Centre College
Presents the 16th annual

Symposium

April 20, 2023

The 2023 Symposium is sponsored by the

Dean's Office and all academic programs

April 20, 2023

Dear RICE participants:

Welcome to the 16th annual Centre College RICE Symposium! This event is the culmination of Undergraduate Research Week, which features a different research-focused event each day.

The RICE (Research, Internships, and Creative Endeavors) Symposium is a forum for showcasing the outstanding research achievements, creative endeavors, and independent projects completed by Centre students. An integral part of experiential learning is moving beyond the consumption of existing knowledge to becoming an active contributor of new knowledge. RICE represents a unique opportunity for students to share their contributions in a professional, scholarly setting that is made rich by the active participation of many members of our community. This event is part of a week-long celebration of research that includes opportunities for students to talk informally with faculty members about research opportunities, a convocation delivered by a panel of Centre Alum: Victoria DiMartile '15, Emilie Ducourneau, '18 and Shruti Ram, '17 who will share their experiences as researchers while at Centre and their current research projects.

This year, 75 presentations from across the academic disciplines by students are featured, including 47 oral presentations and 28 poster presentations. In addition, for the first time, the J.H. & Artie Atkins Scholars Program for Diversity, Inclusion, Equity and Social Justice Research will feature the work of six students at 4:30 PM. On Friday, April 21, students who participated in studio art classes this academic year will host an exhibit of their work in the AEGON Gallery in the Jones Visual Arts Center. We invite attendees to attend the various oral and poster presentations, the art exhibition, and see the diversity of what Centre students offer.

Panels typically take two forms. First, to emphasize the interdisciplinary nature and breath of the scholarly endeavor at Centre College, many presentations are grouped by topic rather than discipline. Second, when it is important to emphasize the depth of a particular issue or collaborative research, such as the study that occurred in an advanced seminar class, a panel may include presentations from only one discipline.

Each oral presentation is scheduled for 15 minutes, including 12 minutes for presenting and three for discussion. As a courtesy to presenters, please wait until the end of a presentation to leave a session. Thank you for your consideration and enjoy the Symposium!

Sincerely,

Karin Gill and Karoline Manny
2023 RICE Symposium Co-chairs

APRIL 20, 2023

Oral Presentations
Session 1, Young Hall
1:30 p.m. to 2:30 p.m.
Oral Presentations
Session 2, Young Hall
2:40 p.m. to 3:40 p.m.
Oral Presentations
Session 3, Young Hall
3:50 p.m. to 4:50 p.m.
Atkins Scholars, Young 113
4:30 p.m. to 5:30 p.m.
Poster Presentations
Lobby, Young Hall
5:30 p.m. to 6:30 p.m.

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3:30 p.m. to 6:30 p.m.

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Young 113 Moderator Andrea Abrams	4:30 p.m. to 5:30 p.m.	47	*Caroline Dahl, Uliana Bazavluk, Anahit Grigoryan, AJ Howell, Vati Pham & Lorena Bonet Velazquez* The Atkins Scholars Program supports research or art focused on diversity, inclusion, equity and social justice. An Atkins Scholar contributes to a more just world through intellectual inquiry and practice. The six scholars will present their research on access to eating disorder treatment, Centre College's commitment to student health and wellness, military conflict and women's health, Buddhism's relationship with queerness, decolonial feminisms in the Spanish-speaking world, and photographic analysis of BIPOC (Black, Indigenous, and people of color) Identity.

5:30 p.m. to 6:30 p.m.
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48. **Dendrimer and Organic Semiconductor Synthesis**
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49. **You: Mental Illness or just a Thrilling TV show?**
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50. **Synthesis of Advanced Lignin Model Polymers**
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51. **Computational Analysis of Possible SARS-CoV-2 Therapeutics**
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52. **Throwing Queerness into the Ring**
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53. **Laid back like a sloth: Do they have measurable levels of the stress hormone--cortisol?**
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54. **Functional Semiconducting Molecule Derivatives**
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55. **Exploiting the Warburg effect using transition metal complexes**
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56. **Does hair cortisol correspond to fecal cortisol in an injured grizzly bear?**
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57. **Inheritance of Scleral Width in Mexican Tetra**
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58. **Language, Gender, and Sport: How do they relate?**
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5:30 p.m. to 6:30 p.m.
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61. **Ruthenium(II) polypyridyl complexes with attached NSAIDs (Non steroidal anti inflammatory drugs) as potential dual mechanism of action therapeutics**
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62. **The Impact of Support Systems on Gender Diverse Individuals**
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63. **Social Norms in Ghanaian University Students**
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64. **Afro-Latine Identity**
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65. **The Effects of Mating on Female Drosophila Bitter Taste Detection**
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66. **Preliminary Research: Inter-Racial/-Ethnic Community Interaction to Improve Relations across Diverse Groups**
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67. **Athletes' Political Voices Within the Media**
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68. **Synthesis and Studies of Organic Semiconductors**
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69. **Tasmanite Preservation after Black Shale Digestion**
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70. **The Effects of Estrogen and Cocaine on the Locomotor Activity of Male Japanese Quail**
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71. **SAA Football EP and EPA Analysis**
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5:30 p.m. to 6:30 p.m.
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72. **Inequality in Sports: Discrimination of LGBTQIA+ Athletes**
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73. **The Scales of Middle Devonian Fishes from the Appalachian Basin of Eastern Kentucky**
Sherice Sutherland

74. **Disparity in Media Coverage in Men's and Women's Sports**
Anna Thomas


R C E
Research - Internships - Creative Endeavors
Art Exhibition
April 21 to May 5
Opening
Friday, April 21, 2023
3:30 p.m. to 6:30 p.m.
AEGON Gallery, Jones Visual Arts Center
Members of the Art Program welcome you to an exhibition of work by students who have taken studio art classes this academic year.

1. **Models for Successful Aging in a Central Kentucky Assisted Living Facility**
   Madi Barron, Conley Combs, Embry Curtis, Joseph Falcon, Eleanor Grubbs, Karen Hernandez Fraire, Joey Johnson, Monika Jusufovic, David Kinsbrunner, Sarah Koch, Chas Nystrom, Elsa Nystrom, Nediva Quaye, Asher Rafkin, Leslie Stewart, Jennifer Vong & Cindy Zamarripa
   Mentor: Dr. Jamie Shenton, Anthropology
   This session will present the ongoing research of students in ANT 301: Qualitative Field Methods. Students partner with an assisted living facility in Danville, KY. Their research aims to understand various dimensions of successful aging within the context of this assisted living facility. What are the models for aging our society has developed, and in what ways do they represent or fail to represent the lived experiences of the elderly in this assisted living facility? Students will explore these questions in a variety of ways: gendered experiences of aging; social versus medical models for aging; dependence, independence, and interdependence; home; care and love; loneliness; activities; among others.

2. **How the French Fueled Feminism**
   Cameryn Lovett
   Mentor: Dr. Allison Connolly, French
   French feminist activists, such as Simone de Beauvoir, Gisèle Halimi, and Simone Veil led the way for women and women's rights starting in the mid 1900s and continuing into the 21st century. These women advocated for social and political change by writing books and participating in law or the government with positions in the French National Assembly or even as President of the European Parliament. Their actions changed the world with their feminist ideologies and affected more than just France. They did amazing things for women, including legalizing abortion and sharing their thoughts with the world via books about feminist theory. These women worked to make institutional changes in France by using their power and taking a legal approach rather than using things like vandalism that are key to modern day France's protests.

3. **Comparative Pedagogies: France, US, Quebec**
   Eleanor Savors
   Mentor: Dr. Allison Connolly, French
   Building on my prior research "Comparative Pedagogies: France and US," "Comparative Pedagogies: France, US, Québec" adds the perspective of Québécois foreign language education. Employing a variety of sources, including articles on the topic of foreign language education in Québec and also instruction manuals from Québec for language teachers, this extension will add the perspective of Québec. The project will begin with a discussion of the educational systems of each of the three countries, particularly with regards to foreign languages (at what age does foreign language instruction begin, how many languages and hours are necessary to graduate, etc.). Next the project will continue with a discussion of the pedagogy of teaching

foreign language, particularly the activities that are used in the classroom in order to engage students with the language that they are learning.

4. **Politesse: The Rules of Etiquette, Self-Conduct, and Cohabitation in France**
   Elena Wiltgen
   Mentor: Dr. Allison Connolly, French
   One is not born without a sense of etiquette. It is a tool, a skill, and sometimes it is even a class. Manners is something used by the whole world, but exactly how it is presented, that depends on several particular factors. In France, polite social conduct demands certain rituals during interactions. Correspondence, purchases, dining all have their own rules. The little nuances of dress, utensil choice, everything is important when one wants to correctly conduct oneself in a new situation. Etiquette is a framework of how to live, and good manners are a way to properly conduct oneself. The rules of cohabitation, particularly in special citations or among the upper classes, “politesse” contains more than your choice of utensil: it is a method to demonstrate your social comprehension. Beginning with the history of dining etiquette and tracing the roots of etiquette, I will uncover the specifics of French rituals and how “politesse” functions nowadays. This presentation is in French.

5. **Effect of pinene odor on the stress response of Long-Evans rats**
   Matthew Kowalski
   Mentor: Dr. Aaron Godlaski, Behavioral Neuroscience
   Chronic stress is correlated with numerous negative health outcomes. Recent studies suggest that exposure to natural environments can reduce stress. One proposed pathway for this effect is via inhalation of volatile organic compounds (VOCs) released by plants. In this study rodents will be exposed to VOCs in the presence of a mildly stressful stimulus. Stress response will be measured via respirometry. It is hypothesized that the experimental group will demonstrate a more rapid return to baseline as measured by CO2 output and O2 consumption. Results could guide future research, which may focus on humans and their response to natural odors.

6. **Examining the Role of Estrogen and Cocaine in Locomotor Activity in Japanese Quail**
   Claire Melvin, Emma Ridener & Molly Samonds
   Mentor: Dr. Karin Gill, Behavioral Neuroscience
   Prior research has suggested that a sex difference is present in patterns of drug use and abuse. Based upon prior research in rodents, estrogen has been implicated as the hormone responsible for increased cocaine-induced responses. This suggests that female and male quail administered exogenous estrogen may experience similar behavior alterations. Recent studies have also shown that disruption of the light-dark cycles of hormone release in Japanese quail alter cocaine-induced behavioral sensitization in both sexes. For the most recent study, sixteen male Japanese quail and sixteen female Japanese quail were subjected to cocaine and saline conditions with

eight of the male Japanese quail receiving an exogenous estradiol injection. The data from the present study were consistent with previous studies, as these results suggest that male Japanese quail that received estradiol injections exhibited increased cocaine-induced locomotor activity.

7. **Endogenous Opiates and Incubation in Ringneck Doves**
   Mason Boone, Erin Bozdech & Abby Jamison
   Mentor: Dr. Melissa Burns-Cusato, Behavioral Neuroscience
   Previous research has found a connection between the endogenous opiate system and parental incubation and behavior in the ringneck dove species. The current study investigated the effects of an opiate agonist (morphine) on the incubation behavior of both male and female ringneck doves. Different doses of morphine and saline were used in a 2x3 mixed factorial design. Following injections, latency to return to the nest was recorded on a ratio scale. Morphine disrupted incubation behavior in both sexes but effects were greatest in females. Additionally, there was a dose effect in females but not in males. The results suggest females' opiate system may be more sensitive to the rewarding effects of incubation behavior. Future research includes running more subjects and investigating the effects of an opiate antagonist (naloxone).

8. **On the Knife's Edge: Race, Womanhood, and Radicalism in the Lives of Mother Jones and Lucy Parsons**
   Natalie Warren
   Mentor: Dr. Sara Egge, History
   This research analyzes the lives and work of Lucy Parsons and Mother (Mary Harris) Jones, both of whom were radical labor activists circa 1870-1930. Parsons was born an enslaved woman in Virginia, but in her adult life, she married a white Anarchist, worked mostly with other white Anarchists, and publicly identified herself as Indigenous-Mexican. Jones was an Irish American Socialist who organized coal miners, notably also organizing the wives and children. This project examines how these activists attempted to either transcend or embrace their gender and racial identities in relation to their radical beliefs. My argument is first, that Lucy Parsons attempted to transcend her race to access the protected status of womanhood that was not afforded to her by her Blackness; and second, that both women utilized perceptions of womanhood to their advantage in their activism, translating the idea of motherly authority and responsibility into their revolutionary agenda.

9. **Queer Identity in the Weimar Republic**
   Lauren Longmeyer
   Mentor: Dr. Sara Egge, History
   This essay studies the f ways in which queer people during the Weimar Republic tried to define their identities and argue for the removal of laws criminalizing homosexuality, in 1920s Germany. I studied this in order to understand how the

earliest Gay Rights movement operated, why specific arguments were made, and why it ultimately failed. In order to research this, I looked into magazines, the work of Magnus Hirschfeld, the head of the Institut für Sexualwissenschaft, the papers of Johanna Elberkirchen, a lesbian feminist, and a memoir by Ernst Röhm who was both a Nazi and a gay man. Queer people in the Weimar Republic used the science of sexology and eugenics, the new democratic state of Germany, and burgeoning political movements like feminism and fascism to both build their identities and legitimize themselves in the eyes of the broader public. The movement ultimately failed to unify behind a single identity, or adapt to the changing political climate, but left a lasting legacy

10. **The History of Lesbianism in the United States Interwar Period**
    Natalie Lester
    Mentor: Dr. Sara Egge, History
    For my history seminar last fall, I researched the growth of lesbianism and lesbian visibility during the United States interwar period. Common history classes teach the technological, economic, and popular social changes that occurred in the years between the World Wars, but they always neglect the queer side of history. Between 1920 and 1938, the lesbian community grew exponentially in urban areas despite the illegality of homosexuality. During my studies, I kept hitting walls with a drastic lack of evidence or research dedicated to the growth of lesbianism in the United States. So, I decided to create a concise history of the most formidable time in the American lesbian community. At a time where queer rights are at risk, my presentation will highlight how queer people have always been vital to our country. Queer history is American history.

11. **Torture**
    Gretchen Casper & Theresa Devarieux
    Mentor: Dr. Mykol Hamilton, Psychology
    Is torture effective enough to be worth the horrendous psychological effects it inflicts on its victims? And even if it is effective, is it morally ethical? Research often supports the notion that torture does more harm than good and should be outlawed. After all, torture can have debilitating psychological effects on both the victims and the torturers. On the other hand, some people see torture as justifiable, if it prevents greater harm to society. This further begs the question of whether or not torture is worth it and which we hope you can decide based on our presentation.

12. **The Death Penalty: Attitudes & Effectiveness**
    Nathaniel Steiner & Joseline Viera Canas
    Mentor: Mykol Hamilton, Psychology
    The death penalty sentence has a long history in the United States' judicial system. Since early civilization, dying as punishment was implemented through various means

of execution. Today, Americans are generally divided in half on their acceptance of the death penalty. It is legal in 27 states, and citizens in favor are typically less educated. Infamous criminals have had overwhelming and public support for their executions, but previous research shows it is not effective in deterring crime. Centre College students residing in various states were interviewed on certain opinionated statements on the death penalty, its effectiveness, and its morality. The results did not provide a significant conclusion, but specific answers give insight to contrasting opinions. The means have also evolved over the last few decades, but all of them can and often do cause suffering, a violation of the Eighth Amendment. Wrongful convictions resulting in death were explored through case studies.

13. **Solitary Confinement**
    Everett Hauser & Austen Reid
    Mentor: Dr. Mykol Hamilton, Psychology
    Solitary Confinement is a common form of punishment defined as the isolated containment of an inmate for 22-23 hours per day with limited human contact. The United Nations has issued a set of guidelines stressing that solitary confinement should be a last resort, only used for the shortest possible duration, and the importance of the inmate's health. Using research both historical and recent, we will analyze interviews from confined inmates describing their experiences and the prognosis of their psychology and physiological symptoms. As well as address the numerous psychological and physiological symptoms that are elicited. Our research has led us to further question the effectiveness and legality of solitary confinement. All of this questions both the legality and use of solitary confinement based on the guidelines set by the United Nations.

14. **Love, Fantasy and Horror in the Spanish-Speaking World**
    Audrey Becker, Alexandra Boardman, Saira Carreto Romero, Faraz Ghamgosar, Gabby Hibbs, Katie Hollingsworth, Abby Ligons, Madeleine Longmeyer, Ben Scott & Mamie Sevier
    Mentor: Dr. Iulia Sprinceana, Spanish
    Have you heard of a woman lurking and hollering at night, looking for children wandering alone? She is the notorious La Llorona, cursed for eternity for having drowned her own children in a moment of jealousy and insanity. Such legends, or myths about cursed homes as well as large-scale, brutal historical events have sparked the creation of horror films. The horror, trauma and pain experienced in reality are sometimes archived in stories and anecdotes under the cover of love and fantasy. We propose a roundtable discussion with the students in SPA 500 "Love, Fantasy and Horror." They will present their research in the course, exploring themes of love, fantasy, and horror in cultural artifacts (fiction, feature films, TV shows) from the Spanish-speaking world. These presentations will provide an understanding of how

topics such as the body and its transformations, motherhood, and children, are critical in the configuration of gender ideology and sexuality, and national identity.

15. **The Social Media World of Spanglish: Building Community**
    Saira Carreto Romero
    Mentor: Dr. Philip Limerick, Spanish
    The current project is focused on the use of Spanglish (the mixing of Spanish and English when speaking) by Mexican/Mexican American individuals on social media as a way to foster solidarity and build community. This independent study analyzes how social media posts in Spanglish have become a prevalent mode of expression, represent cultural significance, and are a direct result of immigration. The data was collected from TikTok and YouTube videos, two understudied platforms in sociolinguistic scholarship in comparison to other sites (e.g. Twitter, Facebook). For the presentation, various social media clips will be shown along with a qualitative analysis of the data.

16. **Desafiando la normativa: El cuerpo y el poder en el trabajo de Krudxs Cubensi**
    Lorena Bonet Velazquez
    Mentor: Dr. Satty Flaherty-Echeverría, Spanish & Latin American Studies
    En esta presentación, examinamos el trabajo de Krudxs Cubensi, un duo de hip-hop de Cuba viviendo en los Estados Unidos que utiliza su arte para desafiar los feminismos hegemónicos y heteronormativos. A través de un análisis de sus canciones y videos del 2014: “Poderosxs”, “Mi cuerpo es mío”, “Mi Barba” demostramos el peligro de subscribirnos a la normativa. No es coincidencia que su resistencia ya es decolonial en práctica, y sus formas innovadoras de centrar a las personas en los márgenes nos empuja a evaluar nuestra posición social y traicionar nuestros privilegios.

17. **Yanga: una narrativa trans-localizada de la mexicanidad y la diaspora**
    Yanga: A Trans-localized Narrative of Mexicanidad and Diaspora
    Emmy Greene
    Mentor: Dr. Satty Flaherty-Echeverría, Spanish
    Emmy nos trae a través de una examinación de la figura de Yanga en el mundo contemporáneo. Yanga, el “primer liberador de América,” era una persona esclavizada que vivió en Veracruz, México durante el siglo dieciséis. Estableció una comunidad de otros fugitivos en las montañas de Veracruz. Permanecieron allá por 30 años, y finalmente después de una triunfo sobre el ejército del gobierno colonial. El gobierno firmó un tratado que reconocía oficialmente esta comunidad de Yanga como una comunidad libre. Emmy examina como la imagen de Yanga como una figura geo-histórica es interpretada en diferentes contextos locales, incluyendo en la literatura, la música, y el carnaval en Yanga, México. Emmy explicará como estos niveles muestran que aunque Yanga es una figura histórica, también funciona como un mito cultural para crear un entendimiento inclusivo y trans-localizado de la diáspora

afrodescendiente en contraste con la narrativa nacional de la mexicanidad.

18. **Understanding The Importance of Carnaval Tlaxcalteca in New Haven, CT, USA**
    Saira Carreto Romero
    Mentor: Dr. Jamie Shenton, Anthropology
    My research focuses on the celebration of Tlaxcala's Carnaval in the state of Connecticut. My goal was to understand why people from Tlaxcala who had immigrated to Connecticut felt the need to celebrate Carnaval if they were no longer in their home country. More specifically, I wanted to know what was so significant about Carnaval that it needed to be celebrated and preserved. I conducted interviews with people who participated in Connecticut's Carnaval but were born in Tlaxcala to better understand why it was so important to them. I concluded that Carnaval is a way to connect to Tlaxcala despite not being able to be there physically, resist assimilation, and teach younger generations (who were born in the United States) about Carnaval and their cultural roots to Tlaxcala, Mexico.

19. **Poetry as a Way of Escape: Russian Immigrant's Experience of the 1920's in France as illustrated by the Life of Georgy Ivanov**
    Uliana Bazavluk
    Mentor: Dr. Allison Connolly, French
    This presentation (in French) will shed light on the lives of White Russian immigrants in France during the 1920's, as many fled the former Russian empire in the wake of the Russian Revolution (1917) and Russian Civil War (1917 - 1923), and who were in opposition to the revolutionary Bolshevik communist Russian political climate. Georgy Ivanov, a prominent Russian poet, was one of the first of these emigres. His life in Paris reveals the experience of Russian emigres in France during the time, and his poetry offers complex sentiments of longing and loss. In the course of the presentation, we will learn more about Ivanov's life in Paris, and take in his poetry - translated to French by the presenter.

20. **The reciprocal influence of gastronomy between France, Morocco, and Vietnam**
    Madeleine Ohm
    Mentor: Dr. Allison Connolly, French
    France's identity as a colonial power resulted in strong influence on the languages, laws, and architecture of its colonies. Two examples of this are Vietnam and Morocco. The decision to invade Vietnam was the result of both missionary propaganda and a larger French influence of Asian territories. In 1912, France imposed a protectorate over Morocco and spent the next two decades controlling the legislation, military defense, and overall jurisdiction of the nation. When these nations gained independence from France, the formal influence of France was gone, but what remained was a prominent cultural influence. Today, we can look at the ways in which France has influenced the cuisine of Vietnam and Morocco, and vice versa. Because

gastronomy is a cornerstone feature of French identity, this study aims to compare and contrast the reciprocal impact of cuisine in Vietnamese, Moroccan, and French cultures.

21. **The Untold Stories of the Vietnamese People Living in the Francophone World**
Una Mijatovic
Mentor: Dr. Allison Connolly, French
There are approximately 660,000 French speakers in Asia and the Middle East. Likewise, there are around 400,000 people who form the Vietnamese diaspora in France. This relationship exists between these two parts of the world due to lingering French colonial influence. As a daughter of immigrants, the subject of the Vietnamese-francophone identity appeals to me because of the way we can use it as a lens to approach universal messages, such as the struggles of immigration, cross-cultural identity, and assimilation into a new country. While there is much history to uncover about the connection between France and Vietnam, the Vietnam-francophone population remains the least-talked about group in the francophone world. I will explore the Vietnamese-francophone identity through the eyes of various Vietnamese authors. My research aims to contextualize France's colonial presence in Vietnam, the impact that the French culture maintains in the region today, and to highlight underrepresented Vietnamese voices.

22. **Arcane Architect: The Art of AI Navigation in Video Games**
Preston Dickerson & Hung Lee
Mentor: Dr. Michael Bradshaw, Computer Science
Arcane Architect is a game that allows you to create your own school of magic. While the player sets policies, the AI moves the characters in the world. Before the AI can move characters, the game engine must build a navigation mesh to show the AI where characters can travel. Unreal Engine provides a default navigation mesh, but it is very inefficient during startup. We created the navigation mesh manually to perform the same actions and improved the startup time by 28307%. This presentation will discuss the process of implementation and effectiveness of our designs.

23. **A Game Engine from Scratch: Research and Challenges**
Noah Scott
Mentor: Dr. Michael Bradshaw, Computer
Science Most game developers use prebuilt game engines, like Unreal and Unity. Game engines are a foundation on which developers can quickly and easily build their envisioned games. I decided to build a game engine myself. This presentation will cover the challenges in research, organization, planning, optimization, and design when building such a large project starting at such a low level; focusing on the challenges of implementing a "physics engine," a core part of the game engine.

24. **Making a Minimap: The Problem of Perspective**
    Jonah Stephens
    Mentor: Dr. Michael Bradshaw, Computer Science
    How do video games make a minimap? Do they just plop a camera in the sky, show the feed, and call it a day? Place a camera an infinite distance away? Show an abstraction of the world? This presentation explores the linear and not-so-linear algebra behind perspective projections, explaining the math behind the distortion we see in pictures. This, among other things, is all in an attempt to make a minimap that is correct, looks nice, and has one glaring function: transporting the player from where they are to where in the world they clicked on the minimap.

25. **Women Soldiers in the Bloody Harlan Labor War**
    Nellie Ellis
    Mentor: Dr. Sara Egge, History
    This presentation investigates the roles of women fighters in the 1930s labor war "Bloody Harlan" in Harlan County, Kentucky. Many Harlan Countians claimed that women played a passive role in the war. However, research shows that women had a strong presence on the battlefield. Incorporating evidence from newspapers, oral histories, reports, and scholarly secondary sources, this presentation shows that women were organizers, strategists, and soldiers in "Bloody Harlan." Still, men and women alike have downplayed the role of women due to existing gendered divisions in Harlan County and a dislike of the communist-affiliated National Miners Union that played a significant role in the initial organization of women in the labor war.

26. **Liquor as a Lost Cause? Anti-Prohibition Arguments in Kentucky**
    Samuel Smith
    Mentor: Dr. Sara Egge, History
    The Eighteenth Amendment to the U.S. Constitution, banning the manufacture and sale of alcohol, came from a century long push by dry activists, and frequently involved racist, anti-immigrant, and anti-Catholic appeals to white American protestants. The Eighteenth Amendment, known informally as the Volstead Act, faced immediate criticism across the United States. Unlike broader national arguments against prohibition that focused on individual rights or the unenforceable nature of the Volstead Act, the tactics adopted by anti-prohibition advocates in Kentucky took on racist, anti-immigrant, and patriarchal overtones incredibly rapidly. White male Kentuckians across the state used anti-prohibition rhetoric to argue that they dominated Kentucky society, using the image of the Kentucky colonel, to reaffirm their political and social control over the Commonwealth against the changes of the Volstead Act and the progressive movement more broadly.

27. **History of Education Policy and Deaf Children's Voices**
Ben Justice
Mentor: Dr. Ellen Prusinski, Education
Modern education policy that impacts deaf education has largely been without the inclusion of Deaf thought and philosophy, so then it is even more crucial to reframe modern policies using Deaf voices. The perception of Deaf people in Kentucky from the early 1800s to 2000s shifted although remained persistently negative. These perceptions of deafness influenced policy, which impacted Deaf experiences. Deaf voices have been historically silenced and continue to be disregarded today in the space of deaf education. So, many of these experiences have continued to this day. This presentation explains the history of these education policies that impact deaf education and reframes modern-day policy using memoirs in the Kentucky Standard and memoirs of deaf students in the modern day. By doing this, this presentation raises concerns about our current education laws and explores how, by listening to deaf voices, we can improve our education system to be more effective for deaf students.

28. **Language Use to Suppress Japanese Americans in WWII**
Antonio Ogaldez
Mentor: Dr. Jonathon Earle, History
Language is a powerful tool that has been used to suppress groups in the past and in the present. The internment camps of the Japanese Americans during WWII are no different. Using newspapers that feature English and Japanese translations, as well as accounts of those in the camps, the use of language was utilized as a method to enforce American ideals and suppress others under the guise of nationalism and the shock of the Pearl Harbor attack. I would like to examine these newspapers, such as the Topaz Times, in their Japanese and English counterparts, since there was much editing by the US government for the English version, would the Japanese version be heavily altered as well and in what ways would it be and also observe other ways the Japanese language was suppressed.

29. **Get Your Plant On: Effect of Engagement on Mental Wellbeing**
Conley Combs & Niki Maleki
Mentor: Dr. Aaron Godlaski, Behavioral Neuroscience
The literature on Horticulture Therapy (HT) indicates that interacting with plants has a positive impact on mental health outcomes. Increased engagement with plants improves the effectiveness of HT indicating a dose-response relationship. Further study of how engagement with plants stands to improve mental health outcomes is warranted. In this study we will manipulate engagement, one group will arrange their own miniature plant biome and another that will be given a plant. Both will care for their plants accordingly for three weeks, at which time we will assess any beneficial effects on their mood and connection to nature compared to baseline levels. We

hypothesize both groups will improve from their baseline mood assessment, but that the individuals in the group who engage more with the plants initially, by creating an arrangement themselves, will score better on the mood scale corresponding to positive effects on mood and mental wellbeing.

30. **Playing with Plants: The Effects of Indoor Live Plant Presence on Physiological and Psychological Markers of Stress and Mood**
John Beebe & Cynthia Nieto
Mentor: Dr. Aaron Godlaski, Behavioral Neuroscience
A growing body of research demonstrates benefits of viewing natural landscapes, including reduced physiological stress and improved mood. Our study aims to analyze differences between physiological and subjective mood responses between repotting a plant and a computer based math task when compared to baseline measurements. Participant's physiological responses were captured by electrocardiograph and impedance cardiography, and subjective mood was determined by using the Brief Mood Introspection Scale. Their physiological responses to either the computer based task or plant repotting task were compared to their baseline physiological responses to assess the effects on cardiac physiology. The mood scale assessed self-reported relaxation and mood directly after completing either task. We hypothesize that when participants are actively engaging with plants, we will see positive effects on stress physiology, mood and relaxation compared to participants engaging in computer based tasks.

31. **Measuring the Testing Effect through ERPs**
Lauren Dodson, Grace Dutcher, Simon Forsting & Sarah Kirtland
Mentor: Dr. KatieAnn Skogsberg, Cognitive Neuroscience
Each academic year, students take many tests and use a variety of studying methods in an attempt to retain information related to their classes. Research suggests that students who engage in recall practices such as quizzes and practice questions, typically retain information better and longer than those who do not, a phenomenon known as the testing effect (Roediger & Karpicke, 2006; Batsell et al. 2017; Shobe 2021). While there is extensive research that demonstrates the efficacy of the testing effect, there are no studies that have used event-related potentials, or ERPs, to investigate this effect. This study will analyze the P3 waveform, a specific part of the ERP brain wave associated with rare and meaningful events, such as when an individual recognizes a correct answer. We expect that participants that quiz themselves over the material will produce larger P3 waves than those who simply re-read the material.

32. ***Chasing the Sun Across the Gold Coast*: Poetry and Prose**
Anna Impellitteri
Mentor: Dr. Sarah Murray, Education

Chasing the Sun Across the Gold Coast is a series of fictionalized poems and prose of my making sense and finding my way during my semester abroad in Accra, Ghana. As a whole, the work navigates the various moving pieces of my identity and how it relates to my new environment, as well as encapsulating some of the moments, stories, and people I've met along the way. It connects my lived experiences in my daily life and on excursions and my other coursework in the transatlantic slave trade and globalization to what I have learned in the classroom about intercultural communication. The coursework is referenced mostly implicitly, but my experiences are governed by both nonverbal and verbal communication, all of which is intercultural.

33. **Writing a One-Woman Show**
Michelle Chan
Mentor: Dr. Amy Frederick, Art History
"One Filipino Woman" is a one-woman show currently being written by Michelle Devera Chan in her independent study with Dr. Amy Frederick. This play is about her own life experiences both on and offstage that lead her to become who she is today. This presentation will highlight her process of being a first-time playwright and how she has used the creative writing process as a form of catharsis in her healing journey. She will also be reading several scenes from "One Filipino Woman" and be open to feedback as she prepares to perform her play for her theatre seminar at the end of the semester.

34. **The Evolution of Japanese Poetry as a Result of Japanese Internment Camps**
Emma Peterson
Mentor: Dr. Jonathon Earle, History
This project explores the history of Japanese Internment Poetry during the period surrounding the Second World War. Senryu is a form of Japanese poetry that does not rhyme and consists of three lines of five, seven, and five syllables. Senryu groups were formed in the early 1800s to preserve Japanese culture and to tell mundane tales of everyday life such as children and homesickness. However, Senryu groups also told the stories of persevering through discrimination and in turn, created a community in a completely new environment. Then Executive Order 9066 was released, an order demanding 120 thousand people of Japanese ancestry were to be forced to relocate. The poetry then became more than just a way to journal; they became a historical memoir of life within the camps and a unifying tool to save a community and a culture.

35. **Energy Dissipation in Reflecting Internal Waves**
Christian Fronk, Luke Payne, Michael Allshouse-Northeastern University & Yichen Guo-University of Texas at Austin
Mentor: Dr. Bruce Rodenborn, Physics

Determining the energy flux of an internal wave from the experimentally measured velocity field was made possible by the work of Lee et al. (Lee et al., Phys. Fluids, 26, 2014). This method is used in our work to measure the amount of energy dissipated when internal waves reflect from sloping boundaries by computing the ratio of the outgoing energy flux to the incoming energy flux through a surface near the reflection region. We compare our experimental results to numerical simulations where the energy flux is known from the pressure and velocity fields. There is good agreement between our experimental and numerical simulation data, and we find that there are high rates of energy dissipation during reflection process. We also find that there is a wave reflected back from the boundary towards the generation site when either the boundary is rough or the angle of the boundary is close to the angle of the internal wave beam.

36. **Exploring new materials for environmentally friendly magnetic refrigeration**
Bryan Birch, Mahmud Khan, Kyra Stillwell, Brandon Reese & Arjun Pathak
Mentor: Dr. Emily Crabb
50% of home and 57% of commercial energy usage comes from refrigeration technology1. A conventional compression system has a Carnot efficiency of ~40%, the system retains less than half of its initial energy due to thermal processes. Owing to the advent of a more energy conscious society, a significant growth in studies2,3 examining the Magnetocaloric Effect (MCE) in magnetic refrigeration systems has been experienced. The MCE makes possible near room temperature magnetic refrigeration: an environmentally friendly, highly efficient, vibration-free, and low-cost alternative to vapor compression refrigeration technologies.4 This study examines the magnetic and magnetocaloric properties of Al0.85+xSi0.15Fe2B2 (x = 0.2, 0.4) prepared via drop-casting followed by annealing and acid treatment. The second-order ferromagnetic phase transitions were observed near room temperature (~298–305 K), and peak magnetic entropy changes (–ΔSM) of more than –6 J kg-1 K-1 were observed for a field change of 5 T.

37. **Calibrating Numerical Simulations with Macroscopic Bacterial Models**
Brianna Tilley & Kate Brown
Mentor: Dr. Bruce Rodenborn, Physics
The swimming of microorganisms is typically studied using biological experiments and/or numerical simulations. However, numerical simulations of microorganisms are often not compared to precise measurements because of the difficulty of making microscopic measurements of forces and torques in biological experiments, which are typically □ 10 μm. Instead, our research group uses models of bacteria that are about 35 cm in size and matches the Reynolds number of swimming microorganisms by using highly viscous silicone oil that is 100,000 times more viscous than water. We can then measure the forces and torques more easily and scale the results from our dynamically similar experiments to biologically relevant sizes. We have used our

experiments to calibrate the method images for regularized Stokeslets and have found excellent agreement between our data for helices, cylinders, and spheres. Our results also have confirmed the theory of Jeffrey and Onishi (1981) for the torque on a cylinder near a plane wall, as reported in Shindell et al., *Fluids* (2021).

38. **Gang activity in Haiti**
    Kirsci Vincent
    Mentor: Dr. Allison Connolly, French
    Gang activity in Haiti is a rising concern as gangs have multiplied in number over the past five years. (*Gangs of Haiti: Expansion, power and an escalating crisis* 2022) This is due to the years of political dysfunction, deteriorating economic conditions, natural disasters, and most recently the COVID-19 pandemic, which has all contributed to creating a weakened state of power. There are approximately 200 gangs across the country and 95 of the gangs reside in the capital Port au Prince. Many of said gangs being in cohorts with corrupt politicians which has led many of them to profit directly from the private sector and deem themselves mercenary partners of the state. This presentation will highlight the history of gangs and their relationships that date to 1958 under the reign of Francois Duvalier AKA Papa Doc, Haiti's last dictator. Key points in my expo will be; the Tonton Macoute (Papa Doc's Gang), the assassination of Jouvenel Moise (The last elected president of Haiti), and the current state of the country (The gang territories in Port au Prince). This presentation will be French and the goal is to bring awareness to the current state of Haiti.

39. **Processing Violence: an analysis of Rwanda 94 and its role in helping victims to comprehend the thought process of the Hutu nationalists in the Rwandan Genocide**
    Caili Harris
    Mentor: Dr. Allison Connolly, French
    Over 100 days in April of 1994, more than 800,000 people were brutally murdered in the Rwandan genocide. Betrayed by their own neighbors, the Tutsi were attacked by Hutu militias, leaving the country's population to mourn those killed. As a mode of healing, survivors and those who witnessed the tragic events began to write, leading to a genre of theatre known as the theatre of genocide or in French "le théâtre du genocide." Where the written word was not necessarily received, theatre, as one of the most viewed art forms in Rwanda, provided a physical representation of mourning and grief, but also recovery and hope. While some narratives focused on themes such as loss, grief, and memory, playwrights such as Jacques Delcuvellerie and others in their play Rwanda 94 seek to delve into the motivations of the perpetrators. This paper aims to focus on the different modes in which the theatre of genocide, but more specifically Rwanda 94 analyzes the impulses of the murderers.

40. **Empty**

41. **Master Conductor: Examining *Ticket to Ride* Using Mathematical Concepts**
Drew Perkins
Mentor: Dr. Prayat Pudel, Mathematics
The board game, *Ticket to Ride*, requires two to five players to put themselves in the role of a 19th century railroad baron whose sole goal is to control the pathways between 36 North American cities. Players must accumulate points by building train lines that connect certain cities. In this talk, we will begin with a brief description of the game, followed by a discussion of how we can use techniques from graph theory to make strategic decisions about the game. We will start with an explanation of the mathematical concepts we utilized before transitioning into how we applied these ideas to *Ticket to Ride*. We will conclude by mentioning potential extensions of our research that we hope to explore in the future.

42. **Running the virtual race: A systematic review to understand virtual reality and gaming research**
Kelsey Jenks
Mentor: Dr. Amanda Glueck, Neuroscience, University of Kentucky
Mentor: Dr. Aaron Godlaski, Behavioral Neuroscience
Previous research demonstrated that action video game play improves cognitive performance on traditional gaming platforms. Action game training with complex and dynamic settings and time-based responses demonstrated significant increases in cognitive performance. With the recent commercialization of more advanced and immersive technologies, more research is needed to investigate the effects these technologies have on cognitive performance. This systematic review sought to summarize the recent research involving immersive virtual reality and cognition. Literature searches were conducted through several scholarly databases and included key terms such as “immersive virtual reality,” “attention,” “cognition,” “learning,” “processing speed,” and “working memory.” The goal of this systematic review was to better understand different immersive virtual reality interventions and their potential cognitive benefits. This information can and will be used to further improve cognitive interventions.

43. **History Bots**
Muchiri Kahwai
Mentor: Dr. John Harney, History
The History Bots project is an educational platform that explores the limitations of current AI technology and the potential for collaboration between human expertise and machine learning. The project involves creating an AI chatbot that allows students to explore different time periods and learn about important historical events and individuals. By connecting the chatbots to three different internet sources - Wikipedia, IBM Watson, and ChatGPT - the project aims to demonstrate the strengths and limitations of these sources, as well as the ways in which human expertise can

complement and enhance AI technology. The project seeks to highlight the value of human judgment and interpretation in historical research and learning. The bot is designed to be accessible and user-friendly, making it a valuable tool for educators looking to incorporate technology into their teaching methods. This project represents a unique and innovative approach to teaching and learning history.

44. **Health of Belizean Coral Reefs**
Anahit Grigoryan & Brenna Hammond
Mentor: Dr. Kelly O'Quin
Coral reefs have suffered serious stress and bleaching events due to climate change and human activities. The Belize Barrier Reef, the second largest barrier reef in the world, has had a recent statistical loss in coral health, putting the diversity of fish, flora, and story coral species at high risk, along with the human communities that rely on them for food and other resources. Our study assesses the health of five reef sites within protected and unprotected zones throughout the South Water Caye Marine Reserve in Belize. We assess ecosystem health using several measures, including herbivory rates, coral bleaching and color, and hard coral coverage and species diversity. Our results indicate a gradual decline in coral coverage, bleaching, and diversity across sites based on the level of protection in the South Water Caye area.

45. **Adventures in Ophthalmology: Eye Diseases in Tanzania**
Luke Pellegrino
Mentor: Dr. Stephanie Dew, Biochemistry and Molecular Biology
Cataracts, both congenital and acquired, are a leading cause of visual impairment and blindness worldwide. We will explore the two different types of cataracts and their impact on visual function, as well as the risk factors associated with their development. I will also discuss my firsthand experience in Tanzania, Africa, where I witnessed and assisted in the treatment of various patients with cataracts. The experience called my attention to the urgent need for accessible and affordable cataract treatment, particularly in developing countries. Overall, this presentation will cover of the anatomy and physiology of the eye, with a specific focus on cataracts, and will underscore the importance of accessible and affordable treatment options for those affected by this condition.
46. **Isotope Analysis at Centre College: How We Can Use It and Where It Can Take Us**
Anna Impellitteri
Mentor: Dr. Brett Werner, Environmental Studies
The Centre College department of Environmental Studies is in the process of installing new laboratory equipment that will open the door to professors and students seeking to do research. Two machines, the Delta Q Isotope Ratio MS, and the Flash IMS, work in conjunction to provide isotope analysis (C, O, H, N, and more) of solid and liquid samples. This will allow for new research opportunities in soil, water, and organic matter analysis across the biology, chemistry, and ENS departments. As one of the only students participating in the initial installation training for the new equipment,

part of my senior seminar for the self-designed Environmental Science major is to comprise an easy-to-use, Centre College-specific laboratory manual for this new equipment.

47. **J.H. & Artie Atkins Scholars Program**
Caroline Dahl, Uliana Bazavluk, Anahit Grigoryan, AJ Howell, Vati Pham & Lorena Bonet Velazquez
Mentor: Dr. Andrea Abrams, Vice President for Diversity, Equity, and Inclusion & Associate Professor of Anthropology
The J.H. & Artie Atkins Scholars Program supports research or art focused on diversity, inclusion, equity, and social justice. An Atkins Scholar contributes to a more just world through intellectual inquiry and practice. The six scholars will present their research on access to eating disorder treatment, Centre College's commitment to student health and wellness, military conflict and women's health, Buddhism's relationship with queerness, decolonial feminisms in the Spanish-speaking world, and photographic analysis of BIPOC Identity.

48. **Dendrimer and Organic Semiconductor Synthesis**
Griffin Baston
Mentor: Dr. Vanessa Song, Chemistry
Dendrimers are spherical and typically symmetric macromolecules that can hold a smaller molecule in their center, or core. Dendrimers are incredibly useful molecules that can be used for biological tracking or drug delivery systems. During Summer 2022, organic synthesis research on dendrimers through internship with the Jørn B. Christensen Group at the University of Copenhagen in Denmark was conducted. After completing a year of organic synthesis at Centre, this internship was a great way to further synthesis knowledge and skills. Working in the lab each day, undergraduate skills obtained at Centre College were further reinforced in facilitating reactions and NMR analysis; proficiency in new techniques such as column chromatography was also acquired. These skills were further refined through organic semiconductor synthesis research conducted with Dr. Vanessa Song at Centre College.

49. **You: Mental Illness or just a Thrilling TV show?**
Lindsay Bohn
Mentor: Dr. Drew Morris, Psychology
This project breaks down what narcissistic personality disorder is and how the show depicts its symptoms and consequences. It will also show how narcissistic personality disorder can coexist with borderline personality disorder, anxiety, and depression. These different mental disorders create the popular, psychological thriller TV show *You*, but it may not present the disorders as it should. *You*, produced by Jason Sokoloff, Jennifer Lence, and Wayne Carmona exhibits how dangerous Narcissistic Personality Disorder can be as well as other disorders coexisting with narcissistic personality disorder. The show focuses on Joe Goldberg's, the main character, drive to controlling Guinevere Beck's life and who she is with to ensure he is the only thing she can focus on that feeds into his need to be the utmost important thing in her life.

50. **Synthesis of Advanced Lignin Model Polymers**
Samuel Brunner
Mentor: Dr. Vanessa Song, Chemistry
Lignin has been and continues to be a significant by-product of the pulp and paper industry. With consideration of renewable energy for the chemical industry, lignin holds immense potential as a renewable aromatic chemical as the world is transitioning away from fossil fuels. In plants, cellulose and hemicellulose have a chair conformation structure, while lignin is aromatic and carbon abundant, making the molecules ideal for energy research. Different linkages in lignin help represent how the compound can be broken down into smaller molecules. While significant advancements have been made, the depolymerization of lignin has been challenging as most of the research has used the β-O-4 linkage, which lacks complexity. In this research, the β-β linkage is targeted with its higher complexity since it is more feasible

and creates the most pieces when broken. The goal of this research is to synthesize complex model polymers for lignin depolymerization and valorisation.

51. **Computational Analysis of Possible SARS-CoV-2 Therapeutics**
Akenpaul Chani
Mentor: Dr. Jennifer Muzyka, Chemistry
SARS-CoV-2 is the positive-sense RNA virus that causes COVID-19, a severe respiratory infection that has had a catastrophic impact on the daily lives of billions. SARS-CoV-2's non-structural protein 5 (NSP 5), otherwise known as the main protease or 3C-like protease, is essential for its pathogenesis. Processing 12 of the 15 non-structural proteins in SARS-CoV-2's genomic sequence, inhibiting MPro will likely induce an antiviral effect in humans. Known inhibitors were docked with MPro in its dimeric form and analyzed to qualitatively assess MPro's active site using computer software (PyMol for preparation and AutoDock Vina for docking calculations). After a qualitative determination of MPro's active site in AutoDock Vina's coordinate system, MPro was docked to several million small molecules in the ZINC database, as well as a set of newly discovered chalcones. Small molecules with binding affinities similar to those of potential inhibitors within the active site were discovered.

52. **Throwing Queerness into the Ring**
Samuel Cotthoff
Mentor: Dr. Chelsea Cutright, International Studies & Anthropology
Androcentric language has been used throughout sports to perpetuate an idea of the "perfect, real man." This is evident in sports like professional football, baseball, and basketball, as male players are told to "man up" and not be a "sissy," "diva," or "primadonna." This rhetoric has not only affected the men who play these sports but the women who play the same sport. Furthermore, this language promotes heteronormativity that is harmful to men who identify as non-heterosexual because it disrupts their personal journey of self-discovery. In this poster, I hope to show analysis of both my personal experiences as an gay thrower as well as media research of the social media and interviews of Olympian Raven Saunders to see how language, gender, sexuality, and race all combine together to affect queer experiences in a traditionally heterosexual, masculine sport.

53. **Laid back like a sloth: Do they have measurable levels of the stress hormone--cortisol?**
Cameron Coulter & Kelsey Jenks
Mentor: Dr. Brent White, Behavioral Neuroscience
The well-being of zoo-housed animals is frequently determined by measuring cortisol concentration in various body fluids. Cortisol is often called the stress hormone because it is elevated during flight or fight situations. The Louisville Zoo recently added two-toed sloths (Choloepus didactylus) to their collection and asked us to

monitor their cortisol levels. This poster summarizes the process of assessing cortisol in a species that has received little attention. In this study, we selected a physiological medium (saliva) to measure cortisol. We then determined a sampling method and tested several assays for their sensitivity in measuring cortisol. This work is ongoing as our lab is experimenting with different assays and implementing standard additions to increase their sensitivities. These modifications have the potential to improve our measures of cortisol in sloth saliva.

54. **Functional Semiconducting Molecule Derivatives**
Catherine Cox, Christina Kousseff, Christian Nielsen* & Rikin Shah**
**Queen Mary University of London*
Mentor: Dr. Vanessa Song, Chemistry
Semiconducting molecules are of increasing interest, however, there are many factors that allow molecules to efficiently conduct charges. Fullerene, a molecule used in organic electrochemical transistors (OECTs) is a useful semiconductor because of its molecular stability and polarizability. Development of fullerene derivatives, such as the 5-crown-5-ether derivative, is essential to the improvement of solubility in the active layer of OECTs and selectivity for ions. Tetracene is also a useful semiconductor to research, but instead of analyzing the impact of solubility on semiconductor efficiency, tetracene derivatives are useful in comparing molecular packing patterns. As different substituents are added to tetracene different pi stackings are produced and therefore different charge carrier mobilities within the pi system. Working towards optimizing semiconductor capabilities is crucial to improving ways to power modern technology.

55. **Exploiting the Warburg Effect using transition metal complexes**
Roma Desai
Mentor: Dr. Erin Wachter, Chemistry
Ruthenium(II) polypyridyl and other coordination complexes have shown light-activated anticancer activity but also toxicity in the absence of light. The Warburg Effect highlights that cancer cells consume more glucose due to the overexpression of glucose receptors. Ruthenium(II) complexes with 5-thioglucose-1,10-phenanthroline (phenTG) and 2,2-bipyridine ligands were synthesized with the intent of increasing uptake into cancer cells over healthy cells to reduce off-target toxicity. The structure and properties of these complexes were examined using Ultraviolet-visible spectroscopy and nuclear magnetic resonance spectroscopy. To test for off-target side effects, an acetylcholinesterase assay was conducted. Current results show increased toxicity for the free ligand. Previous results suggested that off-target toxicity decreases when the ligand is bound to ruthenium(II). The phenTG complexes present a promising reduction in off-target effects but require further purification and analysis.

56. **Does hair cortisol correspond to fecal cortisol in an injured grizzly bear?**
Lauren Dome & Zachary Gregory
Mentor: Dr. Brent White, Psychology
Cortisol in hair is used to measure stress in wild populations of animals, including grizzly bears (*Ursus arctos horribilus*). Hair collection is noninvasive and provides a cortisol record covering weeks in contrast to feces and body fluids which provide very short-term information. However, only a few studies have demonstrated a correlation between hair cortisol and systemic physiological measures of the hormone. Injuries to a grizzly at the Louisville Zoo gave us the opportunity to test this relationship. Daily fecal samples show spikes in cortisol at the time of the two injuries. The proximal half of hair fibers were estimated to be growing during the second injury when fecal cortisol spiked. An ELISA cortisol assay did not detect elevated cortisol in the proximal samples compared to the distal half of the fibers. Our results do not confirm the expected relationship between hair cortisol and fecal glucocorticoids.

57. **Inheritance of Scleral Width in Mexican Tetra**
Mary Gonzalez
Mentor: Dr. Claire O'Quin, Biology
The Mexican tetra (*Astyanax mexicanus*) is a small fish that has two morphs, cave and surface. Like reptiles and birds, fish can have a ring of bone or cartilage in the sclera (outer wall) of the eye. In Mexican tetras, the surface morph typically has a narrower scleral ring of bone, while the cave morph has a wider ring of cartilage. We were interested in determining the number of genes that control scleral width and where those genes are located in the genome. To determine this, we crossed surface fish and cave fish morphs for two generations, measured scleral width in the 2nd generation offspring, and then performed a genetic analysis to determine the genomic locations that contribute to trait differences. We found that approximately 2.89 genes contribute to the width of the scleral ring in Astyanax and at least one of these genes is located on Chromosome 15.

58. **Language, Gender, and Sport: How do they relate?**
Piper Hensley
Mentor: Dr. Chelsea Cutright, International Studies & Anthropology
Language, gender, and sport are all intertwined. The proof is all over campus and can be found all over the Internet, whether it's a news website or a scholarly article. By studying any one of these three elements, we can find information that connects each element to the next. In turn, this can tell us more about ourselves as humans, as well as the culture we are a part of. Due to research on these topics, we are able to understand how and why humans are programmed to think a certain way when it comes to how gender and sport are represented by language. This research could bring light to the ways that men and women are represented in sports, and how it may be problematic. Using my own research, I will apply my findings to news stories

and academic articles, along with examples from our own campus.

59. **The Effects of Social Media on the Physiological Markers of Stress**
Erin Bozdech, Ali-Grace Fleeman, Abby Jamison & Melissa Perello
Mentor: Dr. Karin Gill, Behavioral Neuroscience
Social media usage has become highly prevalent in society. Previous research has shown a correlation between social media usage and stress through multiple physiological and psychological measurements and questionnaires. The current experimental study investigated a potential causal relationship between social media and physiological markers of stress. A 2x2 mixed factorial design was utilized to examine differences in the blood pressure and heart rate of each participant before and after scrolling either Instagram or National Geographic for a set amount of time. Data is currently being collected to statistically analyze results of the current experiment.

60. **The Capitalistic Approach to Nazi Germany Propaganda**
Kam Kiesel
Mentor: Dr. Jonathon Earle, History
The National Socialist Party of the German state created propaganda to demonize Jewish communities throughout Europe during the Second World War. To reimagine Nazi propaganda and to educate viewers on the role of German corporations during the War, the following exhibition will showcase German company advertisements modeled after 1940s-American-styled poster advertisements. The six companies presented in the exhibition are Fanta, Hugo Boss, the Volkswagen Group, the Mercedes-Benz Group, Bayerische Motoren Werke, and Bayer. Each of these companies was either founded due to the rise of the Nazi regime; or grew their brand with the exploitation of Jewish prisoners in the life of the concentration camps.

61. **Ruthenium(II) polypyridyl complexes with attached NSAIDs as potential dual mechanism of action therapeutics**
William Leach & Nate Vela
Mentor: Dr. Erin Wachter, Chemistry
Phototherapy is a medical treatment that utilizes light to activate the therapeutic effects of drug molecules. The use of phototherapy as a treatment option for cancer is becoming more widespread as many chemotherapeutics have harsh side effects. Non-steroidal anti-inflammatory drugs (NSAIDs) have the possibility of reducing the symptoms of current chemotherapeutics. Additionally, NSAIDs should have an increased uptake into cancer cells as they bind to cyclooxygenase enzymes (COX-1 and COX-2), which are highly expressed in cancer cells and aid in the progression and growth of tumors. Three sets of ruthenium(II) polypyridyl complexes with NSAIDs attached at different distances from the metal center were synthesized. The antioxidant properties, DNA binding, and the inhibition of the lipoxygenase and

acetylcholinesterase enzymes were tested. The data shows promising results for these complexes to potentially be used as dual mechanism light-activated chemotherapeutics.

62. **The Impact of Support Systems on Gender Diverse Individuals**
Emy Lovell & Meredith Walker
Mentor: Dr. Jan Wertz, Psychology
The transgender/gender diverse (TGD) population is currently at the forefront of our social climate involving civil rights. The non-acceptance of TGD individuals in our society sometimes leads to violence, discrimination, mental health challenges, and lack of social support. This research is investigating social support of individuals in the TGD community. Specifically, this study examines how TGD individuals have received support throughout their lives in social, familial, and clinical settings. Past research states that family acceptance is among the most important factors in TGD individuals leading a higher quality life, experiencing lower depressive symptoms, and reducing psychological distress.

63. **Social Norms in Ghanaian University Students**
Sarah Marks
Mentor: Dr. Sarah Murray, Education & Mathematics
Interviews with 24 Ghanaian university students from both public and private institutions were conducted in the fall of 2022. The interviews sought to gain understanding of social norms within this demographic in the subtopics of participant childhoods, social norms that are appreciated and not appreciated, typical topics of conversation, college in relation to participant growth in individuality, and how participants view party culture. Public and private university responses were also compared to traditional social norms in Ghana.

64. **Afro-Latine Identity**
Ashley Guerrero
Mentor: Dr. Genny Ballard, Spanish
The intersectionality of the Afro-Latine population is that which someone holds when they are of colored skin, but they speak Spanish; this identity can be very challenging, especially for someone that lives in the United States. During Centre Term I returned to my old high school in Boston at the Margarita Muiz Academy to conduct a three-week workshop, allowing students to have a free space to explore their Afro-Latine identity. In these workshops we spoke about four specific places in Latin America where Afro-Latine history had the biggest social influence. Students who came from families that spoke Spanish and areas where their skin was darker than the rest of their peers were allowed to have these deep conversations and a safe space to talk about some of the concerns they had while identifying as Afro-Latine; in addition, the way history molds the way we see ourselves and others in our population.

65. **The Effects of Mating on Female Drosophila Bitter Taste Detection**
Dillon Di Iorio & Kyla Miller
Mentor: Dr. Genevieve Bell, Behavioral Neuroscience
Mating plays a crucial role in altering the behavior of Drosophila melanogaster, the common fruit fly. Virgin females prefer sweet and/or salty foods however, after mating, preference shifts to yeasty foods due to the presence of sperm which activates this behavioral change. Similarly, mated females detect bitter substances at lower quantities in comparison to virgins. However, the impact of sperm being present has been overlooked. We will be investigating if the presence of sperm influences bitter taste detection. Virgin, mated (sperm present), and post-mated (sperm not present) females will be tested using proboscis extension response (PER) in detection of a bitter tastant (quinine). We hypothesize that both mated groups will detect quinine at low concentrations in comparison virgins. This data will aid in better understanding mating-induced gustatory changes in female Drosophila.

66. **Preliminary Research: Inter-Racial/-Ethnic Community Interaction to Improve Relations across Diverse Groups**
Jacqueline Mullins
Mentor: Dr. Jan Wertz, Psychology
The goal of this study is to increase positive feelings and decrease fear and misunderstanding between inter-racial/-ethnic groups. A meta-analysis found that increasing interracial conflict decreases prejudice. Realistic conflict theory suggests contact between opposing groups working towards a common goal reduces intergroup conflict. This study hypothesizes that increasing inter-racial/-ethnic group contact in a small Kentucky town will increase positive feelings while decreasing fear and misunderstanding between inter-racial/-ethnic individuals. Participants will be recruited from the community to host families or individuals of differing racial/ethnic backgrounds for a cooking and/or activity session. To increase comfort, families or individuals will be matched based on indicated interests and preferences. Methods will include having participants complete pre-and post-surveys indicating their feelings, attitudes, and comfort level with members of different racial and ethnic groups.

67. **Athletes' Political Voices Within the Media**
Tyler Neltner-Devine
Mentor: Dr. Chelsea Cutright, International Studies & Anthropology
Within each culture sport bridges the gap between free time/leisure and societal issues along with different traditions and religious practices. This intersectionality varies between each society and community ranging from sport in lieu of war to sport simply for entertainment. One major aspect of sport is media coverage. Recently athletes have been using their platform to bring political issues to the public scope and raise awareness. Some consider this controversial while others believe they have an

obligation to speak out against political issues. This research will help to highlight the important role that athletes play in the media and the sway they carry in the public eye.

68. **Synthesis and Studies of Organic Semiconductors**
Jack Rodes
Mentor: Dr. Vanessa Song, Chemistry
Organic semiconductors play a significant role in modern electronic devices such as solar panels and smartphone displays. Organic semiconductors are becoming increasingly popular to commercialize because the synthesis process is affordable, light in weight, and abundant. Many organic semiconductors consist of compounds with conjugated ï€-bonds that achieve aromaticity. Extended aromatic molecular systems allow electrons to delocalize within the molecule and its ordered crystalline structure, which gives the material its semiconducting properties. A common building block for organic semiconductor synthesis is pentacene. The stacking of pentacene molecules is often referred to as “herringbone” packing and adding different substituents in the peri-positions allows the molecule to become fully conjugated. In this research, the synthesis of organic semiconductor triisopropylsilyl ethynyl (TIPS) pentacene and anthradithiophene were conducted.

69. **Tasmanite Preservation after Black Shale Digestion**
Kevli Sheth
Mentor: Dr. Amanda Falk, Biology
Changes in biodiversity during the late Givetian and early Frasnian periods (392-383 mya) may foreshadow the Late Devonian mass extinction (375 mya). Black shales in the Appalachian basin house fluorescent tasmanites (paleoalgal spores) that provide insight into the paleoclimate of the Middle-Late Devonian periods. Before analyzing tasmanites, they must be liberated from black shales. We will perform the following three methods of black shale digestion and determine the safest and most effective: freeze-thaw cycles with deionized water, freeze-thaw cycles with saturated sodium sulfate solution, and quaternary ammonium surfactant digestion, which Meehan et al. (2020) suggests will be the most successful. The rate and thoroughness of each digestion method will be determined by comparing the number of tasmanites and the average area of fluorescence in each experimental group, revealing each black shale digestion method’s efficacy.

70. **The Effects of Estrogen and Cocaine on the Locomotor Activity of Male Japanese Quail**
Emma Silvert & Skylan Thompson
Mentor: Dr. Karin Gill, Behavioral Neuroscience
Previous research in mammals suggests that females may be more vulnerable to drug addiction compared to males, an effect that has largely been attributed to estrogen.

Recent work in female quail suggests that estrogen may not impact drug addiction in the same way as it does in female rodents, but this effect has not been studied in male quail. The present study investigated whether estrogen would increase the development of cocaine-induced locomotor activity in male Japanese quail. The study showed that males given both estrogen and cocaine had an increase in locomotor activity compared to the females and control males. The results of the current study suggest that male quail may be more vulnerable to the effects of estrogen when combined with cocaine compared to female quail, a finding that is opposite from mammalian research.

71. **SAA Football EP and EPA Analysis**
Cloe Spracklen & Jane Zhang
Mentor: Dr. Jeffrey Heath, Mathematics & Data Science
The purpose of this research project was to provide meaningful insights about Expected Points (EP) in the Southern Athletic Association (SAA) to the Centre College Football coaching staff to improve game day play. EP are the amount of points a football team is expected to gain during their drive given their yardage and other game parameters.

72. **Inequality in Sports: Discrimination of LGBTQIA+ Athletes**
Leslie Stewart
Mentor: Dr. Chelsea Cutright, International Studies & Anthropology
Starting as early as the 1920s and continuing into the current day, athletes from the Lesbian, Gay, Bisexual, Transgender, Queer/Questioning, Intersex, Asexual/Agender Plus (LGBTQIA+) communities have faced various dimensions of discrimination and stigma associated with their sexual orientation and participation in various athletic competitions. As we see an increase in the number of LGBTQIA+ athletes that participate in competitive and professional sport as well as an increase in the number of rules and regulations that limit their participation in sport, we have seen both positive and negative impacts on the athletes in the community through news reporting, media coverage, individual testimonies from the athletes themselves, and from arguments regarding the policies that focus on LGBTQIA+ athletes. The research has shown the active discriminations that are placed on the LGBTQIA+ athletic communities, and how the community is fighting for acceptance, a voice, and a place in the community.

73. **The Scales of Middle Devonian Fishes from the Appalachian Basin of Eastern Kentucky**
Sherice Sutherland
Mentor: Dr. Amanda Falk, Biology
The Devonian Period is a part of the Paleozoic Era and is sometimes referred to as "The Age of Fishes" because it had an explosive adaptive radiation of several different

fish groups. Paradoxically, a mass extinction occurred during the Late Devonian, after the adaptive radiation, that significantly reduced biodiversity. The Middle Devonian is still a largely unexplored time period for understanding the events that led to such rapid decrease in biodiversity. In Kentucky, the Middle Devonian is represented by the Boyle Formation which includes dolomitic limestone and dark shales. Rock samples from the Boyle Formation along KY-89 were collected and processed using acetic acid digestion to make microfossils accessible. Fossil scales were grouped into categories based on their different characteristics. The sample contained mostly placoderms indicating that the results of this study are consistent with work done on the Middle Devonian in other parts of the world.

74. **Disparity in Media Coverage in Men's and Women's Sports**
Anna Thomas
Mentor: Dr. Chelsea Cutright, International Studies & Anthropology
When looking at the statistics of media coverage for sports, it is no fair comparison, with male sports having 95% of the coverage and women's sports a meager 5%, according to Purdue University. These statistics have not shifted within the last 30 years, almost since the introduction of the Title IX Act. With this being said, the inequality of media coverage has a huge impact on the amount of revenue brought in by the teams, allowing for an even larger gap to form between male and female athletics. Although it will be a lengthy process to achieve equality in this realm, many steps have already been taken in the right direction, especially with the widespread use of social media and the passing of the Equal Pay for Team USA Act in late 2022. This research will bring attention to these inequalities in sports and bring light to possible solutions.

2023 RICE SYMPOSIUM COMMITTEE

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***The Undergraduate Research Committee is thankful to all faculty mentors working with students to make this symposium possible. ***

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