey Mehlretter Drury (Rhetoric)
Title: Amateurism's Death in Chicago: The Supreme Court's Conservative Views of Antitrust in NCAA v. Alston

On June 21, 2021, the Supreme Court released its decision in the NCAA v. Alston, ruling unanimously in favor of Alston. The opinion, penned by Justice Neil Gorsuch, struck down the NCAA's restrictions on education-related benefits for student-athletes, but the rhetorical power of this judicial opinion extends far beyond this. Through the use of ideological criticism to conduct my rhetorical analysis, I argue the Court's opinion promotes the conservative Chicago School of Antitrust by selectively choosing quotes from a key Chicago School proponent and reframing contradictory precedents; privileging economic ideals of "consumer welfare" and "efficiency" over the non-economic ideal of amateurism, and limiting the intervention of the courts in market matters. This ideological promotion possesses powerful implications for legal discourse surrounding antitrust interpretation, the earning power of student-athletes, and the power of both corporations and employees in the U.S. economy.

Presenter: Blake Thomas
Sponsor: Christie Byun (Economics)
Title: The Racial and Social-economic Implications of Voter Identification Requirements in Florida

Since the 1950s two issues have dominated conversations regarding the inviolability of U.S elections: voter fraud and voter suppression. These issues have centered around the topic of voter identification laws. This paper presents empirical evidence on the consequences of increasing the number of acceptable voter ID's In the 2016 general election in Florida. In 2016, the Florida Legislature added 3 new categories of acceptable forms of ID's, bringing the total number of acceptable photo ID's to 12. This paper leverages two distinct datasets to estimate the impact of Florida's expanded list of acceptable forms of ID for the 2016 general elections. The first dataset is a cross-sectional dataset gathered from the Current Population Survey (CPS) and accessed using the Integrated Public Use Microdata Series (IPUMS) service. The second data set was collected from Florida's secretary of state's voter file containing individual-level data including sex, race, age, registration date, and party affiliation. Using voter ID's and county codes, individual voter files were joined with their voting history data which included information on the election type and method of voting used in each election. Of specific importance to this study, home addresses were recorded for each individual, allowing for geospatial analysis of voter behavior after the expansion of acceptable ID's in 2016. Although this paper acts towards improving the precision of this study it does not capture individuals who are unable to register to vote. For this reason, the statistically significant results may not properly represent the impact of expanded voter identification requirements within Florida.

Poster & Exhibit Presentations (Alphabetical by Presenter)

Presenter: George Azar
Sponsor: Heidi Walsh (Biology)
Title: Observing ER Stress in Neuronal Mouse Cells through Bioluminescence

Obesity can lead to endoplasmic reticulum (ER) stress. ER stress occurs when misfolded proteins accumulate in the ER lumen. Once ER stress occurs, the cell responds by initiating signaling pathways to correct protein folding. Luciferase reporter assays can be used to understand how saturated fatty acids and other obesity-related signals cause ER stress. In this assay, eukaryotic cells are transfected with a plasmid containing a luciferase gene downstream of a regulatory region activated by ER stress. Luciferase activity, measured as luminescence, can be observed when the luciferin substrate is added to cell lysates. Our model system for studying the effects of saturated fatty acids on ER stress is the GT1-t cell lines derived from mouse GnRH neurons. GnRH, or gonadotropin-releasing hormone, controls the hypothalamic-pituitary-gonadal axis, and previous work has suggested that the GnRH gene is repressed by ER stress. Our data shows that ER-dependent luciferase activity increased in GT1-7 cells when exposed to thapsigargin. Thapsigargin is an ER stress-inducing inhibitor that disrupts calcium homeostasis. Future experiments will determine the timing and dose dependency of ER stress responses to fatty acids and use chemical signaling molecule inhibitors to understand how fatty acid signaling causes ER stress.

Presenters: Ace Dzurovcik
Sponsors: Sujata Saha (Economics)
Title: Great Lakes? Great Recession! How Homeownership in the Great Lakes Region was Affected by the 2008 Financial Crisis

Likelihood of homeownership changed drastically from before the Great Recession to after. The Great Lakes Region did not escape these struggles, with each state being affected in different ways. Demographic variables such as family size, marital status, age, race, and others were considered to analyze the likelihood of owning a home. Financial variables such as total family income and annual electricity cost were also considered. Using annual data, a logistic model was created to compare states in this region. Selected findings report that increased racial disparities affected likelihood of homeownership due to the crisis, employment did not have a statistically significant effect on likelihood, and older age remains an exceedingly strong impactor of likelihood of homeownership.

Presenters: Daren Glore & Thomas Kay
Sponsor: Brad Carlson (Biology)
Title: Advances in Box Turtle Ecology Research

This poster is an accumulation of miscellaneous work that was conducted over the summer of 2021 survey of Box Turtles by Daren Glore, Jacob Penrose, Thomas Kay, Bradley Johnson, and Dr. Carlson. This poster includes investigations into a population estimate of the turtles in Alley Woods as a continuation of a long running Wabash data set, the use of 3D printing and robotics to invoke a behavioral response in wild turtles, and the correlation between our immune assay data and our behavioral experiment data. As the main focus of our summer work was primarily on the immune response measurements, these multiple side projects have not yet come to complete fruition. Our goal is to explain the progress that we have made and the future direction of our work.

Presenter: Wade Haesemeyer, Gabriel Cowley, James Daniken & Brayden Lentz
Sponsors: Bronwen Wickkiser (Classics)
Title: Ovid: A Contemporary Take

Advanced Latin students put a 21st century spin on Ovidian poetry with four original Latin poems. Each will share their individual compositions elaborating on stylistic elements, inspiration, and literary devices. The poetry will be visualized by a poster with graphic elements, revealing the depth and nuance in each line with the goal of conveying the beauty of Latin to the non-Latin reader.

Presenter: Jakob Faber, Michael Bertram & Adam Berg
Sponsor: Erika Sorensen-Kamakian (Biology) & Walter Novak (Chemistry)
Title: Developing De Novo Designed Protein Keys (LOCKR) in *C. elegans*

The ‘Latching Orthogonal Cage/Key pRoteins’ (LOCKR) system uses designed protein Switches and Keys to control protein expression. The Switch cages a protein sequence, such as a degron, in the off or “locked” state (degronSwitch). Degrons, when activated, signal for protein destruction. Upon Key addition, the degronSwitch is turned on or “unlocked,” which exposes the degron, resulting in protein destruction. Using promoters, we can restrict Key expression, which gives LOCKR the potential for exquisite tissue-specific protein control. We are developing the LOCKR technology in the model organism *C. elegans*, a worm that is genetically similar to humans. We are optimizing the Key for tissue-specific expression in nematodes instead of the original test subject, yeast. In addition, we fused the Key to green-fluorescent protein (ceGFP) for visualization and a 3xmyc tag for protein quantification. Our current work includes a library of tissue-restricted Keys. In the future, we will generate transgenic nematodes using MosSCI, a powerful gene editing technique, and test Key and Switch interactions in the worm.

Presenter: William Fecht & Blaine Teeters
Sponsor: Timothy Cook (Chemistry)
Title: Catalysis of Oxygen Reduction via Cobalt Macrocycles

Cobalt macrocycle complexes utilizing the tunability of cyclam were synthesized and used to run electrochemical tests as a determinant of their catalytic activity on the reduction of O_2 . The complexes differed in terms of single vs. double bonds between carbon and nitrogen in the backbone, as well as the presence of electron-donating or electron-withdrawing groups. The electrochemical plots obtained seemed to suggest that the complexes with electron-donating effects were successful in lowering the energy required to reduce O_2 , and therefore were classified as catalytic. Therefore, such cobalt complexes, and potentially other abundant metals such as iron, can be used as an inexpensive means to improve the efficiency of hydrogen fuel cells. The reduction of O_2 has more conventionally been addressed through the use of platinum coated cathodes; however, utilizing complexes such as those synthesized in this project provides a new route to increasing the efficiency and lowering the cost of hydrogen fuel cells.

Presenter: Kazi Fardinul Hoque & Caleb Powell
Sponsor: Nate Tompkins (Physics)
Title: Brinicle Pattern Formation using Point Models in Python

A Brinicle is a downward-growing hollow tube of ice enclosing a plume of descending brine formed beneath developing sea ice. Brinicles play an important role in heat circulation throughout the world’s oceans. In our paper, we use data from previous studies on Brinicles to model a simulation of Brinicle formation. In modeling Brinicle formations, we used advection (shift downwards) and diffusion (spreading out). Additionally, the model also accounts for temperature change and salinity of water to simulate conditions similar to that of the ocean floor where Brinicles are observed. Finally, the results from the simulation showed a $t^{1/2}$ relationship between growth height and time which is the widely accepted correlation among the scientific community in the subject.

Presenter: Nhan Huynh
Sponsor: Walter Novak (Chemistry) & Erika Sorensen-Kamakian (Biology)
Title: cODC degron Optimization to Control Protein Levels in *C. elegans* using LOCKR

Protein degradation contributes significantly to the maintenance of cellular activity by removing proteins that no longer needed. A degron is a short amino acids sequence that targets a protein for degradation. Fusion of the cODC degron sequence to a target protein is sufficient to elicit degradation of that protein in a variety of organisms such as yeast, tobacco, nematodes, and vertebrates. Recently, the cODC degron LOCKR system was developed as a bioactive switch, which can be induced to stimulate degradation only in the presence of a short peptide Key. As the LOCKR system has not been used in a multicellular organism, this research project aims to determine the optimal sequence of the cODC-degronLOCKR for use in nematode lysate. To achieve this goal, we developed Green Fluorescent Protein (GFP) fusions to the degron-containing Latch, the complete degronLOCKR Switch, and mutants of each by using PCR with mutagenic primers and Gibson Assembly techniques. In addition, we created two optimal Key constructs (Key A and Key C) for fusion to a Glutathione S-transferase (GST) protein to facilitate purification of these Keys. These constructs will be expressed in bacteria, and the degradation rate in nematode lysate will be determined. Use of these constructs will increase our understanding of how changes in the degron sequence correspond to degradation rate in *C. elegans* lysate.

Presenters: Bradley Johnson & Jacob Penrose
Sponsor: Brad Carlson (Biology)
Title: Freezing Effects on Immune Assays in Eastern Box Turtles

Understanding the immune functions of wild species has become crucial in predicting disease emergence and therefore, vital for developing frameworks and programs around conservation. Very little immune research has been done within reptiles and they are currently at an increased risk of disease, thus a greater understanding of their immune function is necessary. Plasma is a good indicator of the immune ability of an organism because many immune components are present in the blood. However, there is currently a debate in the scientific community about the efficacy of frozen plasma samples in comparison to fresh plasma samples in immune assays. To explore this consideration, we conducted two commonly used immune assays, the bacteria killing assay and hemagglutination. Blood samples were either refrigerated for a few days or frozen for multiple weeks and then were compared for immune activity level.

Presenter: Thomas Joven, Drew Bluethmann & Reese Fokine
Sponsor: Robert Royalty (History and Religion)
Title: Roma!

Rome is one of the most famous cities in the world with history that has literally been built on top of itself; studying Rome is an age-old tradition because its innovations and decorations are of interest to all who learn about it. Students will present on the Roman sites they studied in depth: the Pantheon, Trajan's Column, and the Coliseum, respectively, and they will also give an overview of their learnings from the immersion trip.

Presenter: Joe Kaefer & Connor Wakefield
Sponsor: Erika Sorensen-Kamakian (Biology) & Walter Novak (Chemistry)
Title: Insertion of De Novo Protein Switches onto Dynein Heavy Chain

The de novo designed protein system, the 'Latching Orthogonal Cage-Key pRoteins' (LOCKR), is a protein switch that allows for conditional regulation of genes. The LOCKR system consists of two parts: 1) the Key and 2) the degronSwitch. The degronSwitch cages a degron, a destruction signal, in the off or "locked" position. The Key binds the degronSwitch "unlocking" it, which then exposes the degron and permits destruction of the Switch and any proteins fused to the degronSwitch. The LOCKR system has never been utilized in an animal model before; therefore, we are piloting this system in the nematode *C. elegans* because they share a 40% genetic similarity to humans. We focused on the degronSwitch. We will use CRISPR-Cas9 gene editing and homology directed repair (HDR) to fuse the degronSwitch to dynein, a motor protein used for molecular transport within a cell. For CRISPR gene editing, we first designed a guide RNA (sgRNA) to target the sequence at the end of dynein. Second, we designed two separate HDR repair templates 1) mScarlet::3xFlag::Switch and 2) mScarlet::3xFlag (our negative control). Our work establishes a new way to regulate protein expression in an animal that offers greater genetic control over current methods.

Presenter: Mitchell Keeling, Connor Wakefield, Adam Berg & Joseph Kaefer
Sponsor: Erika Sorensen-Kamakian (Biology) & Walter Novak (Chemistry)
Title: Designing LOCKR Protein Switch C in *C. elegans*

The ability to inactivate gene function, through protein destruction, is essential for understanding development and disease at the molecular level. Protein destruction methods offer several advantages in that they can target specific tissues in *C. elegans* through the use of tissue-specific promoters. The de novo designed 'Latching Orthogonal Cage–Key pRoteins' (LOCKR) system has the potential to be a robust and flexible synthetic biology tool for the control of multiple proteins simultaneously in the worm *C. elegans*. The LOCKR system has two parts 1) a degronSwitch and 2) a Key. The Switch cages a protein sequence, such as a degron, in the off or "locked" state. When the degron becomes exposed, upon Key addition, the degronSwitch and any protein fused to it undergoes destruction. We are investigating the nature of the LOCKR system, which allows the design of multiple Switches and Keys as pairs, in the worm. Here, we report the development of degronSwitchC and KeyC, which contrasts and allows us to build upon our other work with SwitchA and KeyA. This work will establish the LOCKR system as an in vivo method that can inactivate multiple proteins independently in a tissue specific manner in *C. elegans*.

Presenter: Jacob Lawson, Youran Wang & K'tren Wilson
Sponsor: Neil Schmitzer-Torbert (Psychology)
Title: Relationship of Nicotine use and Cessation to Impulsivity and Foraging

Many factors contribute to the success of nicotine cessation, such as individual differences or potential problems during the decision-making processes. Our study first aimed to assess the difference in impulsivity (through measuring discounting rates) between nicotine users and non-nicotine users by instructing participants to make a forced decision between two choices: smaller rewards now or larger rewards later. We found that cigarette users have significantly higher impulsivity than non-cigarette users, which align with the findings of many previous studies. Nicotine users have higher impulsivity and is less likely to quit. However, impulsivity only captures one dimension of the decision-making process. Our goal is to investigate whether nicotine use is associated with other differences in decision-making. In the Movie Row task, subjects spent 40 minutes foraging a virtual track consisting of four reward zones accompanied with a delay ranging initially from 1-30 seconds; subject's delay thresholds were able to be increased (but not decreased) by demonstration of willingness to wait for valued rewards. This information was taken from each trial to calculate delay thresholds for each of the participants which was used to predict subjects' likelihood of choosing to stay or skip for the varying reward types, though participants did not always follow this trend. Subjects that reported either recent or lifetime use of nicotine (cigarettes, e-cigarettes, etc.) displayed elevated delay discounting rates as well as higher ratings for the rewards earned. We suspect, then, that the use of nicotine may be interacting with multiple dimensions of decision making such as impulsivity and the valuation of preferred rewards throughout this task.

Presenter: Alexander Litts & Eric Green
Sponsor: Paul Schmitt (Chemistry)
Title: Using Second Harmonic Generation Microscopy to Screen Fungicide Adjuvants

Second Harmonic generation (SHG) microscopy was used to image a proprietary commercial fungicide suspension concentrate (SC) from Corteva Agriscience directly on a living wheat grass plant. The SC was separately formulated with each of the two different additives designed to improve SC performance (adjuvants). The total crystallinity of the fungicide was determined by calculating the total SHG active area on the leaf. A decrease in the total SHG active area directly correlates to the decrease in the crystallinity of the active ingredient on the leaf. Imaging showed a statistically significant difference in crystallinity between the two adjuvants at 16-, 24-, 48-, and 72-hours post-deposition, proving the effectiveness of SHG in measuring formulation dynamics directly on leaf surfaces. These results could inform industrial fungicide formulation, whereby rapid elimination of possible adjuvants from the development pipeline will save time and money in large-scale greenhouse tests.

Presenter: Mark Magnon, Parker Gamble & Devin Jimenez
Sponsor: Sara A. Mehlretter Drury (Rhetoric)
Title: How Should Vaccines be Distributed Globally?

As of December 16, 2021, a greater share of Americans has received booster doses against the COVID-19 virus than residents in African nations have received first doses. As the gap between wealthy nations and the rest of the world continues to widen, important ethical and moral concerns continue to be raised. We aim to understand and correct the rhetorical failings of the current discourse regarding equity in vaccine distribution. Currently, information and decisions largely originate within the World Health Organization, and often serve to reinforce a divide between experts and laypeople on these important decisions is an issue which we seek to resolve. The distribution of resources is ultimately a public decision, although current discourse often fails to reflect this. How can we enable better debate to occur on this important topic? To answer this, we produced a poster which speaks explicitly to the public, providing them with information and potential solutions to the issue, ultimately allowing the public to engage in a greater debate.

Presenter: Ethan Pine, Wade Haesemeyer, Andrew Page, Joseph Plencner & Jordan Reel
Sponsor: Robert Royalty (History and Religion)
Title: Ostia: Exploring the Import Hub of Ancient Rome

Rome is one of the most famous cities in the world with history that has literally been built on top of itself; studying Rome is an age-old tradition because its innovations and decorations are of interest to all who learn about it. Students will present on the Roman sites they studied in depth: the Pantheon, Trajan's Column, and the Coliseum, respectively, and they will also give an overview of their learnings from the immersion trip.

Presenter: Caleb Powell
Sponsor: James Brown (Physics)
Title: Applications of Single Board Computers

Single board Computers are complete, functioning computer in which the microprocessor, input/output functions, memory, and other features are all built on a single circuit board. These board, while functioning as complete computers, are typically very cheap. In this talk we will be exploring some of the applications that single board computers have to the scientific world. To demonstrate these applications, I will be showcasing an oscilloscope built by some small circuit components and a cheap Arduino Uno.

Presenter: Andrew Rippy
Sponsor: Mark McCartin-Lim (Mathematics & Computer Science)
Title: Malware Detection using Machine Learning

This research looks at how we can express program binaries as graph embeddings using machine learning in an effort to detect malware. We considered three graph embedding methods: graph2vec, GL2Vec, and LDP, in conjunction with three clustering methods, K-Means, DBSCAN, and Agglomerative Clustering. From the experiments conducted, we determined the method that had the overall best potential for detecting malware was graph2vec coupled with the K-means clustering method.

Presenter: Jackson Smith
Sponsor: Sujata Saha (Economics)
Title: What Factors Affected the Risk Premia in the United States from 2000-2020?

There is an existing research gap when discussing the impact certain variables such as commercial banks' balance sheets had on the risk spread between the three-month T-bill rate and commercial paper rates (both for the financial and non-financial sectors) in the United States. The research gap can be closed by focusing on the factors that impacted risk premia for both the financial and non-financial sectors during the 2008 financial crisis. By using quarterly data from 2000-2020 and a multivariate regression model, I found that United States' return on assets had the largest impact on determining the risk spread of both the sectors. While unemployment and bank stock index had the most significant impact for the financial sector and volatility and the fed funds rate for the nonfinancial sector.

Presenter: Isaac Temores & Alexander Naylor

Sponsor: Karen Gunther (Psychology)

Title: Effect of Spots versus Gratings on Non-Cardinal Color Perception: Experiment 2

Color vision begins in the cones: red, green, blue. The lateral geniculate nucleus (LGN) in the brain combines these into the cardinal color axes (red/green, bluish/yellowish, black/white). Non-cardinal colors are the combination of these cardinal colors, created in the visual cortex. Spot-shaped stimuli are processed better in the LGN, whereas gratings (striped) stimuli are processed better in the cortex. We thus tested whether the brain perceives non-cardinal mechanisms better with grating stimuli. Stoughton et al. (2012) tested this question between the red/green and bluish/yellowish axes in macaque monkeys, and Gegenfurtner & Kiper (1992) between the red/green and black/white axes in humans. We tested all color axis combinations, all in humans. The current experiment is an extension of Rodriguez, Dunigan, Powell & Gunther (Research Celebration 2019), testing a larger number of colors. Three participants performed noise masking with 8 or 12 different colors of stimuli, presented in four noise masks (two cardinal, two non-cardinal). Our data support the hypothesis that gratings better reveal non-cardinal mechanisms than spots do. The data are particularly strong between the bluish/yellowish and black/white axes, the colors where this has not yet been tested.

Presenter: Blake Thomas

Sponsor: Ethan Hollander (Political Science)

Title: Domestic Terrorism and Voter Participation in United States

This paper examines how domestic terrorism that targets specific subgroups alters the political behavior of that group in comparison to the broader population. From panel data on individual voting behavior, home addresses were geocoded to determine distances from the 2016 Pulse Nightclub shooting in Orlando. By exploiting the spatial and temporal variation in exposure to the shooting using a flexible difference-in-differences framework this research showed voter turnout decreased within the targeted community while proximity to the shooting led to increased voter turnout amongst individuals outside the target group. This paper's findings also contrast with the contemporary literature on the effects of transnational terrorism (which shows turnout increases among targeted groups) while complementing the growing literature which uses spatial statistics to understand the political consequences of violence.

Presenter: Felix Valero-Davila, Nhan Huynh & Grant Johnson

Sponsor: Walter Novak (Chemistry) & Erika Sorensen-Kamakian (Biology)

Title: Optimizing the cODC degron for Protein Control in Nematode Worm

Caenorhabditis elegans, a nematode worm, is a model organism for the study of development and disease in multicellular organisms. Currently it is difficult to control protein function in *C. elegans* due to the lack of existing tools for modulating gene expression. The goal of this study is to develop a system for complex control of protein function using a specific amino acid sequence for enzyme degradation, known as the cODC degron. We will evaluate the function of mutant cODC degrons in *C. elegans* lysate, to determine the optimal amino acid sequence to elicit degradation of a target protein. To develop this system, we fused the cODC degron in a designed protein switch to the C-terminus of green fluorescent protein (GFP). We hypothesize that when the switch is activated and the degron is exposed, the GFP will be degraded in *C. elegans* lysate. We further predict that various mutations will affect the rate of degradation. The *C. elegans* assays will be performed in the spring semester. This study will allow researchers to create more detailed and complex studies of development and disease progression in *C. elegans*.

Presenter: Adan Villeda Jr.
Sponsor: Laura Wysocki (Chemistry)
Title: Drug Targeting on G-Quadruplex DNA

DNA G-quadruplexes are non-canonical secondary structures often formed in the promoter region of many genes and act as a transcriptional “on-off switch.” c-MYC is one of the most commonly deregulated oncogenes implicated in human cancers, and its transcriptional activity is repressed through the formation of a DNA G-quadruplex in its proximal promoter. The c-MYC G-quadruplex is an attractive biological target for cancer therapeutics. It has been found that compounds that bind and stabilize the formation of the G-quadruplex can downregulate c-Myc protein expression. Indenoisoquinolines are topoisomerase I inhibitors that strongly bind to c-MYC G-quadruplex to and downregulate c-MYC activity. Binding affinity measures how strong a ligand (Indenoisoquinoline drugs) binds to a biomolecule (G-quadruplex). One method to test Indenoisoquinoline binding affinity is through fluorescence. Fluorescence is a highly sensitive observable by which binding affinity can be measured. Using a fluorescent-labeled MYC G-quadruplex, we measure changes in fluorophore emission upon drug titration to determine dissociation constant (Kd). Comparison of Kd amongst indenoisoquinoline analogs reveals a structure-activity relationship for drug binding.

Presenter: Abraham Wade, Noah Miller, Seth Kirkpatrick, Jacob Talbert & Benjamin Mijangos Sampsell
Sponsor: Chris Anderson & Sara A. Mehlretter Drury (Democracy and Public Discourse)
Title: Wabash History of Diversity, Equity, and Inclusion

During the fall of 2020, WDPD in collaboration with the MXI, La Alianza, and !shOUT dove into the Wabash College archives, reading through dozens of issues from The Bachelor dating back to the 1890’s and compiling other important historical documents to uncover some of Wabash’s history with Diversity, Equity, and Inclusion. Through our research, we discovered some of the most significant events and moments at Wabash College, highlighting the highs and lows of Wabash’s campus climate toward Diversity and Inclusion, and how the student experience has evolved at this college. In this presentation, we will provide an insight into our findings of the struggles that BIPOC and LGBTQ+ students have historically faced at Wabash, as well as present the data gathered from a deliberative conversation held with students, staff, and faculty on how this part of our history presents itself to us as a community, and how to move toward a more inclusive campus for all.

Presenter: Cihang Wang
Sponsor: Chad Westphal (Mathematics & Computer Science)
Title: Optimization of Intervention Strategies for Zika Virus

Zika virus is spread to human populations primarily by *Aedes aegypti* mosquitos, and Zika virus disease has been linked to a number of developmental abnormalities and miscarriage, generally coinciding with infection during early pregnancy. We consider a mathematical model for the transmission of Zika, conduct a sensitivity analysis on several key parameters, and develop an algorithm to minimize the number of affected pregnancies under a cost constraint. We find the convention strategies that control human-mosquito interaction and increase the mosquito death rate has the biggest impact overall. Though a working vaccine is not available yet, we find vaccination would also be an effective way to control the incidence of affected pregnancies.

Presenter: Jayden Williamson
Sponsor: Sujata Saha (Economics)
Title: The Effect of Household Leverage on Real Output

This paper analyzes the relationship between real GDP and the Household Debt to GDP ratio by accounting for few other macroeconomic variables. Using a multivariate regression model, this helps to study how increasing household leverage might have any impact on a nation’s real output as was the case during the Great Recession of 2008. Quarterly data from 2006 to 2019 has been considered for United States, Germany, Canada, and Australia. The results show that across the nations, an increase in household debt is associated with a decrease in real output with Germany experiencing the maximum negative impact. Additionally, it is found that government consumption expenditure had a positive impact on real GDP.

