



Celebrating
THE LIBERAL ARTS

RHODES SYMPOSIUM



APRIL 29, 2022

April 29th Events

- Awards Convocation: 9:30 a.m., McCallum Ballroom, Bryan Campus Life Center
- Oral Presentation Sessions: 11:00 a.m. – 3:30 p.m., various locations
- Poster Session I: 1:00 p.m. – 3:00 p.m. Multi-Sports Forum of the Bryan Campus Life Center (snacks and refreshments provided)
- Poster Session II: 3:00 p.m. – 5:00 p.m. Multi-Sports Forum of the Bryan Campus Life Center (snacks and refreshments provided)

Acknowledgements and Special Thanks

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- Dr. Brian Larkins, Department of Computer Science, Director of Fellowships and Undergraduate Research
- Professor Raina Belleau, MFA, Assistant Professor, Department of Art & Art History
- Dr. Patrick Kelly, Assistant Professor, Department of Biology
- Dr. Ali Masood, Assistant Professor, Department of Politics and Law
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UNDERGRADUATE RESEARCH & CREATIVE ACTIVITY SYMPOSIUM

FRIDAY, APRIL 29

SCHEDULE BY DIVISION

Poster Sessions will be held in the
Multi-Sports Forum of the BCLC
1:00 p.m.-2:50 p.m., and
3:00 p.m.-5:00 p.m.

TIME	ROOM	SESSION TITLE	DEPARTMENTS/PROGRAMS
FINE ARTS			
11:00-12:40	Hassell 100	Music Oral Presentations	Music
11:00-12:45	Clough Hanson Gallery Clough Hall	Studio Art Exhibition	Art & Art History
1:00-2:10	Hassell Hall 100	Art History Oral Presentations	Art History & History
1:00-2:30	Tuthill Performance Hall Hassell Hall	The Cauthen Competition	Music
3:00-4:00	Barret 034	Media Studies Showcase	Media Studies
HUMANITIES			
11:00-12:00	Buckman 200	The Rhodes Historical Review	History
11:00-12:00	Southwestern Hall 207	Ancient Mediterranean I	Ancient Mediterranean Studies
11:00-12:00	Zoom	Spanish I Gender Trouble in Hispanic Cultures	Modern Languages & Literatures
12:30-1:30	Buckman 200	English / Modern Languages Oral Presentations	English / Modern Languages
12:30-1:30	Southwestern Hall 207	Ancient Mediterranean II	Ancient Mediterranean Studies
12:30-1:30	Zoom	Spanish Senior Seminar II Intersections between Language, Politics, and Ecology	Modern Languages & Literatures
2:00-3:00	Southwestern Hall 207	French I Oral Presentations	Modern Languages & Literatures
2:00-3:15	Zoom	Spanish III Studies on the Hispanic and Latin American Visual Arts	Modern Languages & Literatures
NATURAL SCIENCES			
11:00-12:00	FJ-B	Biology & Biochemistry, Molecular Biology, and Computer Science Honors Oral Presentations	Biology & Biochemistry and Molecular Biology
11:00-12:00	FJ-C	Computer Science I Oral Presentations	Computer Science
12:30-1:30	FJ-B	Chemistry I Oral Presentations	Chemistry
12:30-1:30	FJ-C	Computer Science II Oral Presentations	Computer Science
2:00-3:00	FJ-B	Chemistry II / Physics Oral Presentations	Chemistry / Physics
2:00-3:00	FJ-C	Mathematics Oral Presentations	Mathematics
SOCIAL SCIENCES			
11:00-11:45	Clough 204	Anthropology & Sociology I Oral Presentations	Anthropology & Sociology
11:00-12:00	Robertson 110	Psychology Oral Presentations	Psychology
12:30-1:45	Clough 204	Anthropology & Sociology II Oral Presentations	Anthropology & Sociology
12:30-1:30	Buckman 108	Urban Studies / Educational Studies / Business Oral Presentations	Urban Studies / Educational Studies / Business
2:00-3:15	Buckman 200	Economics I Oral Presentations	Economics



UNDERGRADUATE RESEARCH & CREATIVE ACTIVITY SYMPOSIUM

FRIDAY, APRIL 29

SCHEDULE BY BUILDING

Poster Sessions will be held in the
Multi-Sports Forum of the BCLC
1:00 p.m.-2:50 p.m., and
3:00 p.m.-5:00 p.m.

BUILDING	TIME	ROOM	SESSION TITLE
Barret Library	3:00-4:00	034 Barret Library Basement	Media Studies Showcase
Buckman Hall	11:00-12:00	200	The Rhodes Historical Review
Buckman Hall	12:30-1:30	200	English / Modern Languages
Buckman Hall	12:30-1:30	108	Urban Studies / Educational Studies / Business
Buckman Hall	2:00-3:15	108	Economics
Clough Hall	11:00-12:45	Clough Hanson Gallery	Studio Art Exhibition
Clough Hall	11:00-11:45	204	Anthropology & Sociology I
Clough Hall	12:30-1:45	204	Anthropology & Sociology II
Frazier Jelke	11:00-12:00	FJ-B	Biology & Biochemistry, Molecular Biology, and Computer Science Honors Oral Presentations
Frazier Jelke	11:00-12:00	FJ-C	Computer Science I
Frazier Jelke	12:30-1:30	FJ-B	Chemistry I
Frazier Jelke	12:30-1:30	FJ-C	Computer Science II
Frazier Jelke	2:00-3:00	FJ-B	Chemistry II
Frazier Jelke	2:00-3:00	FJ-C	Mathematics
Hassell Hall	11:00-12:40	100	Music Oral Presentations
Hassell Hall	1:00-2:10	100	Art History Oral Presentations
Hassell Hall	1:00-2:30	Tuthill Performance Hall	The Cauthen Competition
Robertson Hall	11:00-12:00	110	Psychology Oral Presentations
Southwestern Hall	11:00-12:00	207	Ancient Mediterranean I
Southwestern Hall	12:30-1:30	207	Ancient Mediterranean II
Southwestern Hall	2:00-3:00	207	French I Oral Presentations

(F) Rhodes Fellowship

FINE ARTS ORAL SESSIONS

Music

11:00 am – 12:40 pm

Hassell 100

Moderator: Olivia Lane

(F) 11:00 – 11:20 A Thread Through the Plaid: 18th Century Jacobite Music and its Connections to American Social Movements

Emily Haas

Faculty Sponsor: Vanessa Rogers, Department of Music

Folk music traditions are often foundational to the cultures to which they belong. In 18th century Scotland, Jacobites (a political and military resistance group who advocated for the restoration of the Stuart line to the Scottish throne) utilized music to express themselves despite oppression, communicate with each other, and celebrate both their victories and those lost to the cause. Though their political cause did not last, Jacobite music and sentiment remained a strong force in Scotland for many generations after the initial rebellions. In fact, it had such an impact that when Scottish immigrants began to settle in America, the seeds of their song had already been planted. As the American folk tradition grew, and became important to various social groups and oppressed peoples, the legacy of Scots song continued to have influence. Elements of Scots song and their folk tradition began to show itself in the Appalachian coal miner's labor movement, and in the early civil rights movement, with singer Paul Robeson. The cultural connections and empathy across the varying cultures helps to bolster their respective political causes, and increase the longevity of their movements and impact.

11:20 am – 11:40 Effects of Harmonic Variation on Emotional Evocation in Listeners

Lawrence Oswalt

Faculty Sponsors: Courtenay Harter and Vanessa Rogers, Department of Music

While there have been countless debates on the mental mechanisms involved, there is no denying that music and emotion are two very interlinked experiences. However, there has been little research into how impactful different aspects of a piece, specifically harmony, affect a listener's overall interpretation. In this study, I aim to examine how a static melody interacts with three different chord progressions (reflective of different eras in music) through an examination of literature on the relationship between music and emotion. Similar research indicates that listeners prioritize both what is present in the music and how they expect the music to progress, which shapes one's interpretation of a piece. This relationship is not only critical in understanding how a listener comprehends music, but also as an avenue for music to assist in recalling events from an individual's past. This subjectivity also serves as a limitation, which, among others, will be subsequently discussed.

11:40 am – 12:00 pm Music Therapy as an Effective Treatment for Sexually Traumatized Women

Kathleen Whatley

Faculty Sponsors: Courtenay Harter and Vanessa Rogers, Department of Music

This literature review compiles multiple theories and studies that explore how music can facilitate healing in women who have been sexually abused. These include the polyvagal theory and feminist theory, as well as explorations of trauma in the brain and how music can physiologically, cognitively, and psychologically heal sexual trauma. Additional topics of focus include a brief exploration of what sexual abuse looks like, coping mechanisms, the benefits of group-music therapy, as well as new frameworks for trauma-informed music therapy. Overall, music therapy can positively affect sexually traumatized women and help them develop adaptive coping mechanisms, increased self-compassion, and overall improve psychological wellbeing.

12:00 – 12:20 Ceremonies of Coalescence: Traditional and Art Music in Benjamin Britten's "A Ceremony of Carols, op. 28."

Rory Wilson

Faculty Sponsor: Vanessa Rogers, Department of Music

The early twentieth century in England saw an explosion of composers looking to folk music traditions as inspiration for their art music. Benjamin Britten's *A Ceremony of Carols* is the apex of this tradition and works as an excellent case study of a uniquely English phenomenon that flew in the face of what was happening in the rest of Europe. The excellence of *Ceremony* as a case study of this practice is due to its focus on carols specifically; as a niche but incredibly rich vein of traditional music, carols hold incredible utility when assessing the fusion of old and new. With his festive *Ceremony*, Britten dipped his toes into the ocean of genre-bending, creating a genius amalgam of art music, folk tunes, traditional carols, and hymns. This paper employs theoretical analysis of several movements from *A Ceremony of Carols* to assess the work within the context of both twentieth century art music and the array of traditional sources that influenced Britten, to justify the claim that *A Ceremony of Carols* is the perfect coalescence of traditional songs and contemporary art music.

12:20 – 12:40 Just Play: Making Music at the Refugee Empowerment Program

Georgia Winkler, Jared Smith, and Emily Haas

Faculty Sponsor: Vanessa Rogers, Department of Music

This year, with the help of a Mellon Health Equity grant and a Lainoff Grant, three fellowship students at Rhodes College created a weekly in-person after-school Music Club at the Refugee Empowerment Program for primary school children. Our goals are to teach children to be musically literate and to help them discover how to express themselves through music. With the Music Club, we promote the REP's (and Rhodes College's) goals of assisting our community, building ties between different groups, and creating a culture of "Health Equity, Human Flourishing, and Well-Being through the Public Humanities". Our presentation addresses the highs (and the lows) of serving our community at the REP during this difficult year.

Art History / History

1:00 – 2:20 pm

Hassell 100

Moderator: Sawyer Bay

1:00 – 1:20 Figurative Allegories in Michelangelo's The Last Judgment

Joseph Canova

Faculty Sponsor: Victor Coonin, Department of Art and Art History

Michelangelo's The Last Judgment is one of the world's most renowned and well-known paintings. An extensive amount of research has been conducted analyzing Michelangelo's placement of figures, as well as the possible allegorical connections between them as elucidated by their spatial positioning to one another. My research explores how two figures on the threshold of what is referred to as the mouth of Purgatory connect, in an allegorical manner, with two figures on their diagonal that are denoted the rosary group. The two Purgatorial figures, long characterized as demons, I theorize to be figurative allegories for African individuals. I suggest Michelangelo distorts the Purgatory figures into sub-human, animalistic specimens who reference the anatomy of Africans. I believe he does so via a link in Italian Renaissance vernacular connecting Africans with satyrs and primates. To this point, no research has been conducted that explores how these two groups may relate to one another or suggests the Purgatorial figures are caricatures. Through visual analysis and historical context, I explore how the two group's potential correlation could be a narrative on newly freed peoples' ability to reach heaven by converting to Roman Catholicism rather than Protestantism and likewise save their deceased, non-converted ancestors.

1:20 – 1:40 Challenging Roles: Michelangelo's Drawings to Tommaso Dei Cavalieri

Olivia Lane

Faculty Sponsor: Victor Coonin, Department of Art and Art History

Michelangelo met Tommaso dei Cavalieri in the Winter of December 1532. Their subsequent relationship, as conveyed in Michelangelo's sonnets and drawings, elucidates much of the artist's interpersonal struggle with his own romantic desires. An analysis of the aesthetic signaling, artistic choices Michelangelo utilized to convey covert messages within his drawings: The Punishment of Tityos (Fig. 1) and The Rape of Ganymede (Fig. 2), which he gifted to Tommaso, cross-examined with selected sonnets, exemplifies the multi-dimensional nature of his interpersonal conflict. Most scholars, including Ruvoldt and Kleinbub, note that the figures present in these drawings represent Michelangelo and Tommaso as the two figures intertwined in opposing romantic and emotionally fraught struggles. However, a closer analysis of the drawings allows for the interpretation that Michelangelo has represented himself as both figures, rather than just one, in an attempt to express the complex nature of his desires towards the young Tommaso de Cavalieri. In recognizing the duality in these drawings, Michelangelo's private desires towards Tommaso can be more fully explicated.

(F) 1:40 – 2:00 Understanding Historical Research: Judeophobia Sourcebook Project

Patsy Wardlaw

Faculty Sponsor: Jonathan Judaken, Department of History

Through the Lainoff Fellowship, I have had the opportunity to work alongside Professor Judaken for his research in creating his newest sourcebook. The sourcebook is a curated set of primary sources focused on the theme of Judeophobia from the ancient period of history to contemporary history. During the summer portion of the fellowship, I also researched for Professor Ifft-Decker and Professor Saxe of the Rhodes College History Department. For Professor Saxe, I transcribed World War II newspapers from the Stars and Stripes newspaper. For Professor Decker, I researched secondary source material to help with her sourcebook on Jewish medieval women. The experience of researching for Professor Judaken, as well as Professors Ifft Decker and Saxe, has been enriching and an important experience to better my own historical research skills. Throughout the process I learned how to properly cite, transcribe, and organize sources for a sourcebook, as well as find public domain sources. Not only have I gained insight into academic research processes, but also into Judeophobia as a whole. During the preliminary phases of my work, I read material about Judeophobia as instructed by Professor Judaken. Overall, the experience has elucidated the process of historical research and book editing.

2:00 – 2:20 The Irish Famine: A Manmade Event or an Environmental Disaster?

Will Short

Faculty Sponsor: Lynn Zastoupil, Department of History

The purpose of the research paper I plan to write focuses on whether the Irish Potato Famine was a manmade event or an environmental disaster. The famine that lasted between 1845 and 1849 was a defining moment in Ireland's history. The importance of this event lies in what caused untold famine, disease, and evictions to spread across Ireland and whether the British government, poor rural Irish society, or landlords had a hand in making conditions worse. Potential reasons for the famine were that the Irish people depended solely on one crop, thus making their diet and farms geared for one food group. Thus, when the famine struck, their method for food production shrank considerably. Other reasons for the severity of the famine suggest that the economy was not modernized enough to support the cost of the potato crop failing in 1845-1846. The reason I will investigate for this paper is the claim in Jürgen Osterhammel's book, that famines are manmade rather than natural disasters. In this case, I am assessing to what degree the Irish famine should be considered a manmade event rather than a natural disaster.

Media Studies Departmental Showcase

3:00 – 3:30 pm

Barret 034

Faculty Sponsor: Joy Brooke Fairfield and Rashna Richards, Media Studies Program

The Media Studies Symposium aims to be a curated half hour screening of short films and video essays made in various MST classes throughout the course of the academic school year. Using

the visual medium, student creatives communicate powerful, diverse stories and perspectives that crave to be shared. In a city with a struggling film culture, a Rhodes sponsored symposium presented annually allows student filmmakers to broaden their outreach significantly, showcasing and promoting student work to be researched by fellow students, colleagues, and faculty. Additionally, with the Media Studies department in its infancy and beginning to establish itself amongst the college's other departments, the symposium raises acknowledgement to the various opportunities courses in MST may offer.

3:30 – 4:00 pm Experimental Film Screening: Tree

Yifei Zhang, Mars McKay, Mitchell Carter, and Derik Keeslar

Barret 034

Faculty Sponsor: Joy Brooke Fairfield and Rashna Richards, Media Studies Program

This 10-minute-long film features on a story between a girl and a tree. By using experimental visual and audio elements, this film links a personal story of loss into a bigger question of relations between human and non-human and aims to raise awareness of prevailing anthropocentric ideology.

Studio Art Exhibition

11:00 am – 12:45 pm

Clough-Hanson Gallery

Faculty Sponsor: Karl Erickson, Department of Art and Art History

Student Artist Oral Presentations:

Sophia Brinton

Elizabeth Houck

Kristin Pedrozo

Adelaide Turpin

Mary Elizabeth Whitmire

Marley Wisby

Studio Art Seniors will present 10 minute artists talks outlining the creative activity and research that informed the artworks on display in the 2022 Senior Thesis Exhibition. These presentations include slide lectures with visual examples of the artists' past works, artistic influences and other sources of inspiration that have lead them to create works of art that embody their individual studio experience at Rhodes.

The Cauthen Competition

1:00 – 2:30 pm

Tuthill Performance Hall, Hassell Hall

Faculty Sponsor: Evan Williams

Gladys Cauthen was one of the founding influences in the development of the Rhodes College Department of Music, which grew out of the Memphis College of Music. In her honor and memory, Gladys Cauthen's legacy is remembered through the naming of this solo competition. The winner will perform with the Rhodes College Orchestra in the following academic year.

HUMANITIES ORAL SESSIONS

Rhodes Historical Review

11:00 am – 12:00 pm

Buckman 200

Moderator: Thomas Rose

11:00 – 11:15 Sonnenallee and East German Culture of Remembrance

Conor Brennan

Faculty Sponsor: Samson Ndanyi, Department of History

The film *Sonnenallee* (1999), as one of the first German films dealing with the German Democratic Republic (GDR) following the fall of the Berlin Wall, is an important contribution to GDR Erinnerungskultur ('culture of remembrance,' or the engagement of societies and individuals with their past). Previous scholarship has dealt with the film's role in filmic Ostalgie (East German nostalgia) post-GDR reconciliation, authorial intent, and the role of music in *Sonnenallee*. This paper hopes to add to the understanding of this film by dealing with acts of individual rebellion and their role in how they both shape memory and feeling about their life in the GDR. The acts of individual rebellion, referred to in this paper as 'everyday resistance,' are almost always insignificant in scope – they don't hope to topple the GDR. Instead, they allow one to distance oneself and one's memories from the state in which they took place. In doing so, the film provides an explanation for how individuals can remember their time in the GDR as the 'best times of their life,' despite oppression and intrusions from the state in their personal life.

11:15 – 11:30 Women and the Occult in Victorian England

Sarah Judd

Faculty Sponsor: Samson Ndanyi, Department of History

The occult movement of Victorian England was interested in understanding the supernatural world and phenomena through a scientific framework. At its heart, it was a religious movement that was often seen as the antithesis of Christianity. Though it was viewed derisively by nearly anyone outside of the movement, it attracted and remained open to women during a time where few movements did. Why was the movement so open to women, and what attracted women to the movement in the first place? For example, the Theosophy movement, one of the most prominent occult movements, was led by distinguished occultists Helena Blavatsky and Annie Besant, who made significant contributions to the occult movement as a whole. Both were well-educated divorcées, with Blavatsky founding the Theosophy movement and Besant converting to and eventually leading the Theosophy movement after Blavatsky's death. It is through the early involvement of women like Blavatsky and Besant who were able to define their own roles in the movement and use it to expand their own views of themselves and hopes for the future through the reinterpretation of existing religious ideas that allowed the movement to remain so open to and attract female followers and supporters.

11:30 – 11:45 Gandhian Nonviolence in the United States: Cesar Chavez and MLK Compared

Emma Stauber

Faculty Sponsor: Samson Ndanyi, Department of History

Since the 1960s, scholarship surrounding Dr. Martin Luther King Jr.'s role in the Civil Rights movement has flourished, leading to a growing understanding of how the movement recruited,

trained, and supported the nonviolent protesters it has become known for. However, much less scholarship has been put into understanding Cesar Chavez's nonviolent labor protests, which chronologically overlapped with the Civil Rights movement before continuing strongly into the 1990s. Despite their different goals and reach, both American movements were unified in their commitment to nonviolence. This paper seeks to understand the influence of India's Mahatma Gandhi on MLK and Cesar Chavez by examining the rhetoric, preferred protest methods, and legacies of surrounding both MLK and Cesar Chavez.

11:45 am – 12:00 pm Regardless of Marriage: Women, Lineage and Legal Ideology in Medieval Iceland

Chiara Torrini

Faculty Sponsor: Samson Ndanyi, Department of History

Medieval Iceland was unique—a near-democracy without a central authority and the source of a wealth of literature and legal codes. Contemporary media interprets this literature and displays Norse women as independent and powerful, but the legal codes from Iceland tell a different story. This paper focuses on marriage and its effect on Icelandic women's legal status from 1000-1262 and concludes that marriage did not cause a major change in legal status because women were considered unfit legal participants regardless of marriage. The ways that women could participate in the legal system make clear how women were valued: almost always as mothers who could bear lineages or, if a family had no sons, a last resort to carry on the lineage. And almost always, men were expected to take on legal roles for women—to oversee their cases, represent their households, or manage their property. For most women, the only difference marriage made was which man had primary legal responsibility for her: husband, father, or legal administrator.

English / Modern Languages

12:30 – 1:30 pm

Buckman 200

Moderator: Dr. Brooke Schedneck

12:30 – 12:50 "Your love is too thick": The Mother-Daughter-Daughter Triad in Toni Morrison's *The Bluest Eye* and *Beloved*

Carolyn Bruce

Faculty Sponsor: Marshall Boswell, Department of English

In her novels *The Bluest Eye* and *Beloved*, Toni Morrison explores the power and danger of the psychological connection between mothers and daughters. Feminist psychoanalytic theory, feminist theory, and womanist theory all agree that self-love is a learned practice. When mothers model healthy self-love, their daughters will mirror them—and vice versa. With these theories in mind, I propose a new model for analyzing mother-daughter dynamics in Morrison's novels. I argue that the primary women of *The Bluest Eye* and *Beloved* fall into three categories: the inadequate mother, the burdened daughter, and the daughter-turned-caregiver who assumes the role of the mother. As Black women and girls, Morrison's characters experience both traumatic racism and traumatic misogyny. Through their unique experiences of these compounded forms of oppression, each mother develops a sense of self-loathing. The burdened daughters are forced to carry not only their mothers' deepest insecurities, passed on through maternal self-

identification, but also the historical sins of white supremacy. The other daughters are free to progress into adulthood; there, they assume a maternal role, acting as caregivers and protectors for other vulnerable women. This paper aims to provide a new critical framework for interpreting Morrison's female characters and their symbolic functions.

12:50 – 1:10 Explaining US-Russian Relations Using Intercultural Communication Theories
Carley Jo Goggans

Faculty Sponsor: Alexandra Kostina, Department of Modern Languages and Literatures

Rising global tensions between Russia and surrounding nations make it absolutely vital to understand how to effectively communicate across Western and Eastern European cultural differences. This presentation will examine cultural differences between the US and Russia and how those differences affect and harm relations between the West and Russia. Furthermore, this presentation will explain how to navigate cross-cultural relations using intercultural communication theories.

1:10 – 1:30 The practice of naming in *Song of Solomon* and *Beloved*

Margot Foster

Faculty Sponsor: Marshall Boswell, Department of English

With origins in enslavement, African Americans have faced a long history of dehumanization, physical abuse, discrimination, exclusion, and abandonment. These various forms of trauma are inherited from generation to generation through cultural influences and personal relationships. The practice of naming in *Song of Solomon* and *Beloved* portrays the perpetuation of trauma and ultimate development of a character's identity. Morrison draws upon the oppressive relationship between Christianity, as a dominant ideology, and the African American community to complicate the traditional reading of Biblical figures with characters of their respective namesakes. On a personal level, characters carry familial trauma both physically and symbolically through the names bestowed upon themselves. I am focusing on how interpretations of white Christianity act as a cultural practice that incites trauma for the African American community. Morrison's revisionist understanding will provide ways to comprehend the characters with biblical names. Understanding trauma as something transmittable intergenerationally is reflected through the practice of naming. As names are passed down through familial tradition, the stories and trauma follow. However, this custom of naming does not address the practice of self-naming or nicknames

Ancient Mediterranean I

11:00 am – 12:00 pm

Southwestern 207

Moderator: Betsy Phillips

(F) 11:00 – 11:20 A Storm within Skin: The Transformative Potential of the Tiresian Archetype
Olivia Ducharme

Faculty Sponsor: Susan Satterfield, Ancient Mediterranean Studies Program

If an archetype is "a typical or recurring image...a symbol which connects one poem with another and thereby helps to unify and integrate our literary experience," then Tiresias, not a symbol but an omnipresent and transcendent embodied voice, is the archetype par excellence.

Tiresias is everywhere, calling out to us, asking for our eyes to pay attention to theirs. There are eyes behind their divination, a mind behind their prophecy, experiences behind their knowledge. The Tiresian is tangible, a gender-fluid body battered lest it threaten the established order. No story illustrates this better than Ovid's *Metamorphoses*, in which Jupiter and Juno, king and queen of the gods, seek out Tiresias, a mortal, to answer a question which they themselves cannot: which gender has greater sexual pleasure. Tiresias answers "women," and immediately, he is blinded by Juno. Jupiter attempts to redress these wrongs by granting Tiresias prophetic sight, a "gift" which precipitates many future tragedies. When we examine the person behind the seer, we discover that the Tiresian experience elucidates the present just as much as it does the future: wherever there is power, suffering follows closely behind. Tempest and torment swirl within Tiresias's speech—and even more-so under their skin.

11:20 – 11:40 The Athenian Ekklesia in the Fifth and Fourth Centuries: Institutional Design and Its Implications for Civic Ideology

Matthew Kenny

Faculty Sponsor: Kenny Morrell, Ancient Mediterranean Studies Program

The Athenian assembly, or *ekklesia*, functioned as the institutional center of popular participation in the Athenian city-state during the fourth and fifth centuries BCE. The end of the Peloponnesian War, however, drastically reduced the size of the Athenian population, brought an end to the Athenian Empire, and produced economic discord hindering postwar recovery. I argue innovations in the *ekklesia*'s activities, structures, and responsibilities during and after the Peloponnesian War reflect an institutional response to changes in Athenian civic ideology brought about by the significant wartime losses Athens suffered. Select procedures and functions were purposefully designed to facilitate and maintain democratic participation and public accountability, as well as to promote deliberation and equality among its citizens. The post-Peloponnesian War *ekklesia* did not become less democratic but instead adapted its procedures to slow democratic decision-making. These precautions aimed to address the vulnerabilities to external influences and internal corruption which had emerged during the war, and protect the will of the *demos* from arbitrary or sudden abuse. Adaptations to institutional design throughout the fifth and fourth centuries illustrate how Athens put its democratic preferences into practice and defined the boundaries of its civic ideology while minimizing risks to the state.

11:40 – 12:00 pm An Analysis of Gender in Apuleius's Cupid and Psyche Story and Twilight

Marisa Hudspeth

Faculty Sponsor: Kenny Morrell, Ancient Mediterranean Studies Program

In this paper, I examine the portrayal of gender roles within Apuleius's Cupid and Psyche story and Stephenie Meyer's Twilight series. First, I explore Cupid's and Edward's marriages through the lens of the Beauty and the Beast story. These narratives compare both men to monsters, animals, and specifically serpents. Psyche eventually "tames" the beast inside Cupid, gaining a measure of control in her relationship with Cupid that Bella is never able to achieve with Edward. Second, I discuss Psyche's and Bella's differing perceptions of their supernatural pregnancies. Both women become pregnant by their immortal husbands while they are still human, leading to conflicts about whether the fetuses will be born mortal or immortal. Psyche consistently puts her own interests above those of her unborn child's, whereas Bella is willing to sacrifice her life to carry her pregnancy to term. Finally, I examine the role of Venus and Rosalie as maternal figures jealous of Psyche's and Bella's beauty, youth, and fertility. I argue these

similarities stem from both stories' attempt to address the same questions and conflicts that would arise from pairing a mortal woman with an immortal man.

Ancient Mediterranean II

12:30 – 1:30 pm

Southwestern 207

Moderator: Matthew Kenny

12:30 – 12:50 Misanthropic or Just Misrepresented: A Deep Dive into the Life, Reign, and Reputation of Emperor Nero

Sarah Mann

Faculty Sponsor: Kenny Morrell, Ancient Mediterranean Studies Program

Tacitus, would have his readers believe that the Emperor Nero, was an evil madman, who is best known for starting the Great Fire of Rome and persecuting Christians. In this paper, I will suggest that this is simply a case of *damnatio memoriae*. Tacitus, a historian, politician, and contemporary of Nero, who hated the Emperor, wrote the most detailed account of his life. While most records of Nero portray him in a negative light, many historians now believe that Tacitus's personal feelings toward Nero render Tacitus' influential writings not credible. Concerns about Tacitus' biased perspective, with recent research, call for a reassessment of Nero. I will also look specifically at the accounts of Dio and Pliny, and present reasons why their arguments against him, are questionable at best. I will also examine the work of, Hülsen, who argues that conditions were not ideal for starting the fire intentionally, and Champlin, who notes that Nero's response to the fire is inconsistent with ideas about his role in it. Finally, the argument that Nero sought to clear the real estate for his new palace conflicts with evidence that he had already obtained the land that he required to build the Domus Aurea.

12:50 – 1:10 Ancient Wombs: Female Biology in the Hippocratic Corpus

Betsy Phillips

Faculty Sponsor: Susan Satterfield, Ancient Mediterranean Studies Program

Many know Hippocrates as the semi-mythological 'father of modern medicine.' This is for good reason; the Hippocratic writings are one of the earliest true attempts at medical writing and Hippocratic healers were among the first medical professionals. What many do not realize is that the Hippocratic corpus is a *mélange* of different authors and scientific theories, many of which are convoluted and outlandish, especially when it comes to female biology. The Hippocratics believed that the very nature of the female body was fundamentally different than that of the male body, and they used this as scientific "proof" that women were inferior to men. I will give a brief overview of "female biology" as the Hippocratics understood it, highlighting how their misconceptions were influenced by preconceived notions of female inferiority, and how their misconceptions perpetuated belief in female inferiority. I will explain why gynecology was considered the study and treatment of the entire female body, and how the Hippocratics understood the womb, menstruation, conception, pregnancy, and childbirth. As we are now more conscious than ever before of health and medicine, it is important for us to interrogate the misogynistic origins of gynecology to examine the biases we may still be carrying.

1:10 – 1:30 Do Gods Dream of Sacred Sheep? The Nature of Dreams According to Artemidorus

Lindie Page Harper

Faculty Sponsor: David Sick, Ancient Mediterranean Studies Program

Artemidorus, a professional diviner and dream interpreter from 2nd-century CE Asia Minor, begins his work, the *Oneirocritica*, by stating that he will not engage in debate regarding whether prophetic dreams are sent by the gods. As other omens and methods of divination in his time were understood to be divinely inspired, it would be easy to assume that prophetic dreams were also believed to have a divine external source. However, in analyzing Artemidorus' methods of interpreting the allegorical meaning of prophetic dreams, and in examining the outcomes of predictive dreams recorded by him, *Do Gods Dream of Sacred Sheep?* finds that Artemidorus approaches dream interpretation not from a religious perspective, but a psychological one, indicating that Artemidorus believes the source of dreams is indeed internal.

French

2:00 – 3:30 pm

Southwestern 207

Moderators: Dr. Laura Loth and Dr. Abou-Bakar Mamah

2:00 – 2:30 La nature et la spiritualité dans la littérature africaine

Claire Lucas

Faculty Sponsor: Abou-Bakar Mamah, Department of Modern Languages and Literatures

Pour mon projet de recherche, j'explore les thèmes de la nature et la spiritualité dans la littérature africaine. En particulier, je vais me concentrer sur deux aspects principaux. Premièrement, dans *La saison de l'ombre* de Léonora Miano, j'examinerai les relations entre les personnages et la nature – le rôle de la nature dans leur identité et leur compréhension du monde, et aussi l'importance spirituelle de la nature pour la communication avec les ancêtres. De plus, je discute l'utilisation de l'ombre dans le roman, comme une figure de style et un élément du monde naturel. Deuxièmement, je discute la nature et la spiritualité dans *Les soleils des Indépendances* de Ahmadou Kourouma. En particulier, je me concentre sur comment les communautés traditionnelles pratiquent à la fois des religions ancestrales avec les divinations et l'importance de la nature et de l'Islam. Entre ces deux romans, j'examine les effets du colonialisme sur les relations entre les africains, la nature, et la spiritualité.

2:30 – 3:00 La représentation des femmes dans *Les Soleils des Indépendances* d'Ahmadou Kourouma et *La saison de l'ombre* de Léonora Miano

Jessica Steiner

Faculty Sponsor: Abou-Bakar Mamah, Department of Modern Languages and Literatures

Ma thèse a pour sujet la représentation des femmes dans la littérature afro-francophone. Les droits de la femme ont longtemps été débattus. Avec cela, il y a une nette différence dans la représentation des hommes et des femmes dans la littérature. Mon projet explorera la représentation des femmes dans la littérature francophone africaine en conversation avec le traitement des femmes et la discussion sur les droits des femmes des périodes encapsulées dans la littérature et celle du moment où le livre a été écrit. Je m'appuie sur le discours de Thomas Sankara dans lequel il a inversé les rôles traditionnels, forçant les hommes à voir la vie

quotidienne des femmes qui les entourent. Les deux romans que j'étudie sont *Les Soleils des Indépendances* d'Ahmadou Kourouma et *La saison de l'ombre* de Léonora Miano.

3:00 – 3:30 L'unification du marché linguistique pour réaliser l'homogénéisation de la langue française: une étude de cas de la France et du Québec

Natalie Smith (Honors)

Faculty Sponsor: Laura Loth, Department of Modern Languages and Literatures

Pourquoi et comment est-ce que la France et le Québec maintiennent l'homogénéisation linguistique? Le sociolinguiste Pierre Bourdieu aborde cette question avec une approche théorique du marché laissez-faire où l'homogénéisation linguistique est réalisée quand les individus consomment et produisent la langue française pour qu'elle devienne le produit qui établit une monopolisation sur le marché linguistique. Cependant, pour adresser également le rôle que des institutions occupent dans la poursuite de l'homogénéisation linguistique, il faut ajouter une deuxième dimension à son modèle qui met en valeur la manière dont les bureaucraties françaises et québécoises réglementent le marché linguistique afin d'imposer la langue française dans la sphère publique. Cette étude avance la théorie que l'homogénéisation linguistique est maintenue par le processus d'unification du marché, qui comporte trois mécanismes principaux: le mécanisme d'établissement qui donne un statut officiel au français, le mécanisme de réglementation qui élabore les politiques linguistiques, et le mécanisme d'application qui fait appliquer ces politiques par la surveillance bureaucratique. En analysant comment ces trois mécanismes influencent le champ linguistique, il devient clair que les gouvernements français et québécois diluent la diversité de la langue dans leurs nations en contrôlant les produits et la valeur de ces produits qui entrent sur le marché linguistique

Spanish I – Gender Trouble in Hispanic Cultures

11:00 am – 12:00 pm

Online Session Link: <https://rhodes.zoom.us/j/99871344580>

Moderator: Natalia Cipponeri

11:00 – 11:15 Domesticidad en los cuentos cortos de Silvina Ocampo y Mariana Enriquez
Amy Band

Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages and Literatures

For this presentation, I researched the short stories written by Argentinian authors Silvina Ocampo (1903-1993) and Mariana Enriquez (1973-present). I examined themes of domesticity (specifically children and the home) in the authors' fantastical, and often times horrific, short stories. I will present Argentina's sociopolitical and economic history of the 20th and 21st centuries as a backdrop to these authors' works.

11:15 – 11:30 The Evolution of the Female Narrative in Spain
Cygy Willoughby

Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages and Literatures

In this presentation, I will compare and contrast three novels written by Spanish authors that take place during different time periods in the history of Spain. *Nada* by Carmen Laforet illustrates the atmosphere in Spain directly after the Spanish Civil War. *El cuarto de atrás* by Carmen Martín Gaité demonstrates how the country was during Franco's dictatorship and how its people plan to move on after his death. Lastly, *Feria* by Ana Iris Simón reflects on the country after it has transitioned to democracy. The notable elements that overlap in these three novels that I will be analyzing are space, time, the female experience, and the form of the novel itself.

**11:30 – 11:45 Mental Health Presented Through the Feminist Works of Samanta Schweblin
Renaé Isabella Lallo**

Faculty Sponsor: Alberto del Pozo Martínez, Department of Modern Languages and Literatures

Stigma surrounding mental health is one that affects many people today and can be associated with negative psychological outcomes. Studying mental illness and promoting mental health could contribute to better psychological outcomes for people across the globe, but this study will focus on South American countries including Argentina. Analyzing short stories written by Argentinean author Samanta Schweblin, this study investigates how Schweblin uses short stories to combat the stigma surrounding mental illness. In conjunction with this, Schweblin's work also fights against the social norms enforced by the machismo attitude offering an interesting perspective through which mental health and the perception of mental illness may be studied. The feminist perspective through which Schweblin writes her short stories provokes questions about social norms for women, consequently priming the reader to also challenge current stigmas regarding other marginalized groups of people who Schweblin also mentions in her works—including those with mental illnesses. This fresh perspective could be associated with increasing awareness about mental illness and work towards combating stigma in South American countries including Argentina.

**11:45 – 12:00 pm Representation of Women in Poems by Alfonsina Storni and Gabriela Mistral
Lauren Hodges**

Faculty Sponsor: Alberto del Pozo Martínez, Department of Modern Languages and Literatures

Alfonsina Storni and Gabriela Mistral are two Latin American poets from the 18th century. Both poets are considered to be a part of the modernism movement but produced their works at different times. Despite this difference, both lived and wrote through a radical change to the social, political, and economic institutions across Latin America. These changes are reflective in their works as they confront traditional social representations of sex and gender. They actively redefine the role of women and challenge the patriarchy. The way in which this is achieved changes from one poet to the other. This research explores these differences to answer what social or political changes existed that may have led to such differences. Further, it examines how these differences manifest politically through the analysis of multiple poems by each author.

Spanish II – Intersections between Language, Politics, and Ecology

12:30 – 1:30 pm

Online Session Link: <https://rhodes.zoom.us/j/99871344580>

Moderator: Lexis Sullens

12:30 – 12:45 pm Narrativas artísticas y científicas: la intérprete y dinámicas de poder en comunidades multilingües (Artistic and Scientific Narratives: Interpreters and Power Dynamics in Multilingual Communities)

Ansam Qaddoumi

Faculty Sponsor: Eric Henager, Department of Modern Languages and Literatures

Depending on the specific location and historical moment, Spanish has been a dominant or a minority language. The corresponding, shifting power dynamics affect crucial decisions made by agents who find it necessary to cross language and cultural boundaries, perhaps most intensely in acts of interpretation and translation. This study explores the power dynamics of Spanish in contact with other languages in order to examine choices related to accessibility and representation that agents working across language boundaries face. In particular, the study explores how power dynamics between Spanish and other languages affect interpretation and translation decisions made in the artistic and medical fields, and how artistic decisions can have implications in other contexts. In an increasingly bilingual world, interpretation and translation in the arts and medicine are important not only to transmit a message, but also to represent and include minority languages and make these resources more accessible and widespread to the people who speak them.

12:45 – 1:00 Se llama Rigoberta Menchú y así nació la conciencia guatemalteca

Brendan Fusco

Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages and Literatures

My presentation is entitled “Se llama Rigoberta Menchú y así nació la conciencia guatemalteca”. In this presentation, I seek to analyze the collective testimony of Rigoberta Menchú, the 1992 Nobel Peace Prize winner hailing from Guatemala. In doing so, I sift through 2 of Menchu’s most notable texts, “Me llamo Rigoberta Menchú y así me nació la conciencia” and “Crossing Borders”. The former thrust Menchú into stardom and highlighted key issues regarding the rights and status of Guatemala’s robust indigenous Maya population. The latter emerged after Menchú’s eventual exile to Mexico during the remainder of the Guatemalan Civil War. This presentation seeks to address the controversy that emerged after the publication of her first text as well as analyzing how consistent her testimony is across both books. Additionally, it will entertain the notion of how Menchu’s message and voice has changed from her newfound celebrity status following “Me llamo Rigoberta Menchú y así me nació la conciencia”.

1:00 – 1:15 Unveiling Marginalized Female Voices of Cuban literature: an exploration of El hombre, la hembra y el hambre by Diana Chaviano and Desde los blancos manicomios by Margarita Mateo Palmer

Santeria Pratt

Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages and Literatures

Few academic investigations and journals give attention to contemporary literature written by women in the genre of fantasy. Even less focus on this category of works from Cuba, despite Cuba's immense and diverse influence on Latin American literature. My investigation will engage with this pool of studies and apply them in my interpretation of two Cuban contemporary novels by women: *El hombre, la hembra y el hambre* by Daina Chaviano and *Desde los blancos manicomios* by Margarita Mateo Palmer. The objective is to deconstruct and compare the narrative components of both novels to highlight Chaviano's and Palmer's interpretation of the Cuban economic crisis of the 90's. The investigation will focus on uncovering both the Cuban cultural experience and the Cuban feminine experience. Using the layers of complexities, ambiguities, and subversions seen in both novels I explain how these characteristics reflect the Cuban identity during this severe period. I argue that both women use the genre of fantasy and complex novelistic structure to communicate their own criticism of the Cuban government and society using two different experiences of marginalized women: a prostitute and a patient of mental disorder.

1:15 – 1:30 Ecocriticism and Effects of Postcolonialism in Spanish Literature

Vann Walthall

Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages and Literatures

Resource extraction and changing power dynamics (or power vacuums) are leftovers of a postcolonial system in the Spanish Americas. Little respect was given to Spanish countries culturally, linguistically, and physically. Thus, we are left with different spheres of influence in these countries. Spanish literature covers some of these topics through an ecocritical lens; a feminist lens additionally empowers those who were twice-over wronged. Spanish writers address the pursuit of a utopia (or a better life) in the shadow of a postcolonial society through fictional representations of their true homes. The question then begins to form: what is best, utopia or reality? Can we truly find utopia, or does it only exist in our fictional imitations of our lives?

Spanish III – Studies on the Hispanic and Latin American Visual Arts

2:00 – 3:15 pm

Online Session Link: <https://rhodes.zoom.us/j/99871344580>

Moderator: Renae Isabella Lallo

2:00 – 2:15 La Catrina: a través de un siglo

Natalia Cipponeri

Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages and Literatures

La Catrina, the skeletal woman with a hat and skirt seen at so many celebrations of the Day of the Dead in Mexico, is a rich, complex figure of deep importance to Mexican tradition. First appearing in the artist José Guadalupe Posada's work, and revived again through the murals of Diego Rivera, La Catrina has been immortalized as one of the most famous representations of Mexican culture: but who is she and what messages does she convey? Through Disney's award-winning movie *Coco*, the importance of La Catrina and her meaning continues to shift through

the eyes of the artist portraying her. Over a century, from 1913 till today, La Catrina has come to represent many aspects of the Mexican people and regarded as a symbol of their history, unique culture, politics, and beliefs of death. By understanding the artists behind her creation, this paper aims to unfold these complexities and reveal how La Catrina came to be who she is today.

2:15 – 2:30 "Exploring Bastardilla: The Political Implications of Space and Art"

Maya Searle

Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages and Literatures

Modern street art and graffiti have long been associated with vandalism and crime yet today public art has transformed urban landscapes, fueled tourism, and helped spur urban redevelopment. The controversy of street art often relates to the frequent critiques of society and government placed in public and unauthorized spaces. Street art is a constantly adapting and temporary art form which has gained public interest in recent years fueling tourism and urban development. The unique form makes it accessible to the public and capable of sparking public discourse about current events and societal issues framed by the artwork. Often labeled as non-traditional artwork, street art and graffiti have ancient roots and have evolved to interact with modern issues and urban infrastructure. Artist Bastardilla from Bogotá, Colombia is known internationally for her street art. Famous for her anonymity and unique style of art Bastardilla utilizes street muralism as a form of self-expression. Her work often comments on violence, women's rights, immigration, indigenous rights, climate change and other current events. The politics of space, authority, and evolution of street art can be better understood utilizing the example of Bastardilla.

2:30 – 2:45 Buñuel, Dalí y Lorca: How the Spanish Civil War Influenced Surrealism

Lexis Sullens

Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages and Literatures

The influential Generation of 27 consisted of Luis Bunuel, Salvador Dalí, and Federico Garcia Lorca, three artists that concerned themselves with analyzing contemporary political events through artistic expression. In my research, I will explore how filmmaker Bunuel, painter Dali, and poet Lorca respectively rationalized Spanish wartime through surrealist art. There is a primary focus on the ideas of violence, as a criticism of the bourgeois versus fascist war violence and Freudian ideas of surrealism. In particular, I focus my study on Dali's *Soft Construction with Boiled Beans (Premonition of the Civil War)* (1936), Bunuel's *La Edad de Oro*, and Lorca's collection of poems in New York before his exile. Finally, I introduce the idea of the subconscious, a theme central to surrealism, to consider how the art speaks for the individual artist and the Spanish collective during violent conflict.

2:45 – 3:00 Commemorating the Missing: How Colombian Artists Mourn of the Armed Conflict
Marlo Morales

Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages and Literatures

Colombian artists have taken initiative to fight against the violence brought about by the armed conflict by commemorating the trauma that the Colombian people have endured since 1948. Though these artists take different approaches, visual artists, Beatriz González, Doris Salcedo and writer, Laura Restrepo are all taking a stand against the violence in their native country by drawing attention to forced disappearances and displacement of millions of Colombians. Restrepo's novel *A Tale of the Dispossessed* commemorates a personal experience of a rural displaced Colombian man, an experience which many Colombians today can relate to. Though Restrepo's novel is nothing short of a moving masterpiece, literature in general lacks the ability to reach the quantity of people that public installation art does. Beatriz Gonzalez's installation piece, *Desplazamientos* and Doris Salcedo's installation piece *Noviembre 6 y 7* reach more people more efficiently than Restrepo's novel. These pieces prove to be more effective in commemorating Colombia's trauma and the legacy of millions of displaced and disappeared people by being more accessible. Though all of these works successfully honor these people's legacies, public installation reaches more people, better amplifying the artist's message.

3:00 – 3:15 Holy Mary in the Cantigas of Santa María: Participant, Protector, and Patron of Conquest and Colonization

Griffin Laird

Faculty Sponsor: Clara Pascual-Argente, Department of Modern Languages and Literatures

The *Cantigas de Santa María* are a collection of 420 songs in Galician-Portuguese, some of them accompanied by narrative illustrations, that were created in the thirteenth century under the direction of King Alfonso X "the Wise" of Castile. The cantigas are part of the monarch's ambitious cultural program, which also included the production of Castilian translations of Arabic scientific works, histories of the world and the Iberian Peninsula, and an influential law code, the *Siete Partidas*. The cantigas have often been studied as literary and artistic works, as well as musical artifacts, but they are also a vehicle to shape and transmit Alfonso X's political and cultural objectives, a dimension that has been the focus of recent scholarship. Drawing from these findings, in this presentation, I will analyze several cantigas to show how they use Marian devotion, Marian narratives, and Marian participation to recount, process, and justify the ongoing process of conquest and colonization of Muslim territory in which Castile was actively involved during Alfonso's reign.

NATURAL SCIENCES ORAL SESSIONS

Biology & Biochemistry and Molecular Biology

11:00 am – 12:00 pm

FJ – B

Moderator: Mia Harris

11:00 – 11:15 Pain Neuroscience Education

Heidi Frazier

Faculty Sponsor: Jonathan Fitz Gerald, Department of Biology

Physical therapists use a technique called Pain Neuroscience Education to address the significant and challenging problem of chronic pain. Also known as Therapeutic Neuroscience Education, Pain Neuroscience Education is defined by Physiopedia as “consist(ing) of educational sessions for patients describing in detail the neurobiology and neurophysiology of pain and pain processing by the nervous system.” This technique has been used by therapists since 2002. While, some patients are interested in the mechanisms of their pain, many are not. The goal of Pain Neuroscience sessions is for patients to better understand their experience of pain, to educate patients around pain and, over time, change their perception of pain. The goal when educating patients about pain is to diminish fear and pain while doing therapy, physically moving around, and/or doing normal daily activities. Pain Neuroscience Education is best used with a combination of treatments, including exercise therapy, to break down movement-related pain memories via graded exposure to exercise and decreased sensitivity of the nervous system. This paper breaks down our understanding of pain and the new therapies educating patients about where pain stems from.

(F) 11:15 – 11:30 Identifying and Categorizing the Key Studies within Pediatric Epilepsy

Wiley Pippenger, Stephen Fulton, and Andrew Gienapp

Faculty Sponsor: Larryn Peterson, Department of Chemistry

Bibliometric analysis is often used to determine the impact of an article as a function of how many times it is cited by other publications. In this case, it was used to develop a list of the top 100 most cited articles in pediatric epilepsy to be easily accessed by medical residents and physicians. Web of Science was used to collect the top cited articles under relevant search terms for “pediatric epilepsy.” The top 100 relevant articles were compared by citation count, year of publication, and journal of publication. More importantly, they were sorted into ten topic areas within pediatric epilepsy. Articles in the category of epidemiology (n=19) and surgery (n=19) were the most popular, followed by articles about drug treatment (n=17) and psychology/psychiatry (n=17). The remaining six categories accounted for only 28 articles: neuropsychology (n=13), pathology (n=4), neuroimaging (n=4), devices (n=3), diet treatment (n=2), and practice guidelines (n=2). This list is now available for medical residents and physicians to readily access the leading papers in each category.

11:30 – 11:45 Grounded Reasoning about Robot Capabilities for Law and Policy

Osman Celikok

Faculty Sponsor: Ross Sowell, Department of Computer Science

In this project we investigate the effectiveness of different interactive methods of teaching non-experts about how robots visualize and navigate the world around them. Robots are continually becoming a bigger part of day-to-day life. While the access to robots is growing, there continues to be a gap in the minds of most individuals between their conceptualizations about robots and the reality of robots. This gap results in there being major problems in interactions with robots and leads to the passing of misinformed and improper laws and policies regarding robots. In order to bridge this divide, we create learning modules and compare their effectiveness. We evaluate three styles of learning module interfaces (physical, web application, and web video) and ask a set of questions before and after the learning modules to gauge each interface's effectiveness. Our evaluation looks at the theoretical knowledge a user gains and their ability to apply said knowledge. We use both self-reported and indirect measures to gauge comprehension. We hypothesize that 1) the physical learning module interface will be more effective than virtual interfaces; 2) exploratory experiences, combined with non-anthropomorphic language, is effective for improving reasoning capabilities.

Chemistry I

12:30 – 1:30 pm

FJ – B

Moderator: Benjamin Oelkers

(F) 12:30 – 12:45 “As long as they don’t grow, that’s good!”: Communicating prognostic uncertainty when children with high-risk cancer do not progress

Emma Chow, Amy S. Porter, MD, PhD, Cameka Woods, MBA, CRA, Justin N. Baker, MD, Jennifer W. Mack, MD, MPH, Erica C. Kaye MD, MPH

Faculty Sponsor: Larryn Peterson, Department of Chemistry

Direct and truthful prognostic disclosure throughout the illness course benefits pediatric patients and their families. When patients with high-risk disease do not progress as expected, oncologists struggle to discern likelihood of cure and thus to communicate prognosis. In this study, we focused on settings in which children with high-risk cancer did not progress as expected to (1) assess how frequently oncologists communicate prognostic information and (2) describe thematic patterns in how they communicate such information in settings of prognostic uncertainty. In this prospective, longitudinal, qualitative study, we audio-recorded serial disease reevaluation conversations between children with high-risk cancer, their families, and their primary oncologists over 24 months. This sub-analysis focuses on children with high-risk cancer who did not progress as expected. Prognostic communication was absent in <50% of conversations, comprising <5% of dialogue time. Prognostic uncertainty was communicated far more often than curability and goals of care. Inductive content analysis of prognostic communication dialogue revealed five patterns in which oncologists shared prognostic

information when disease reevaluation findings lacked evidence of frank disease progression: (1) expressions of temporary excited relief, (2) strong seed planting, (3) uncertainty with what is seen on a scan, (4) balancing concern with optimism, (5) desire for certainty.

(F) 12:45 – 1:00 The Effects of Body Weight Unloading on Economy and Ground Reaction Forces

Ben Hazelwood, Zoey C. Kearns, Malia R. Sanders, Adriana Miltko, and Max R. Paquette
Faculty Sponsor: Dana Horgen, Department of Chemistry

The Lever Running System is a highly portable and relatively affordable bodyweight unloading system that fits on almost all commercial treadmills. The purpose of this study was to assess running economy and ground reaction forces while running at various speeds and bodyweight unload conditions using the Lever Running System (LRS). 16 runners ran for 3 minutes at 2.98 m/s, 3.35 m/s and 3.84 m/s for each of three body weight (BW) conditions using the LRS: 100%BW, 90%BW, and 80%BW. During all trials, metabolic data, 3D GRF and 3D kinematic data were collected. No interaction effects were observed for all dependent variables. VO₂ was lower at 80%BW compared to 90%BW and 100% BW and at 90% BW compared to 100%BW. VO₂ for 80% and 90%BW at 3.84 m/s were similar to 100%BW at 3.35 m/s. Peak braking GRF, peak propulsive GRF, vGRF, instantaneous vertical loading rate, vertical impulse, and oscillation were all lower at 80%BW and 90% compared to 100%BW but not different between 80% and 90%BW. Our findings suggest that body weight unloading reduces oxygen consumption from full body weight to 80% of bodyweight but only reduces magnitudes of external forces from full body weight to 90% bodyweight.

1:00 – 1:15 Developing and refining a theory of change to improve time to antibiotic administration for febrile pediatric oncology patients in real-world settings: Experience from the MAS Golden Hour Collaborative

Alisha Pershad, Naomi Echeandia-Abud, Francis Duran, Miriam Gonzalez, Logan Houston, Cecilia Enriquez-Chavez, Paula Aristizabal, Jafet Arrieta, and Paola Friedrich
Faculty Sponsor: Larryn Peterson, Department of Chemistry

From May 2019 to November 2020, 23 institutions participated in the first Mexico in Alliance with St. Jude Golden Hour Quality Improvement Collaborative (MAS Collaborative) and improved the proportion of febrile pediatric hematology-oncology patients who received the first dose of antibiotics in ≤ 60 min from 39% to 78%. This report describes the process followed to develop and refine the shared theory of change (TOC) to improve outcomes. The TOC was built over the course of four phases: pilot testing, driver diagram refinement using input from a multidisciplinary expert panel, multisite deployment, and consolidation and dissemination. The final driver diagram, a TOC visualization tool, included five primary drivers, 18 secondary drivers, and 97 change ideas. At the close of the MAS Collaborative, teams reported the change ideas they tested and their degree of belief (low to high) that the change ideas had led to improved outcomes. The inherent flexibility of this TOC allowed teams to operate with a sense of agency, developing, adapting and implementing changes and led to reports of increased empowerment. This TOC provides practitioners with practice-based evidence to reduce time to antibiotic administration and improve clinical outcomes for children with cancer in resource-limited real-world settings.

(F) 1:15 – 1:30 Determining the pKa values of catechols by using UV-Vis spectroscopy

Gisela Xhaffkollari, Alexa Alana, and Keri L. Colabroy

Faculty Sponsor: Larry Peterson, Department of Chemistry

Enzymes such as catechol-O-methyltransferase (COMT), L-3,4-dihydroxyphenylalanine (L-DOPA) dioxygenase, and cytosolic sulfotransferases (SULTs) have catechols as their substrates. Among these catechols, dopamine, catecholic nitriles, L-DOPA, and 3,4-dihydroxyhydrocinnamic acid (DHHCA) are of importance. A number of novel derivatives of these catechols with a range of substituents on the aromatic ring were synthesized to examine the substrate selectivity and mechanism of the aforementioned enzymes. Determining the pKa values of these compounds is crucial in understanding their reactivity and identity as many enzymatic reactions involve the abstraction of the proton as part of their mechanism. UV-vis spectroscopy was used to determine experimentally the pKa values of these catechols, providing information about their behavior and interaction in the active site. The pKa values of these compounds correlate well with the electron-donating/withdrawing ability of the substituent.

Chemistry #2 / Physics

2:00 – 3:00 pm

FJ – B

Moderator: Olivia Kaufmann

(F) 2:00 – 2:15 Hematopoietic Stem Cell Regulation by N-terminal Protein Modifications

Julia Vining, Dr. Chris Nevitt, Dr. Shannon McKinney-Freeman

Faculty Sponsor: Larry Peterson, Department of Chemistry

Hematopoietic stem cells (HSCs) are able to give rise to all blood cells and are the therapeutic component of bone marrow transplantation. However, how these HSCs are dynamically regulated is still poorly understood. N-terminal modifications on the alpha amino group are widely occurring across the proteome, with N-acetyltransferases (NATs) acetylating the free amine while N-methyltransferases (NTMTs) methylate this position. To evaluate a possible regulatory role for these enzymes, their expression was observed across the hematopoietic hierarchy and HSC ontogeny showing differential expression throughout. It was found that high expression of the NAT NAA40 correlated with decreased survival in AML patients. To validate NAA40 as an aggressive cancer driver, cell cultures were grown of AML cell lines THP-1 and KG1 which held high NAA40 expression. NAA40 was then knocked down and will be transplanted into mouse models to see what phenotypic differences arise. Recent work from other laboratories regarding NTMT1 has implicated regulation of neural stem cells, leading to the continued question and exploration of its role in HSC regulation. The findings point towards possible roles for N-terminal protein modifications in regulating healthy and malignant hematopoiesis and underscore the need to further understand this class of protein regulation.

2:15 – 2:30 Design and Synthesis of Novel Anti-Bacterial Compounds to Combat Gram-negative Bacterial Resistance and Infections

Emma J. Chow, Gabriella A. Krisanic, Jacob D. Greenberg, Eleanor A. Fontana, Campbell A. Brown, Trinity L. Liaw, Maria F. Alvaro, and Larryn W. Peterson

Faculty Sponsor: Larryn Peterson, Department of Chemistry

The development of chemical compounds with broad-spectrum activity against Gram-negative bacteria, which cause life-threatening illnesses, is imperative to source our limited stores of antibiotics and to combat the growing resistance of bacteria to antibiotics. These novel compounds, which include a hydrophobic moiety amide coupled to a propargylglycine-based hydroxamic acid, will provide additional options for the treatment of Gram-negative bacterial infections. Gram-negative bacteria with the TolC-mediated efflux pump have effectively removed propargylglycine-based anti-bacterial compounds with a biphenyl tail, resulting in limited activity of these compounds. However, the design of novel compounds that avoid the efflux pump with better overall antibacterial activity have been investigated. The pathways to the design, successful synthesis, and purification of these novel compounds will be presented.

2:30 – 2:45 Insight Into the Interactions Between Charged, Conducting Spheres

Nolan Brown, Shubho Banerjee

Faculty Sponsor: Shubho Banerjee, Department of Physics

The capacitance expressions which ultimately govern the interactions between charged, conducting spheres are mathematically complex. It is difficult to gain intuition regarding the behavior of the spheres simply by looking at the expressions themselves. However, by reformulating the capacitance expressions, we can simplify them and gain better understanding of the spheres' behavior. We can do so by performing series analysis and by analyzing the simpler expressions themselves. I present the reformulated capacitances of the spheres, as well as qualitative explanations of anomalous phenomena computed between the charged, conducting spheres, such as a temporary inverse relationship between sphere separation and repulsion, and a conditional inverse relationship between sphere voltage and repulsion.

(F) 2:45 – 3:00 Investigating Physical Properties and Transport of Magnetic Microspheres by Observing Particle Motion

Ryan Simms, Eliza Howard, Greg Vieira

Faculty Sponsor: Gregory Vieira, Department of Physics

Magnetic microspheres are commercially available particles made of iron oxide encapsulated in polystyrene. These particles are mainly designed for bioseparation of cells, proteins, DNA, and RNA as they can be bound to a target material/structure which allows for separation of the particles in a mixture by magnetic means. Recently, there has been the development of surface-based transport schemes of superparamagnetic beads using external magnetic fields. In our lab, we investigate particle motion on our unique experimental setup consisting of a stage, microscope, and recording equipment as well as arrays of micro-scale permalloy disks, aided by the application of time-varying magnetic fields. In my presentation, I will discuss both long-range and short-range microsphere transport on disk arrays and include sources of error and troubleshooting protocols. Furthermore, I will partly discuss computer models which simulate

transport and the observed behavior, and the importance of our results. These results are dependent on the magnetic susceptibility of the beads which we have also investigated. Additionally, I will look to examples of future experimentation in this lab, some of which include changes to the experimental setup and disk array structures.

Computer Science I

11:00 am – 12:00 pm

FJ – C

Moderator: Raeba Roy

11:00 – 11:15 TripWizard: A Road Trip Planning App

Julianna Foster, Grace Hill, and Abby Roevens

Faculty Sponsor: Catie Welsh, Department of Computer Science

TripWizard is an android application created to aid people in organizing and planning a road trip. It has many features that help people keep track of important information, so they can relax more and enjoy the ride. The implementation of this app uses the Android Development Kit, and is written in Kotlin. It is supported by Firebase's authentication and database resources, as well as Google Maps. The main goal of the app is to let users create an itinerary that will have all the information they need to have a successful road trip, and support secondary features, such as keeping track of how much money they've spent, tracking events on a calendar, and using Google Maps directions.

11:15 – 11:30 Share-A-Ride: Bringing Student-Led Carpooling to Rhodes

Jadesse Chan, Sarah Jarrell, Ryan Jones, and Huyen Tran

Faculty Sponsor: Catie Welsh, Department of Computer Science

For many students, college is their first time away from home. Exploration of one's new surroundings is a staple of the college experience. Some students don't have access to transportation. We hope to create a safe, intuitive, and reliable way for students to connect and explore the city. This is important for first years and transfer students who are looking to make more connections and cultivate their college experience, but also relevant to all current students after the period of isolation caused by COVID-19. Thus, to facilitate our goal we are developing a carpooling website called Share A Ride. We created a responsive website that makes our service compatible with all screen sizes. This allows students to access Share A Ride from any location. In order to cultivate a sense of community within the student body, our service has features for users to create interest-related groups, add new friends, leave anonymous reviews on drivers, and can customize ride-sharing preferences. Our service also integrates with Rhodes' OneLogin SSO, which enables us to verify users' identities to ensure they are current students at Rhodes. These features allow students to find or offer a ride while making new connections on campus.

11:30 – 11:45 Comfort Zone: A Safe Space Created from Virtual Reality

Allie Leising, Jiwoo Lee, Jordan Hare, and Ethan Ferguson

Faculty Sponsor: Catie Welsh, Department of Computer Science

Virtual Reality (VR) is a simulated experience similar to or completely different from the real world. The industry has been growing fast as constant improvements to VR hardware, such as the introduction of smaller and more portable devices, support an increased VR adoption in other industries including healthcare, education, and marketing sectors. In particular, VR has been recognized as an effective tool to reduce negative emotions during medical treatments and for helping to treat mental disorders. Connecting this idea to providing comfort for children, we try to address the question of whether it is possible to use VR to induce positive emotions for people, especially children. We are planning to build six different environments (Castle, Space, Under the Sea, Disco, Sky, and Football Stadium) on Blender and Unity. To further enhance the immersion and imagination aspects of VR, we are also incorporating some of the animations we extracted in the motion capture lab. In order to measure the effects of VR on comfort level, we will use at least 30 test participants and have them complete three evaluations, one on motion sickness, usage, and overall emotions in addition to measuring heart rates.

11:45 – 12:00 pm Rhodesdorms.com

Jun Kim, Hung Tran, DJ Barker, and Chris Willis

Faculty Sponsor: Catie Welsh, Department of Computer Science

Many first-year students at Rhodes know very little about the dorm in which they will be staying before they get to campus. We built a website called “RhodesDorms.com”, which will allow first years to see not only what their potential rooms will look like, but will also let them see reviews made by previous residents. RhodesDorms.com is a tool that can be used by upperclassmen as well to see potential dorms they may want and how fellow students reviewed the experience in those dorm rooms. Through Frameworks like “React JavaScript” and “Python's Django” our team was able to construct a website that allows exclusively Rhodes students to write reviews on dorms and let future students see what it's like living in the various dorms around Rhodes campus.

Computer Science II

12:30 – 1:30 pm

FJ – C

Moderator: Allie Leising

12:30 – 12:45 Hate Speech Classification and Counter Speech Generation

Kimberly Aiken, Lesh Chadick, Marisa Hudspeth, and Mohammed Hyder

Faculty Sponsor: Catie Welsh, Department of Computer Science

Online hate speech classification is a well-studied problem, but it is common to stop at this point, with social media companies tending to provide warnings or delete content that has been identified as hateful. More recently, researchers have begun investigating the generation of

counter speech in response to hate speech. This method sidesteps concerns about censorship while still addressing hate speech. In our project, we have developed two models. The first classifies text as targeting one of the following groups of people: disabled, Jews, LGBT+, migrants, Muslims, women, POC, mixed (targeting multiple groups of people), or none (targeting no one/not hate speech). Given this classification, the second model generates an appropriate counter response. We present results comparing the accuracy of different combinations of models and word embeddings, both for the classifier and counter-speech generator, tested on real-world posts from Reddit and Tumblr.

12:45 – 1:00 pm Raving Craving: Find Your Perfect Meal

Raeba Roy, Alexandria Smith, and Fernando Serrano

Faculty Sponsor: Catie Welsh, Department of Computer Science

We have all been in situations where we were looking for unique dishes to satisfy our cravings. Whether it be gluten-free doughnuts, extra spicy wings, or vegan tacos. Our web application Raving Craving hopes to satisfy your craving by helping you find your perfect meal. This web app is designed to parse through restaurants in the greater Memphis area and create a list of meals with their locations that fit the users' requests using our intricately designed filtration system. To find your perfect meal, the user will input their perfect meal with the entrée item and the adjectives used to describe the dish and our algorithm will develop a customized menu with assorted food items to satisfy their food cravings. Unlike Yelp, GrubHub, and Google, this app will give the user direct meal suggestions rather than restaurant suggestions. Not only does our app hope to help those with niche food cravings, but also helps those who have allergies and dietary restrictions not be limited to certain food options when going out to eat.

1:00 – 1:15 pm Foster Finder

Anese Park, Sarah Judd, Thu-Trang Nguyen, Jade Yang

Faculty Sponsor: Catie Welsh, Department of Computer Science

There are many animals that are in need of shelter, and a number of organizations and individuals that are willing to take care of these animals. However, building the bridge between potential fosters and animals that need fostering can be difficult. In particular, each foster organization has its own application and screening process. This requires potential fosters to fill out countless surveys and submit to numerous home visits if they'd like to foster for more than one organization. Additionally, animal shelters spend copious time posting ads to find potential fosters. Therefore, we built the app, Foster Finder. Foster Finder supports both potential fosters and foster organization accounts. Potential fosters enter information related to fostering, such as whether they have children or other animals at home. Meanwhile, Foster Finder keeps a database of animals that need fostering and presents this information to prospective fosters. Additionally, animal shelters will be able to review and accept or deny foster applications, and post animals available to foster. This app will help potential fosters and animal shelters decrease time and costs in communication and allow more animals to find people to care for them while they wait for their forever homes.

1:15 – 1:30 Computational Chemistry: Molecular Immunotherapeutic Research

Taylor Ratliff, Catherine Magee, and Deion Locklear

Faculty Sponsor: Catie Welsh, Department of Computer Science

The students in Dr. Stoddard's Molecular Immunotherapeutics Research (MIR) lab produce potentially lifesaving research. However, many of the computational analysis tools necessary to do this work require students to use the command line to run various scripts and tools. According to our survey many biochemistry students have limited command line experience which in turn can negatively affect the return time of their results. Therefore, the purpose of our project is to increase these students' ability to engage in research without needing to learn the command line. More specifically, we have built a website that consists of file conversion and programs which output results that students can access directly from their Box folder. We were provided with 48 python scripts, some of which had overlapping functionality, and we combined these to make one main script that runs all programs and conversions. The website was built using Sublime Text, HTML, and CSS, and provides a streamlined process that no longer requires knowledge of the command line.

Mathematics

2:00 – 3:15 pm

FJ – C

Moderator: Deion Locklear

2:00 – 2:15 Voting Systems and Notions of Fairness

Nico Lindsay

Faculty Sponsor: Eric Gottlieb, Department of Mathematics

Voting systems are useful because they aggregate individual preferences into one group preference. However, while this should seem fair to everyone in the group, how fair can they truly be? Kenneth Arrow explored this concept in the 1950's and concluded that given a set of desirable and intuitive properties (axioms of fairness), all voting methods other than dictatorships violate at least one of these properties. We will first define some terms and provide background information on voting systems. We will identify Arrow's axioms of fairness and provide examples of voting systems violating such properties. Then we will examine the properties of anti-IRV, followed by some commentary on strategic voting and the manipulability of such voting systems. We will conclude the talk with discussion about Arrow's results and their implications.

2:15 – 2:30 Row-Column-Split: An Analysis of a Novel Impartial Combinatorial Game

Zack Roder

Faculty Sponsor: Eric Gottlieb, Department of Mathematics

Combinatorial games are games of perfect information and no chance where two players take turns moving alternatively. Of particular interest are impartial games, a subset of combinatorial games with the added condition that the moves available to a player depend only upon the game

state, not upon which player is moving. With the Sprague Grundy Theory for Impartial Games, we have a framework with which we can determine whether any game of this type will always be a win for the first or second player, assuming perfect play. In this presentation, we will apply the Sprague Grundy Theory to analyze Row-Column-Split, a novel impartial game played on Ferrers diagrams. Furthermore, we will share results that allow us to readily identify the Sprague-Grundy value of Row-Column-Split games played on Ferrers diagrams of particular shapes.

2:30 – 2:45 Integrating Functions via the Hilbert Embedding

Lily Whitesell

Faculty Sponsor: Christopher Seaton, Department of Mathematics

Let G be a collection of $n \times n$ invertible complex matrices. Define $C[x_1, \dots, x_n]^G$ to be the set of polynomials in n variables that are invariant under G --they don't change when elements of G are applied to the variables. If we suppose G acts on a vector space V and assume that G is either finite or a classical group, then a theorem of Hilbert guarantees that $C[x_1, \dots, x_n]^G$ is finitely generated. Then a finite set of polynomials f_1, \dots, f_k , called a Hilbert basis, generates the subalgebra of $C[x_1, \dots, x_n]$. Given a Hilbert basis, the Hilbert embedding (a map $f: V \rightarrow R^k$) can be defined, allowing us to think of the orbit space (the image of the Hilbert embedding) as a subset of R^k . The goal of my research is to integrate functions that are invariant with respect to a group action over the orbit space via the Hilbert embedding. I will integrate a smooth function of invariant polynomials (by the Schwarz-Mather Theorem) to compute the integral of the invariant smooth function (known as the canonical measure). I present computations of this canonical measure in some corregular cases.

(F) 2:45– 3:00 Hilbert Series of Invariants of the 2-Torus

Mike Shible

Faculty Sponsor: Christopher Seaton, Department of Mathematics

A function is considered invariant under a transformation if the value of the function does not change when the transformation is applied. The function is considered invariant under a group of transformations if it is invariant under all transformations in the group. The Hilbert series of a group of transformations gives information about the polynomials that are invariant under that group. Given a term of the series of the form Ct^d , the coefficient C is the number of invariant polynomials of degree d under the transformation group, up to multiplication by a number and function addition. In this presentation, we give a formula for the Hilbert series of invariants of the 2-torus. Given a faithful representation of the 2-torus on a complex space of arbitrary dimension, we give a weight matrix. We then express the torus action in terms of the weight matrix, use the Molien-Weyl theorem to express the Hilbert series as an iterated contour integral over the complex unit circle, and evaluate the integral using the Cauchy Residue Theorem. We will also discuss our progress towards the formula for the Hilbert series of the 1-torus for an arbitrary natural number l .

SOCIAL SCIENCES ORAL SESSIONS

Anthropology / Sociology I

11:00 – 11:45 am

Clough 204

Moderator: Dr. Earl Wright II

11:00 – 11:15 Do Anti-Depressant Prescription Drugs Lead to Mass Shootings?

Karl Van Blargan

Faculty Sponsor: Laura Loth, Department of Anthropology and Sociology

Mass shootings are an ever-present issue in American Society, and it behooves us to understand its causes. In this study I examine the potential link between mass shootings and Selective Serotonin Reuptake Inhibitors (SSRIs). Specifically, the research question guiding this study is “Do anti-depressant prescription drugs lead to mass shootings?” There is little understanding of how SSRIs work in the body and limited knowledge on the side effects. If SSRIs cause people to carry out horrific acts of violence, then the American people should be informed. Currently, science and medical professionals are unwilling to take a firm stance about the potential violent side effects these drugs may have, and instead claim that more research is necessary to fully understand them. In this study I conduct a content analysis of the media to ascertain if and how the prescription drug use of mass shooters is characterized. Using the functionalist theoretical lens, I argue that the body works and functions as a system to maintain homeostasis. If SSRIs introduced into the body act as a dysfunction it is important to understand how this affects the system. It is my hope that a clear consensus emerges in the scientific community, possibly, using the functionalist theoretical lens to understand exactly how SSRIs impact people.

11:15 – 11:30 Compassion Fatigue and Volunteer Organization

Faith Coffman

Faculty Sponsor: Laura Loth, Department of Anthropology and Sociology

Compassion fatigue is a burgeoning field of research that can be further enhanced by diving into specific populations, such as service providers for the queer homeless population. By providing analysis on if and how compassion fatigue shows up in these service providers, organizations doing this work can better help their staff’s mental well-being which will ultimately benefit the queer homeless population that is in so desperate a need for help. This study attempts to answer the question: Do service providers who work with queer homeless youth at nonprofit organizations aimed at supporting LGBTQ+ people in the south experience compassion fatigue? Arlie Hochschild’s theory of emotional labor is used to frame the data gathered in semi-standardized qualitative interviews with staff at two organizations across the South that work with the queer homeless population. I hypothesize that these interviews will show that not every service provider has experienced the full extent of compassion fatigue, but that all study participants have symptoms that align with burnout or the beginnings of what could be considered compassion fatigue. It is expected that this study will provide a baseline of *best*

practices for individuals and organizations working with LGBTQ+ people in the south to combat compassion fatigue in their staff.

11:30 – 11:45 An African Americans’ Islamic Conversion Narrative

Hasan Hamada

Faculty Sponsor: Earl Wright II, Department of Anthropology and Sociology

I was born Muslim in the United States and am always proud when someone converts to Islam. This interest led me to the research question guiding this study, “why do African Americans convert to Islam?” This question is timely and relevant because Islam is a religion whose believers have long experienced discrimination in the United States, but especially since 9/11. Given this fact, I want to understand why members of a marginalized group would be attracted to the Islamic religion, another marginalized entity in the United States. Answers to this research question will help us better understand the social, racial, and religious dimension of American society. This research was conducted in a large Southern city where I conducted in-depth interviews with African American converts to Islam. Using the snowball sampling technique, I engage with worshippers at my local mosques to construct a narrative of the conversion experience of African Americans. Using macro-conflict theory and Snow and Machalek’s conversion theory, I show that the motivating factor in the conversion of African Americans to Islam is their tension with societal conflict and disorder which leads to change and then becomes order once they embrace Islam.

Anthropology / Sociology II

12:30 pm – 1:45 pm

Clough 204

Moderator: Mary Katherine Brown

12:30 -12:45 Space Junk, “Near-Earth” Space, and Anthropocentrism

Rachel Perry

Faculty Sponsor: Hadi Khoshnevis, Department of Anthropology and Sociology

Upwards of 27,000 pieces of orbital debris or space junk are traveling around the earth placed there by humans and their desire for “exploration.” About 23,000 are pieces larger than a softball traveling at speeds up to 17,500 mph. These staggering numbers never turn into public knowledge or concern because we perceive space as infinite and out of sight. Even at the scientific level, the main concern is around “near-Earth” space and the urgency of regarding it as an ecosystem. This specification proves that the motive behind it is to protect Earth and the people on it. While this is vitally important, as the ecosystems and organisms on Earth must be protected, it reveals an unacknowledged hierarchy: The nature surrounding humans is the nature that must be protected because it will have repercussions that affect us, revealing the anthropocentric concept that there is no protection of nature for nature’s sake. Nature matters only if it impacts us. This research explores how and why the hierarchies of which nature is important were established. In this presentation, I explore how and why these hierarchies of

significance were established and framed in an apolitical language that centers humans, their aspirations, and their safety.

12:45 – 1:00 The Impact of COVID on College Students' Body Perception

Tallulah Ritchie

Faculty Sponsor: Laura Loth, Department of Anthropology and Sociology

According to the National Association of Anorexia Nervosa and Associated Disorders, 9% of the U.S. population (~28.8 million people) will struggle with an eating disorder in their lifetime (such as Anorexia Nervosa, Binge Eating Disorder, and Bulimia nervosa). A greater number will experience maladaptive eating patterns and/or body dissatisfaction (Jones, et al. 2005). These disorders and disordered patterns are the result of numerous (cultural, socioeconomic, and biological) elements, and are often worsened by specific risk factors such as social isolation, food insecurity, fatphobic messaging, increased social media consumption, and restricted healthcare access (Cooper et. al 2020). Given the direct physical and emotional harm to girls and women, this topic is important and worthy of scientific study. The question driving this study is, “Have women's (and non-gender-conforming individuals’) pandemic experiences affected their body image and/or eating behaviors?” Utilizing original field and survey data from a sample of students at a private liberal arts institution in the South, this study will contribute to this emerging body of work by analyzing individuals’ unique pandemic experiences. I hypothesize that the findings of this study will support the existing novel literature, which has thus far concluded that the pandemic has negatively affected individuals’ experiences with maladaptive eating patterns and/or body dissatisfaction.

1:00 – 1:15 What Barbie Movies Teach Us About Gender Roles

Emi James

Faculty Sponsor: Laura Loth, Department of Anthropology and Sociology

Walk down any toy aisle in America and one cannot escape *Mattel* and the plethora of pink colors surrounding one of their main lines: *Barbie*. A lesser acknowledged facet of the line is that Barbie media contains over thirty-five direct-to-DVD movies and other content. I have been fascinated with the barbie movie franchise since I was a child and that spurred my interest in this area of research. The research question guiding this study is “What do Barbie movies teach us about gender roles?” This question is important because of the prevalence of *Barbie* consumption among young children, especially girls. In this study I use content analysis in the examination of Barbie movies to understand the gender roles presented. More specifically, I use a two faceted content analysis to examine general trends across thirty-three of the movies as well as behavioral characteristics in seventeen of them. Through the lens of feminist as well as cultivation theory, the results suggest that while the movies portray some stereotypical representations, they also allow for levels of variance within those portrayals.

Economics

2:00 – 3:15 pm

Buckman 200

Moderator: Dr. Bruno Badia

2:00 – 2:15 Medicaid Expansion on Labor Market Movements: An Exploration into the ACA Bill

Anna Benafield

Faculty Sponsor: Jaqueline Oliveira, Department of Economics

While public transfers such as Medicaid and Medicare provide integral support to moving individuals out of poverty, many critics argue that such relief may decrease participation in labor markets. The Affordable Care Act increased the income cap needed to receive Medicare and has expanded state by state since 2014. This paper examines its effect on labor market participation, namely the types of employment and hours worked due to Medicaid expansion. I also will look at the impact on divorce rates as individuals are less reliant on spouses for affordable healthcare. My study is to investigate the differences in opportunity costs for individuals both privately and publicly when they have greater access to affordable healthcare.

2:15 – 2:30 Estimating the Effect of Graduated Driving Licensing (GDL) Laws on Roadway Fatalities Involving Age 15-17 Drivers

Ryan Sullivan

Faculty Sponsor: Jaqueline Oliveira, Department of Economics

Starting in the 1990s, Graduated Driving Licensing (GDL) laws surged in popularity in the United States. Since Florida implemented the first three-tiered GDL in 1996, all 50 states and the District of Columbia have implemented some form of GDL. However, do these laws work? Despite the scope of GDL, there has been little research identifying the causal effect of GDL laws on teenage roadway fatalities. Using state-level roadway fatality data from the Fatality Analysis Reporting System (FARS), I propose a staggered difference-in-differences model to estimate the effect of GDL laws on roadway fatalities involving age 15-17 drivers. Furthermore, I apply a new estimation technique proposed in Callaway and Sant'Anna (2021) to achieve an unbiased estimate of the policy's effect.

2:30 – 2:45 The Effects of Daylight Savings Time on Fatal Car Crashes

Adrian Pascotto

Faculty Sponsor: Jaqueline Oliveira, Department of Economics

Daylight Saving Time has been found, through economic literature, to have an impact on the everyday lives of individuals and their health. Such research led me to ask if there is a relationship between fatal car crashes that occur during Daylight Saving Time and the age of the victim, or victims, involved? This article aims to identify a causal relationship between the time transition and fatal car crashes, with an intention of finding what group of individuals is most affected.

2:45 – 3:00 The Effect of Natural Resource Wealth on GDP Growth: A Study of the Resource Curse

Lily Roberts

Faculty Sponsor: Jaqueline Oliveira, Department of Economics

Since the 1980s, the resource curse has been a dominant theory in explaining varying levels of development across countries. Using econometric analysis, this study aims to estimate the effect of natural resource wealth on gross domestic product per capita. The study uses data from the World Bank to estimate the relationship between total natural resource rents (as a proxy for natural resource wealth) and GDP per capita (as a proxy for economic development). The fixed effects model is used on a balanced panel of 217 countries from 2000-2019. I find evidence both for and against the resource curse.

3:00 – 3:15 Are low-income individuals relatively more charitable than their high-income counterparts?

Alvaro Siu

Faculty Sponsor: Jaqueline Oliveira, Department of Economics

The economic literature on charitable contribution has extensively researched the motivations and incentives that individuals have to donate to charity. This article focuses on charitable contributions reported in federal tax returns and aims to understand the effect of income levels on charitable contributions. The research methodology includes a fixed-effects model to analyze, estimate, and forecast the effect of income on charitable contributions and help fundraising practitioners. Results show that, as income increases, both the share of income donated and the percentage of filers who donate to charity increase

Psychology

11:00 am – 12:00 pm

Robertson 110

Moderator: Katey Kanzler

(F) 11:00 – 11:15 Effect of Medications on Cognitive Late Effects from Pediatric Craniopharyngioma

Lauren Hodges

Faculty Sponsor: Rebecca Klatzkin, Department of Psychology

Craniopharyngioma is a benign tumor located in the suprasellar region of the brain but due to its location, behaves malignantly. Treatment and the tumor itself cause an increased risk for developing cognitive late effects later in life. Cognitive late effects are characterized by deficits in core and secondary cognitive abilities that emerge around two years following diagnosis. These deficits affect attention, processing speed, and executive functioning. There is a growing interest in investigating medications that may reduce such impairments to improve the quality-of-life post-treatment. Previous literature has established methylphenidate, modafinil, and metformin as promising candidates for pharmacotherapy. The current study examines the role of such medications on specific measures of performance on select cognitive abilities. Data were collected at two time points: around the medication start time and after the medication had been terminated. Results will examine the benefit each medication may have on preserving cognitive

abilities. Further results will compare performance across medications through patients who were administered multiple medications of interest.

(F) 11:15 – 11:30 Effects of Emotion on Gesture and Speech Production Using a Picture Storytelling Task

Olivia House, Anni Johnson, Ben Barfield, and Japneet Kaur

Faculty Sponsor: Katherine White, Department of Psychology

The goal of this research was to investigate the relationship between spoken language production and gesture, specifically exploring how emotional valence and arousal affect these processes. Previous research has suggested that speakers might offload some of the cognitive demands of communication to gestures, especially when communication is demanding. In this study, we investigated whether speakers use gestures differently when speaking about highly emotional topics. Participants completed a picture storytelling task where they were shown pictures and asked to create a story about the characters in each image, including what the character(s) were feeling/thinking, what happened before the event in the image, what happened during the event, and what happened after the event. Images varied in arousal (high, low) and valence (negative, positive), or were emotionally neutral. Over 30 participants were recorded telling 20 stories each, and their speech and gestures were tracked via a video camera and motion tracking technology. In this presentation, we will discuss the procedure, as well as current progress in creating manuals to code different types of gestures and speech disfluencies.

11:30 – 11:45 The Bonner Scholar Alumni Interview Project: The Effects of co-curricular service programs on post-graduate adult identity

Hannah Luckes, Becca Folkes-Lallo, Erin Walker

Faculty Sponsor: Elizabeth Thomas, Department of Psychology

The Bonner Alumni Interview Project seeks to explore the effect the Bonner program has on the identity, skill interest, and civic development of Bonner graduates. The Bonner Foundation is national college access program that assists marginalized and under-represented students in achieving an undergraduate education. Through this program, students are required to complete over ten hours of community service a week and participate in at least two summers of service. Building off a rich set 400 Bonner narratives, the Community Narrative Research team is now actively interviewing these graduated narrative authors about post-undergraduate life. Within these interviews we touch on themes of continuity and change surrounding identity, we have participants reflect on career choices, their civic engagement and experiential learning, as well as their overall time at Rhodes. The data collection is currently ongoing, but we are now analyzing our growing data set for themes of critical hope, emerging adulthood, and the possible longitudinal effects of community engaged service learning.

11:45 – 12:00 pm Perception of Prosociality in Ensembles

Kathryn Chambers, Sarah DiLuzio, and Anna Parkinson

Faculty Sponsor: Matthew Weeks, Department of Psychology

Ensemble perception refers to the visual system's ability to extract summary statistical information from an array of stimuli. Prosociality refers to behavior that is positive, helpful, and intended to promote social acceptance. Previous research has supported the idea that lower-class individuals are more prosocial than higher-class individuals. Our work will extend this literature by aiming to examine whether this extends to the perception of lower-class individuals are being more prosocial in order to see whether perception matches reality. This will contribute to scholarly work in ensemble perception of social status because there is little research that examines the perception of prosociality in an ensemble. We will conduct a series of studies to investigate a) whether the ensemble perception of social status occurs and b) whether this ensemble perception of social status informs the perception of prosociality in an ensemble. We are currently in the process of data collection, but hypothesize that groups that are rated as having more lower-class individuals will have higher ratings of prosociality. Implications for social status, prosocial behavior, and more broadly, the attitudes towards groups of varying social status will be discussed.

Urban Studies / Educational Studies / Business

12:30 – 1:15 pm

Buckman 108

Moderator: Megan Crouse

12:30 – 12:45 How do Nonprofit Stakeholders aid Refugee Identities through English Language Education in the Context of Culturally Relevant Pedagogy and Resettlement?

Sujung Hwang

Faculty Sponsor: Laura Taylor, Educational Studies Program

In 2019, UNHCR reported an accelerated dislocation of more than 15.9 million refugees living in protracted situations, with the United States being one of their major resettled locations.

Nonprofits are typically tasked with supporting refugee resettlements by providing English language education for refugees. This research explores how nonprofit organizations coordinate English language learning for refugees in the context of dislocation and resettlement through a case study of one such organization. Drawing on theories of culturally relevant pedagogy, this project investigated how individual stakeholders within nonprofits empower the identities of the refugee population. The participants were all native English, American, ESL volunteer tutors and coordinators within a nonprofit organization supporting refugee resettlement through education, located in Memphis, TN. I conducted a qualitative case study involving semi-structured interviews with five ESL tutors and coordinators. In addition, I reviewed existing case studies and qualitative research articles on refugee and ESL education in the context of culturally relevant pedagogy. The findings examine how pedagogical theories are placed into practice as participants incorporate the links between language and culture in refugee acculturation and

resettlement into the U.S. These results suggest the importance of culturally relevant pedagogy as its foundations in refugee settlement programs.

12:45 – 1:00 Did Authority Log onto Zoom?

Maryam Taysir and Daniel Lake

Faculty Sponsor: Dee Birnbaum, Department of Business

Amidst all the uncertainty it has caused for schools, COVID-19 certainly has had a major impact on education alone. Schools and businesses nationwide have shifted to remote learning using online platforms, such as Zoom, in order to keep operations going. However, with this shift, the learning environment, specifically the professor-student relationship, has changed as well. This research study will attempt to explore the authority dynamic of professor-student relationships before and after moving to remote learning. We do so by analyzing two of Max Weber's types of authority: charismatic authority and legal-rational authority. We hypothesized that moving to remote learning has caused a weakening of professors' authority in class regardless of if they exhibit charismatic authority or legal-rational authority. A survey questionnaire sent out to Rhodes students was our main method of obtaining data and was used to provide insight to our claim.

1:00 – 1:15 Examining the Construction of Gender in Caldecott Award Winning Children's Books

Katherine Seage

Faculty Sponsor: Laura Kelly, Educational Studies Program

The gender binary, defined as the classification of two distinct genders of male and female, is a concept that has developed and come more into our understanding over the years but still pervades forms of media and our culture. Characterizations of gender have expanded as our knowledge and awareness of the LGBTQ+ and feminist movement have pushed them forward, yet educational tools, in this case, children's literature, are still deep in the archetypes and stereotypes that are heavily seen as falling into the gender binary. This study aims to examine how children's literature has changed throughout the years to better reflect transforming and expanding views on gender and sexuality. To see how gender is used in children's books, I studied eight Caldecott Award-Winning Children's Books, one within each decade from the onset of the awards in the 1940s, and used a series of codes to analyze their gender depictions within the illustrations and the language used. The study confirms a previous conclusion that while there are not drastic changes in portrayals of gender roles in characters, there is a subtle shift away from the previously held archetypes and a movement towards a more gender-neutral approach to characterizations.

POSTER SESSION I

Multi-Sports Forum in the Bryan Campus Life Center

1:00 – 3:00 pm

Poster Numbers are listed with title

#1 How Language Shapes Priorities: A Critical Discourse Analysis of Tennessee's English as a Second Language Manual

Suzy Ascutto

Faculty Sponsor: Laura Kelly, Educational Studies Program

As of 1984, Tennessee identifies itself as an English Only State, (TN Code § 4-1-404, 2016). Thus, English Learners (ELs) are required to follow instruction, learn content, and complete assessments in a language they are not yet proficient in, English. Tennessee defines progress of EL proficiency rates as the percentage of ELs who meet the expected growth standards for reading, listening, writing, and speaking in English (TN Department of Education, n.d.). Recently, English proficiency rates have been dropping, which suggests a discrepancy between the department's goal and the English language development for ELs. I analyze Tennessee's English as a Second Language Manual (2018) to identify the Department of Education's priorities for facilitating English language acquisition for ELs in public schools. I argue that the departments' priorities shape English language development and ultimately the proficiency rates for ELs in Tennessee. My critical discourse analysis research addresses the following research questions: • Who does the ESL program prioritize? • What does the ESL program prioritize? • How does the ESL Manual view ELs?

#2 Multiple Regression Model for Ultrasonic Backscatter Measurements at the Hip

Amalia Bay, Sarah Delahunt, Kiera Downey

Faculty Sponsor: Brent Hoffmeister, Department of Physics

Ultrasonic backscatter techniques are being developed to detect changes in bone caused by osteoporosis and other diseases. In a recent study, 5 ultrasonic backscatter parameters were measured at the hip (femoral neck) of 80 adult volunteers. The measurements were compared to another ultrasonic parameter (SI) measured at the heel. Linear regression analysis found the strongest correlation between any single backscatter parameter and SI to be $R=0.29$. Multiple regression analysis was used to determine if a linear combination of the backscatter parameters produced stronger correlations. When all five backscatter parameters were combined, the correlation improved to $R=0.36$. The result indicates that models involving multiple backscatter parameters may improve performance compared to the use of only a single parameter.

#3 Qualitative and Quantitative Analysis of Purity and Composition in Lavender Essential Oil
Margaret (Ngoc) Hoang, Gillian Winston, Alisya Solankhi, Dallas Bennett, and Kimberly A Brien

Faculty Sponsor: Kimberly Brien, Department of Chemistry

Essential oils are intended for topical and diffusion uses only but are often misused as flavor additives. As these oils are not designed for consumption or medicinal purposes, the FDA does not monitor their production. As such, they might contain harmful volatile organic compounds

(VOC) that are not suitable for human ingestion. This experiment was conducted to evaluate the purity and composition of essential oils. The purity of a sample from three lavender essential oil brands was analyzed before and after short-path distillation with ^1H NMR. NMR spectra shows peaks that correspond with four major active compounds: linalool, linalyl acetate, camphor and eucalyptol. Peaks not present in the distilled lavender essential oil spectra will undergo comparative analysis with pure samples of suspected compounds, which may allow us to detect the presence of VOCs in lavender essential oil. Future analyses will be done via GC-MS, ^{13}C NMR, and IR.

#4 Rhodes College CubeSat Outreach Program at Memphis Public High Schools

Jo Boff

Faculty Sponsor: Ann Viano, Department of Physics

The primary focus of the Rhodes CubeSat project is educational, aligning with NASA's objective for the production of nanosatellites by students of "Inspiring and Engaging the Public in Aeronautics, Space, and Science." To fulfill this objective, the CubeSat research group, along with other student volunteers, provided science education outreach to high schools and STEM-related programs in Memphis. Two hands-on outreach activities were developed to execute the project. First, a gravity well simulation was designed and constructed, along with a teaching curriculum with interactive and engaging activities that aimed to teach students about the physics behind the solar system and satellite orbits, including the understanding of complex Einsteinian concepts of gravity, such as the curvature of space-time. Second, photovoltaic (PV) cell kits were created to demonstrate PV cell technology and its role in Rhodes' CubeSat scientific mission, which is to test novel PV cells in low earth orbit to promote the advancement of this technology in space. During the 2021-22 academic year, Rhodes students engaged with the Memphis community through the execution of the two outreach activities in various public high schools, museums, and programs that aimed to reach underrepresented groups in STEM.

#5 Organic Residue Analysis of Basal Rocks of Prehistoric Rock Paintings from Various Parts of the World using Gas Chromatography Mass Spectrometry

Antonio Clayton, S. Spades and J. Russ

Faculty Sponsor: Dhammika Muesse, Department of Chemistry

This study aims to analyze the basal rocks of prehistoric rock paintings and investigate their organic residues. Identifying and quantifying these organic residues are essential to reveal the materials used to make these prehistoric rock paintings and how they have been preserved for such a long time. Furthermore, discovering the organic residues of the basal rock can also be used to radiocarbon date the rock paints, thus, providing concrete insight into the prehistoric work. First, we analyzed the fatty acids of the basal rocks. Due to low volatility, free fatty acids and triglycerides are not amenable to gas chromatographic analysis, and they must be converted to more volatile methyl esters. We then used methanolic HCl to convert fatty acids to methyl esters and then extracted the methyl esters using hexane. Lastly, we identified each methyl ester using the EI (electron ionization) mass spectrum.

(F) #6 Investigation of Group 6 Complexes with Diimine Ligands for Solvatochromism

Madeleine Davis, Emma Dove, Sarah Helland and William Eckenhoff

Faculty Sponsor: William Eckenhoff, Department of Chemistry

We recently reported that $\text{Mo}(\text{bpy})\text{Cl}_4$ showed unexpectedly strong solvatochromism over a range of aqueous and non-aqueous solvent environments. To expand on that work, we here report on the synthesis and investigation of derivative molecules using $\text{W}(\text{III})$ for the central ion, and/or Br^- and SCN^- for the halide ligands. Typically, these new compounds are not as impressively solvatochromic, but improved procedures for their preparation are reported.

#7 Synthesis of Novel $\text{Mo}(\text{III})$ Complexes

Emma Dove and William T. Eckenhoff

Faculty Sponsor: William Eckenhoff, Department of Chemistry

Solvatochromism is the property of a compound that causes it to change color in the presence of solvents with varying polarity. Previous success in synthesizing the solvatochromic complex, $[\text{Mo}(\text{bpy})\text{Cl}_4]^-$ ($\text{bpy} = 2,2'$ -bipyridine), which shifts over 100 nm in various solvents, lead to interest in the related $[\text{Mo}(\text{bpy})\text{Br}_4]^-$. However, no synthesis of this $\text{Mo}(\text{III})$ bromide complex is known. The synthesis of the $\text{Mo}(\text{IV})$ bromide complex is available, although it suffers from low-yielding procedures. Starting from $[\text{Mo}(\text{bpy})(\text{CO})_4]$, yields of $[\text{Mo}(\text{bpy})(\text{Br})_4]$ have been improved from 15% as reported, to ~50% in our hands. Subsequent reduction by cobaltocene affords the desired target complex, which has so far been characterized through X-ray crystallography and cyclic voltammetry. Investigation into the solvatochromism of $[\text{Mo}(\text{bpy})\text{Br}_4]^-$ will soon be conducted to see how the bromide ligands affect it as compared to the chloride ligands from our previous work.

#8 Crisis, Individual Responsibility, and Race Evasion: How Media Framed a District's New Grade Retention Policy

Isabella Fraser, Julianne Chung, and Maggie Emmendorfer

Faculty Sponsor: Aixa Marchand, Department of Psychology

States and districts nationwide are enacting promotion/retention policies that retain elementary students based on literacy test scores, even as research questions the effectiveness of grade retention and documents the disproportionate impact of these policies on Black students and students living in poverty. This case study explores how local media framed one such policy in Shelby County Schools, a large urban district in Memphis, Tennessee. Drawing on theoretical lenses of critical race theory, critical consciousness, and crisis narratives, we found local media used unsupported casual language and perpetuated race-evasive discourses of individual responsibility while ignoring institutional and systemic factors. Our findings make visible how crisis narratives in local media evade discussions of racism and capitalism while blaming students and families.

#9 Odor intensity affects food neophobia

Isabelle Gillespie

Faculty Sponsor: David Kabelik, Neuroscience Program

In animals (and humans) the decision to ingest a familiar food depends on previous experience with that food. In the case of novel food, there is no knowledge available for the animal to make its decision whether to eat or not eat. The hungry animal shows a reluctance to consume the novel food. This phenomenon is known as food neophobia (Reilly, 2018). An essential factor influencing food neophobia is olfaction (Demattè et al., 2014). Odor is a crucial component when it comes to sensory evaluation of food, especially novel foods (Yeomans, 2006). However, little work has explored if food neophobia is driven by the intensity of the smell of the novel food. The purpose of this study is to investigate the essential role of odor in food neophobia. To accomplish this, we measured the latency to eat familiar food scented with the novel odor isoamyl acetate (IAA) in hungry mice. To determine if the intensity of the novel odor impacted latency to eat we used different concentrations of IAA (0%, 0.1%, 1%, and 10%). Our results indicate that odor invoked food neophobia depends on the intensity of the stimulus, with latencies growing longer as the intensity rises.

#10 Oxalate Coatings on Rock Art

Sarah Ginsberg, Francisco Nunez-Parker, Catharine Bruner, and Jon Russ

Faculty Sponsor: Jon Russ, Department of Chemistry

Most prehistoric rock paintings found worldwide are covered with a natural coating composed primarily of calcium oxalate. There are two hypotheses on how the oxalate forms. The first hypothesis is that it is a byproduct of lichen or other microbes that grow on natural rock surfaces, whereas the second is that it is the result of reactions of oxalic acid in atmospheric aerosols with calcium on the rock surfaces. If the coatings were produced by lichens then we would expect there to be trace organic compounds that are specific to lichens in the oxalate coatings, specifically various fatty acids and sterols. If, on the other hand, the oxalate source is aerosols, we would predict that other trace organic compounds that occur in aerosols would be present. Here we report on the chemical analysis of various lichen species from Lower Pecos Canyonlands in southwestern Texas. We used gas chromatography-mass spectrometry to characterize the trace organic composition of the lichens, then compared these results from analyses of the natural oxalate rock coating.

#11 Investigating Sensitivity to Variability in Socioeconomic Status as a Mechanism in Ensemble Perception

Allison Hagler, Abigail Carter, and Alexandra Chicharro

Faculty Sponsor: Matthew Weeks, Department of Psychology

Ensemble coding enables us to quickly perceive the average for a group or set of stimuli. This process is complex and involves different mechanisms that are used for low level versus high level stimuli. A measure of variance is a statistical moment, which is different but related to coding for an average, that previous research shows we can identify in Ensemble perception. Humans have been found to detect the diversity within low level stimuli such as color arrays without awareness of individual colors, indicating ensemble perception of variability. There is a statistical moment coding for variance in race and emotion (high level stimuli) within an ensemble. In our study, participants will be asked to rate the diversity of one ensemble of targets

compared to another ensemble. The ensembles will vary on the perceived social status of the stimuli which have been coded previously. The participants will be identifying variability within the ensemble perception of socioeconomic status. Our group is currently working to collect data. We hypothesize that participants will more accurately extract the variability of social status amongst arrays of targets that contain higher levels of variance compared to lower levels of variance.

(F) #12 Rhodes Satellite Circuitry Design

Jess Hamer

Faculty Sponsor: Bentley Burnham, Department of Physics

RHOK-SAT is Rhodes College's nanosatellite project. The goal of RHOK-SAT is to test the space hardiness of perovskites, a type of solar material never tested in space. If the perovskites fare well in orbit, they would be a much cheaper alternative to the solar cells presently used on Earth and in space. RHOK-SAT will evaluate the perovskites using a specialized chip designed and provided by the Aerospace Corporation. The main issue RHOK-SAT faced was electrically connecting these Aerospace Measurement Units (AMU) to the perovskites for measurement. Their electrical connections are difficult to work with, even in a lab setting. RHOK-SAT is overcoming this challenge by using pogo pins. Pogo pins are small spring-loaded contacts that electrically connect to the delicate perovskite pads. The pogo pins are mounted on a printed circuit board (PCB), a platform to create pathways for electronic circuits. I designed three custom PCBs to ensure that the perovskites can be successfully measured by the AMUs in space. These PCBs will connect the perovskites to the AMUs, and also gather information on the Sun angle which determines how much sunlight interacts with the perovskites.

(F) #13 Hydrogen Production Using Nickel Complexes with Substituted Thiosalen Ligands

Alex Hemphill, Nate Hames, and William Eckenhoff

Faculty Sponsor: William Eckenhoff, Department of Chemistry

As our global population grows, our need for clean energy also grows. One new energy source can be found through the use of artificial photosynthesis to produce hydrogen gas. In our lab, we have investigated the effectiveness of nickel complexes with thiosalen ligands acting as a catalyst for the artificial photosynthetic process. While unsubstituted thiosalen complexes show proton reduction to occur electrocatalytically at ~ -2.0 to -2.5 V vs Fc^+/Fc ., addition of electron withdrawing substituents can lower the overpotential. Ni(II) thiosalen and thiosalphen complexes with 3- CF_3 and 5- CF_3 groups were synthesized, characterized, and tested for efficacy of hydrogen production. While the substituents did lower the Ni(II/I) redox couple in accordance with their electron withdrawing ability, this effect did not greatly affect the overpotential of proton reduction as we supposed. DFT calculations were carried out to better understand the mechanism of proton reduction. Currently, 4- CH_3 substituents are being worked on, and we hope to figure out the results before Rhodes symposium.

#14 Remembering Max versus Matt: Examining the Roles of Retrieval, Lag, and Phonological Relatedness in Memory for Proper Names

Lauren Hodges

Faculty Sponsor: Geoffrey Maddox, Department of Psychology

Remembering face-name pairings is challenging because there is no inherent association between faces and names. One approach to enhancing face-name memory is to utilize spaced retrieval practice, which combines two techniques. First, the spacing effect refers to the memory benefit for information that is repeatedly studied and separated by intervening information. Second, the testing effect refers to the memory benefit observed when information is retrieved versus restudied. Theories suggest that spaced retrieval results in more precise encoding (i.e., discriminative contrast hypothesis) and also offers protection against forgetting and interference. The current study examined the extent to which phonologically related names facilitate or interfere with retrieval of face-name pairs in a spaced retrieval and repeated study paradigm. Participants studied a series of face-name associations that were repeatedly studied or retrieved after short or long delays. Phonologically related (e.g., Matt) or unrelated (e.g., Frank) names were presented immediately following the initial presentation of each target name or preceding each target name's repetition or retrieval trial. Analysis will examine the effects of lag and phonological relatedness on final test face-name accuracy. Additionally, results will consider how the lag and phonological relatedness effects are modulated by retrieval practice.

#15 Use of low-cost, time-efficient microfluid titrators to study acid base reactions

Mere Hunter, Camryn Brown, Dhammika Muesse

Faculty Sponsor: Dhammika Muesse, Department of Chemistry

Most of our acid-base analyses in teaching labs are currently carried out using conventional 50-mL burets. However, titrations with burets take a relatively long time to complete, create large quantities of chemical waste, and are expensive. We use the emerging micro fluid paper technology to introduce a low-cost and low waste alternative to this conventional analysis. The micro fluid paper titrators use only micro or nanograms quantities of reagents to complete the reaction. First, we prepare sodium hydroxide-infused microfluidic paper titrators and then validate the analytical method to study acid base reactions. We also plan to extend the capabilities of microfluid titrators to complexometric and electrochemical analyses.

#16 Investigating Potential Interactions Between *Aspergillus nidulans* Protein Kinase C and Constitutively Active Rho-type GTPases Using Yeast Two-Hybrid Assays

Matilda Hilarides, Imaan Hussain, William McDade, Terry Hill, and Loretta Jackson-Hayes

Faculty Sponsor: Loretta Jackson-Hayes, Department of Chemistry

The long-term goal of our research is to advance understanding of the mechanisms involved in hyphal growth and maintenance of cell walls in filamentous fungi. Recently our work has focused on proteins that localize to sites of cell wall synthesis, namely hyphal tips and forming septa. This project focuses on Protein kinase C (PkcA) because in previous work, we identified a mutation in the gene that encodes an orthologue of protein kinase C in our model organism *Aspergillus nidulans*, which results in reduced cell wall integrity. This project seeks to uncover

the protein-protein interactions involving PkcA focusing mainly on four Rho GTPases including RacA, ModA, RhoA, and AN4953. Previous research has shown each of these GTPases may be part of processes involved in hyphal growth or cell wall maintenance and therefore may physically interact with PkcA. Potential interactions will be assessed through yeast two-hybrids assays. We have not yet found an interaction with wild-type Rhos, but new literature suggests a constitutively active version of Rho is necessary to observe interactions in the yeast two-hybrid system. Thus, we mutated the Rho GTPases through site-directed mutagenesis to evaluate their potential interactions with PkcA.

#17 Ultrasonic time slope of apparent backscatter (TSAB) measured at the femoral neck of human volunteers

Grant Jenson, Kiera L. Downey, and Sarah I. Delahunt

Faculty Sponsor: Brent Hoffmeister, Department of Physics

The long-term goal of our research is to advance understanding of the mechanisms involved in hyphal growth and maintenance of cell walls in filamentous fungi. Recently our work has focused on proteins that localize to sites of cell wall synthesis, namely hyphal tips and forming septa. This project focuses on Protein kinase C (PkcA) because in previous work, we identified a mutation in the gene that encodes an orthologue of protein kinase C in our model organism *Aspergillus nidulans*, which results in reduced cell wall integrity. This project seeks to uncover the protein-protein interactions involving PkcA focusing mainly on four Rho GTPases including RacA, ModA, RhoA, and AN4953. Previous research has shown each of these GTPases may be part of processes involved in hyphal growth or cell wall maintenance and therefore may physically interact with PkcA. Potential interactions will be assessed through yeast two-hybrids assays. We have not yet found an interaction with wild-type Rhos, but new literature suggests a constitutively active version of Rho is necessary to observe interactions in the yeast two-hybrid system. Thus, we mutated the Rho GTPases through site-directed mutagenesis to evaluate their potential interactions with PkcA.

#18 Design and Synthesis of Unnatural Amino Acids and their Application in Creating Antibiotic Polypeptides

Thomas Jones, Kimberly Brien, and Roberto de la Salud Bea

Faculty Sponsor: Kimberly Brien, Department of Chemistry

Antibiotics are considered a powerful antimicrobial drug in medicine when treating and preventing bacterial infections. They are often times also called antibacterials. Our group is interested in the synthesizing and researching unusual amino acids such as D-amino acids, beta-amino acids, N-methylated amino acids, etc. for the purpose of observing their effects on antibiotics. We synthesize these amino acids by adding side chains with unusual functional groups. In addition to the functional groups, we also present “orthogonal” elements such as fluorine and silicon to the side chains. Currently, we are focused on creating a volume and library of these unnatural amino acids. By building up a library of these amino acids, the amino acids can be put forth more research into the physical effects on toxicity and antibiotic potential. In the past, research has shown that specific chemical changes can maintain or increase antibiotic activity all the while decreasing toxicity.

#19 Establishing Analytical Protocol for Prehistoric Rock Art

Justin DiProffio, Olivia Evans, Bonnie Kennedy, Jon Russ

Faculty Sponsor: Jon Russ, Department of Chemistry

The goal of the study we report here was to develop two methods for the trace organic analysis of the oxalate compounds found on prehistoric rock art around the world. This will provide information on the mechanism(s) by which the coatings form. We analyzed standards with known compounds with BSTFA and methyl esterification extraction. Both procedures remove active hydrogens so that the solutions become less polar so the chemicals of interest can be separated using column chromatography. Then, they are analyzed using gas chromatography – mass spectrometry (GC-MS). Our standards include both polar and nonpolar compounds because it's unknown if the compounds we are searching for are polar, nonpolar, or have functional groups that are both. For this, we dissolved the standards in either chloroform or methanol, then diluted to a concentration of around 10-20 mg/L. Aliquots were treated with either BSTFA or a methanolic-HCl solution, then evaporated, extracted with hexane, and then analyzed using GC-MS. Establishing analytical protocol to analyze these known mixtures will allow us to perform the same analysis to establish the trace organic compositions of oxalate rock coatings.

#20 Analysis of the Variance of Ultrasonic Backscatter Parameters Measured at the Hip

Blake Lawler, Sarah Delahunt, and Brent Hoffmeister

Faculty Sponsor: Brent Hoffmeister, Department of Physics

In a recent study, ultrasonic backscatter measurements were performed at the left and right hips (femoral necks) of 80 adult volunteers. Seven backscatter parameters were extracted. The relative performance of the parameters was determined by comparing values from the left hip to the right hip. The underlying assumption is that the parameters should exhibit strong left-right correlations if they are sensitive to naturally occurring variations in bone tissue. The original analysis was based on the mean value of each parameter determined by averaging several thousand signals acquired from each skeletal site on each volunteer. The goal of this study was to perform a similar analysis of the variance of the measurements. The hypothesis is that the variance in the backscatter measurements depends upon the porosity of the bone. Linear regression analysis found weak ($R < 0.36$) correlations for all seven parameters. Only two parameters exhibited a significant ($p < 0.05$) left-right correlation. In contrast, analysis of the means yielded correlation coefficients as high as $R = 0.68$. These results indicate that variance of the backscatter parameters is not as sensitive as the means to naturally occurring variations in bone tissue.

(F) #21 High fidelity average orientation representation maintained across multiple time scales

Ava Mitra and Jason Haberman

Faculty Sponsor: Jason Haberman, Department of Psychology

The visual system can summarize visual scenes by grouping similar features together (e.g., average orientation of lines), providing an efficient way for the visual system to overcome the limitations of visual consciousness. Although individual and ensemble information is hierarchical, what happens to the ensemble representation as individual information deteriorates? We explored how varying interstimulus interval (ISI) affected orientation representation at both the individual and ensemble levels. Observers viewed sets of four oriented gabors followed by a cue to one of the four items, then reported the cued-orientation using continuous report. We analyzed the precision of individual item representation, but also examined the precision of the

implicit ensemble representation over time. We expected ensemble precision to improve and individual item representation to decline with increasing ISI (indicating greater reliance on the ensemble as memory for individual item deteriorated) but found no change in performance. A second version with a similar design except with explicit cues to both individual items and average orientation of the set also showed no change in performance. Overall, these findings suggest that both ensemble and individual information is immediately and continuously accessible; the visual system seemingly has both representations simultaneously active for a surprisingly long time.

#22 Investigation of Nickel Pyridinediimine Derivatives as Catalysts for Hydrogen Production

Robert G. Musicante, Liam Rhodes, and William Eckenhoff

Faculty Sponsor: William Eckenhoff, Department of Chemistry

With an ever-increasing global population, the need for avant-garde sources of energy continues to advance as well. An alternative source of energy can be found via the implementation of artificial photosynthesis to produce hydrogen gas. Therefore, the development of more active and robust catalysts is necessary in order to make artificial photosynthesis a viable method of hydrogen generation. Recent studies have shown that metal complexes with redox non-innocent ligands and pendant base groups are highly active for proton reduction. EtPyPDI has shown to be a promising catalyst by producing hydrogen gas using Ru(bpy)₃²⁺ and ascorbic acid generating turnover numbers of 1400. Changing pyridine for imidazole led to a complex with a similar structure but yielded less activity. This is likely due to imidazole being more basic in nature with a higher pK_a, and superior nickel binding properties. Other pendant bases are being evaluated for their activity in catalysis.

#23 A Consideration of Touch in Michelangelo's Creation of Eve

Katy Nau

Faculty Sponsor: Victor Coonin, Department of Art and Art History

Michelangelo's Sistine Ceiling panel, The Creation of Eve, pushes back against Medieval, Early, and High Renaissance precedents of art, neglecting the pattern of clear physical touch between the Creator and first woman. Fully aware of the artistic precedents surrounding him, Michelangelo deliberately broke away from the Western canon, in part because of his initial alienation and later distaste for female touch. But this aversion to female touch manifested itself in the hands and mind of Michelangelo into a deeper commentary of a metaphorical and spiritual touch of the soul, a pattern that is continuously mimicked in Michelangelo's personal life, theology, and life's work.

#24 Demonstrating the Ensemble Perception of Social Status

Anna Parkinson and Hailey Connell

Faculty Sponsor: Matthew Weeks, Department of Psychology

Ensemble perception refers to the visual system's ability to extract summary statistical information from an array of stimuli. Prosociality refers to behavior that is positive, helpful, and intended to promote social acceptance. Previous research has supported the idea that lower-class individuals are more prosocial than higher-class individuals. Our work will extend this literature by aiming to examine whether this extends to the perception of lower-class individuals are being more prosocial in order to see whether perception matches reality. This will contribute to scholarly work in ensemble perception of social status because there is little research that

examines the perception of prosociality in an ensemble. We will conduct a series of studies to investigate a) whether the ensemble perception of social status occurs and b) whether this ensemble perception of social status informs the perception of prosociality in an ensemble. We are currently in the process of data collection, but hypothesize that groups that are rated as having more lower-class individuals will have higher ratings of prosociality. Implications for social status, prosocial behavior, and more broadly, the attitudes towards groups of varying social status will be discussed.

#25 Understanding Health Practices and Challenges Among South Asian Immigrants in the City of Memphis

Jaynee Patel

Faculty Sponsor: Shaolu Yu, Urban Studies Program

This research aims to understand health practices and barriers among South Asian Immigrant Health in the City of Memphis. South Asians are a growing minoritized group in the United States and in the Mid-South region, and it is important to understand their health practices and barriers to healthcare. This research is important because immigrants often have unique health needs that should not be generalized and assumed. This project examines the specific health needs of the South Asian Immigrant community and whether these needs are being met. The study will also focus on looking at lived experiences of South Asian immigrants to understand the coping strategies to certain health barriers. I will be using a purposive snowball sample to reach out and interview South Asian individuals in the Memphis Community about their health experiences and health barriers. The work fills a major gap of the health practices among immigrant groups in Memphis and the Mid-South region.

#26 Needs Assessment for Parenting a Sexual Minority Child

Joshua Goodman, Mandy Friedlander, Isabela Talban, Nick Rachlin, and Vaniel Simmons

Faculty Sponsor: Joshua Goodman, Department of Psychology

The current study seeks to assess the concerns of parents of youth ages 10-18 about 1) having or potentially having a sexual minority (lesbian, gay, bisexual, or otherwise non-heterosexual) child and, 2) their interest in and needs regarding parenting resources about sexual orientation. This study addresses a gap in the current psychological literature by assessing the specific needs of different groups of parents, including: parents of lesbian/gay youth, parents of bisexual youth, parents of asexual youth, parents who are unsure of their child's sexual orientation, and parents who presume their child to be heterosexual. Participants will be recruited through MTurk and directed to our survey page on Qualtrics. Next, participants will be asked open-ended questions to describe concerns about having an LGBTQ+ child, consider resources that they would find helpful as a parent, and reflect upon their strengths as a parent. We hope to begin initial data collection soon and hope to include preliminary findings and exemplar quotes indicating parents needs for additional resources. The findings can inform the development of intervention resources for parents who want to learn about or prepare for the possibility of their child coming out as a sexual minority.

#27 “But I think that she left because I think that she thought that I was following her, but I wasn’t”: The Impact of Story-Sharing Circles on Preschoolers’ Character Representation

Leticia Rosas, Emilie Blais, Veronica Houle, and Abigail Hultquist

Faculty Sponsor: Kiren Khan, Department of Psychology

Across the preschool years, children’s character representation shifts toward a focus on the internal worlds of narrative protagonists (Bruner’s 1986 “landscape of consciousness”). Nicolopoulou & Richner (2007) characterized this transition as moving from “actors” in most four-year-olds’ stories, to “agents” having simple cognitive abilities in most five-year-olds’ stories, to “persons” with well-specified mental representations motivating action. The present study examined approximately 150 stories shared by children ((N= 20, mean age= 62.35 months, SD= 4.57) in 12 sessions of story-sharing circles implemented in a 4-week kindergarten readiness program. Sophistication of character representation was coded on an 8-point scale (see Table 1) with high inter-rater agreement (.8 to 1.0). Results support a shift to stories with higher levels of character representation (corresponding to “agents” and “persons”) in later sessions compared to earlier sessions. Contrasting patterns for character representation of the self, other, and collective (we) characters in children’s stories will be presented as well. The advanced character representation levels elicited from preschoolers in our predominantly Black and low-income sample contributes to prior literature suggesting narrative skills as a cultural strength in Black communities and indicates that story-sharing circles may be a particularly powerful context for supporting narrative development.

(F) #28 Operating Room Traffic and Its Effect on Shunt Infection

Mallory J. Saleh, C. Stewart Nichols, Paul Klimo Jr., and Brandy N. Vaughn

Faculty Sponsor, William Eckenhoff, Department of Chemistry

Shunt procedures pose a great risk of infection to patients, especially pediatric patients. Infections are a common occurrence with shunt surgeries because placing a foreign object in the body can cause bacteria to grow. The synthetic tubing provides a host for bacteria and decreases the immune system’s ability to induce phagocytosis. Many protocols have been implemented to reduce infection rates in the operation room (OR) such as administration of antibiotics prior to incision, preserving the sterility of the instruments for as long as possible, and placing door signs to limit OR traffic. Studies have shown OR bacterial air count is correlated to OR activity therefore, it is hypothesized that decreasing OR traffic could reduce infection rates. This study aims to investigate the possible correlation of OR traffic to pediatric shunt infection rates. Since January 2019 a random sample of shunt surgeries have been observed at Le Bonheur Children’s Hospital to get a representative picture of OR traffic. These patients are monitored up to 90 days post-surgery to record any Cerebrospinal Fluid (CSF) infection. This is an ongoing study that requires a large sample size.

#29 Synthesis of peptide analogs from solitary Eumenine wasp venom with potential antimicrobial properties

Jeremy Thelven and Roberto de la Salud Bea

Faculty Sponsor: Roberto de la Salud Bea, Department of Chemistry

In recent years, pathogenic organisms have developed an increase resistance to traditional drugs and therefore it is necessary to find new active compounds for the treatment of infectious diseases. Due to their variety of properties and activities, natural products are a potential source of new drugs. Venoms from animals and plants contain a variety of active molecules with useful

and potential medicinal applications. In our group we were interested in two short α -helical peptides (14 amino acids) found in the venom of the Eumenes genus solitary wasps. These peptides, called EMP-AF and EMP-ER, already have antimicrobial properties but, as venom components, they also have undesired toxic activity. In this work we have designed a library of analogs with specific mutations on the amino acid sequence of those two wasp venom peptides and our goal was to keep or even increase antimicrobial activity and reduce or eliminate their natural toxicity. We will present the sequences of the designed peptides, their synthesis and the results of their full physical and chemical characterization as well as their antimicrobial and toxic activities tests.

(F) #30 Apneic seizures in term neonates. A review of five cases.

Bennett Thomas and Nitish Chourasia

Faculty Sponsor: Dana Horgen, Department of Chemistry

Neonatal seizures are often clinically subtle and difficult to distinguish from normal infant behaviors. Typically, isolated apnea and/or desaturation are rarely an ictal manifestation by itself. Initial clinical presentation with apnea, especially in term infants, requires a high degree of suspicion for seizures to avoid a delay in diagnosis. However, by using continuous video-EEG, subtle ictal clinical features can be better detected for seizure-like activity. Our study, a retrospective record review, evaluates five term infants who present with increasing apnea and desaturation with subtle clinical features consistent with ictal apneic seizures. Data collected include gestational age, sex, medications, video-EEG and MRI brain. All 5 infants presented at term with increasing episodes of apnea and/or desaturation within a period of 24 hours. Stereotypical apneic episodes were recorded on video-EEG showing ictal onset in the temporal or temporo-occipital region with only subtle clinical changes noted on video (mild stiffening of extremities) during the seizure. Neonatal apneic seizures predominantly localized to the temporal lobe (onset or evolution) on EEG with or without underlying structural abnormality. Video EEG should be used to evaluate increasing episodes of apnea in infants due to its ability in monitoring subtle ictal clinical features.

(F) #31 Exploring Language in Children with Focal and Generalized Epilepsy Syndromes

Brandon Walker, Kelley Parsons, and Billy Holcombe

Faculty Sponsor: David Kabelik, Neuroscience Program

Epilepsy is a chronic disease that is characterized by excessive electrical activity. Its causes can be singular, multifactorial, or unknown, and its effects on day-to-day functioning are also variable. The most common type of focal epilepsy is temporal lobe epilepsy (TLE), which is linked to language processing and comprehension. Frontal lobe epilepsy (FLE) is linked to language formation and overall verbal communication ability. Previous studies investigating this connection have shown variable language outcomes. Thus, the goal of the present study was to elucidate the impact of focal and generalized epilepsy syndromes on functional language skills, inclusive of language acquisition, utilization, and comprehension. To accomplish this, data was abstracted from a neuropsychology patient repository at a large children's hospital. Data analysis will consist of one-way analysis of variance (ANOVA). Results will be used to inform treatment and psychoeducational planning, as delayed interventions are associated with suboptimal outcomes.

#32 The Effects of Class Essentialism on the Ensemble Perception of Social Class

Houston Walker and Nick Cobb

Faculty Sponsor: Matthew Weeks, Department of Psychology

Ensemble perception describes a mechanism by which people capture various types of summative information based on visual stimuli (Haberman et al, 2015). We are interested in the ensemble perception of social class and how it may be potentially affected by individual differences in levels of Class Essentialism ideals. Class Essentialism is the idea that social classes are indicative of innate and determinative characteristics of the individuals that occupy them (Kraus & Keltner, 2013). We predict that individuals with high Class Essentialism will be more accurate in their ensemble perception of social class. We will test this hypothesis using a 2x3x3 between subjects design, our variables being: high/low class essentialism, all male/ all female/ mixed sex ensembles, and higher/lower/ about the same class difference conditions. Individuals will be shown two ensembles, consecutively and asked to determine if the average social status of the second ensemble was higher, lower, or the same as the first one. The accuracy of these judgments will be used to contrast the perceptual abilities of the high/low Class Essentialism groups. We expect to find that individuals with higher levels of Class Essentialism will be more accurate in the perceptions of social class.

(F) #33 Nickel Complexes with both Redox Non-innocence and Pendant Bases for Light-Driven Hydrogen Production

Scott Wicker, Meghan Kiker, and William Eckenhoff

Faculty Sponsor: William Eckenhoff, Department of Chemistry

Over the next century, the world's population is expected to increase at a drastic rate; therefore it is essential to consider new and more efficient sources of energy such as the use of artificial photosynthesis to generate hydrogen gas. Hence, the development of more active and robust catalysts is necessary in order to make artificial photosynthesis a viable method of hydrogen generation. Recent studies have shown that metal complexes with redox non-innocent ligands and pendant base groups are highly active for proton reduction. To incorporate these two features, we used the 1,1'-(pyridine-2,6-diyl)bis(2-(pyridin-2-yl)ethyl)ethan-1-imine (EtPyPDI) ligand with nickel(II). X-ray crystallography reveals that this ligand forms an octahedral coordination environment around the nickel ion. Cyclic voltammetry experiments showed reversible redox waves at -0.91 and -1.78 V vs Fc+/Fc. In the presence of acetic acid, a catalytic wave corresponding to hydrogen formation was observed at -2.11 V vs Fc/Fc+. Hydrogen production was observed also produced in a light-driven system using Ru(bpy)₃²⁺ and ascorbic acid achieving turn-over numbers of 1400.

#34 Hardware Development for Small Satellite Applications

Ben Wilson

Faculty Sponsor: Bentley Burnham, Department of Physics

Over the last decade, nanosatellites have become increasingly popular among research teams in the aerospace industry. These small, cube shaped satellites (CubeSats) are quick and relatively inexpensive to develop, making them ideal for space technology testing and for providing smaller institutions access to space. The Rhodes College CubeSat team is collaborating with the University of Oklahoma Photovoltaic Materials and Devices Group to design a CubeSat, named

RHOK-SAT, to test newly developed solar cell technology. Recent advances in these new cells, called perovskites, have shown that they could be potential candidates for future space missions. There are many engineering challenges that come with building satellites and space hardware. The design challenges specific to RHOK-SAT stem from the experimental perovskite payload. Perovskites have several qualities that limit their effective lifespans. They can quickly degrade if exposed to air or moisture and their electrical contacts are fragile. With these design constraints, the RHOK-SAT hardware development team needs to design custom space-grade hardware to secure and preserve these cells through the harsh launch process and ensure that adequate measurements can be obtained while in orbit.

#35 The Importance of Cognition to Aging in Place: A Holistic Framework for Supporting Elders in their Communities

Meghna Yammanur, Sarah Shambaugh, and Emaan Khawaja

Faculty Sponsor: Geoffrey Maddox, Department of Psychology

With increases in health care and prolonged life expectancies, the population of older adults is increasing in size. Many factors impact the aging process: Maddox et al. (2019) identified that the factors of physical safety, physical health, psychological health, and financial resources all contribute to healthy community-based aging. To assess Maddox et al.'s framework and its flexibility to accommodate individuals and communities with different goals and priorities, we developed a survey comprised of assessments corresponding to each factor in the model. We distributed our survey online (via MTurk) and obtained a sample (N = 219) of middle-aged and older adults across the United States. Respondents completed the survey with regard to their current residence. Additionally, participants ranked each component of the model in order of personal importance and the degree to which they caused worry. Our analyses will explore connections within each of the four main factors with an emphasis on the impact on cognitive health. Implications for community-based aging and aging in place will be considered.

POSTER SESSION II

Multi-Sports Forum in the Bryan Campus Life Center

3:00 – 5:00 pm

Poster Numbers are listed with title

(F) #1 The Impact of Land Use on Nutrient Limitation and Bioavailability in Southern Lakes

Jake Ackerman, Kathleen Cutting, Patrick Kelly

Faculty Sponsor: Patrick Kelly, Department of Biology

We examined if nutrient limitation may be tied to land use within a lake's watershed. Specifically, we looked at chlorophyll response ratios to additions of N, P, and N + P. We expected these lakes to be co-limited by N and P because the ratio of these nutrients is essential to the lives of many organisms. Early indications of co-limitation are common in lakes across the mid-south. Additionally, we observed the bioavailability of nutrients in these lakes and how this is related to watershed land use. Agricultural production is common throughout the mid-south.

Agricultural fertilizers, which can run into lakes, are designed to be easily usable by organisms. Therefore, we anticipated lakes with predominantly agricultural watersheds would contain more readily available nutrients. Understanding how bioavailability of nutrient inputs varies across lakes with differing watersheds will inform others on the impact of land use for lakes in the mid-south. Further, there is a lack of research on the bioavailability of nutrients in lakes with primarily urban watersheds. This project is contributing to reducing this gap in knowledge while also building on current data for nutrient limitation and bioavailability occurring in lakes in the mid-south.

#2 Thematic and Content Analysis of Older Adults' Positive and Negative Lifespan Memories

Amy Band, Sydney Brown, and Lauren Martin

Faculty Sponsor: Katherine White, Department of Psychology

This research investigated the content and characteristics of older adults' speech when recalling emotional memories from various points across the lifespan. Forty-four older adults ranging from 66 – 92 years of age ($M = 82$) responded to a series of prompts asking them to share a significant positive and negative memory from their childhood, adolescence, young adulthood, middle adulthood, and older adulthood. A thematic analysis identified four superordinate content categories: negative experiences, the speaker's reaction to the negative experience, positive experiences, and major life transitions. Narratives in these different categories were then analyzed with Linguistic Inquiry and Word Count (LIWC) and Coh-Metrix. Preliminary analyses suggest that speaking about negative memories is cognitively demanding: Compared to narratives with primarily positive content, narratives with negative content contained more words reflecting cognitive processing, were less syntactically complex, and had lower referential cohesion. Negative content was also narrated with a more conversational tone and included language that focused on the present. These results offer insight into the content, cognitive processes, and linguistic features of older adults' narratives.

(F) #3 Investigating cellular characteristics of oncogene Ybx1

Olivia Barrett and Katherine Lindsay

Faculty Sponsor: Tanushree Pandit, Department of Biology

During embryonic development, altered expression of certain oncogenes in neural tissues appears to correlate with the advancement of many malignant pediatric cancers. This study's focus surrounds oncogene Ybx1 (Y-box binding protein 1), a multifunctional nucleic-acid binding protein first identified by its ability to bind specifically to Y-boxes in the promoters of target genes. Ybx1 is implicated in almost all DNA and mRNA dependent processes within the cell such as mRNA translation and packaging, DNA repair and replication, and cellular proliferation. Ybx1 was first discovered in our lab to interact with other key genes involved in embryogenesis such as JARID2 and SNIP1 to regulate Polycomb Repressor Complex 2 (PRC2) chromatin binding, which is vital for gene regulation in embryonic neural development. The analysis of neural progenitor cells (NPCs) in vitro can help further explore Ybx1 and its impact on neural development. NPCs are multipotent stem cells that give rise to many neuronal and glial cell types within the CNS. Through our continued analysis of Ybx1 genetic knockout mouse NPCs, we discover that Ybx1 remains a key gene of interest in the field of pediatric cancer and

modulates neural differentiation and proliferation during neural tube development with implications during the cell cycle.

**#4 Synthesis of Antibacterial Compounds to Target LpxC Enzyme in Gram-Negative Bacteria
Campbell Brown, Eleanor Fontana, Emma Chow, Gabriella Krisanic, Trinity Liaw, Maria Alvaro, Larryn Peterson**

Faculty Sponsor: Larryn Peterson, Department of Chemistry

Only slight progress has been made in the development of broad-spectrum antibacterial compounds that target LpxC in gram-negative bacteria, making the treatment of these bacteria a growing concern. Previous propargylglycine-based compounds have shown some antibacterial activity when introduced to *Escherichia coli*. However, antibacterial activity only occurred when the TolC-mediated efflux pumps present in the bacteria were knocked out. In *E. coli*, these efflux pumps are used as a defense mechanism to eliminate potentially harmful compounds. In an attempt to avoid the efflux, compounds with polar threonine, cysteine, and methionine amino acid derivative side chains and hydrophobic tails, created through coupling reactions, were investigated. In addition, heterocyclic side chains, including biphenyl and naphthalene, have been investigated. After synthesizing potential compounds with different combinations of side chains, they were then converted into a hydroxamic acid form on the C-terminus of the respective amino acid. These compounds were then docked via AutoDock to show interactions within the LpxC site. Compounds with heterocyclic side chains, and threonine or methionine amino acid derivatives showed strong docking interactions. Therefore, efforts have been focused on naphthalene-threonine hydroxamic acid and biphenyl-methionine sulfoxide hydroxamic acid, which have been successfully synthesized, and will be tested in *E. coli*.

#5 Built from the Ground Up? Exploring Re-Purposed Architectural Materials in Enslaved African and African American House Structure in Western Tennessee

Olivia Evans, Chiara Torrini, Mary Katherine Brown, Maya Shah, Kimberly Kasper, Jamie Evans

Faculty Sponsor: Kimberly Kasper, Department of Anthropology and Sociology

This poster investigates the recovered architectural materials from enslaved African and African American houses at the Fanny Dickins and Cedar Grove plantations in western Tennessee. Since 2011, the Rhodes College Annual Environmental Archaeology Field School has focused its excavations on the enslaved African and African American house sites to learn more about the daily lives of the enslaved individuals within these plantations. Through the analysis of nails, bricks, and glass excavated from both sites, we will compare the types of houses and explore whether the house structures at each site deteriorated in situ or were repurposed to create other structures. This research provides insight into the specific function of architectural materials and post taphonomic processes. In addition, this comparative approach will allow us to build on existing data about the daily lives of enslaved people in the 19th century, especially relating to the accessibility of architectural resources and house maintenance.

(F) #6 Tree Recruitment Dynamics in Overton Park Old Growth Forest

Ashlee Caurana

Faculty Sponsor: Sarah Boyle, Department of Biology and Environmental Studies and Sciences Program

Overton Park Old Growth Forest is home to over 350 plant species and is important for providing ecosystem services to the surrounding community. A decline in the overstory species abundance has led to the study of the forest's recruitment dynamics. Due to the urban environment, Overton Park is exposed to many factors such as seed predation, leaf litter abundance, and above-ground competition which could impact early seed success rates. This study is ongoing and includes 12 germination plots installed in Overton Park Old Growth Forest. These plots are checked every two weeks to document seed predation and germination. This presentation will show the plot design, early patterns in the data on seed predation, and current germination rates of oak seeds. This study helps to understand how urban forests differ from rural forests, and how to help develop the best ways to manage urban forests.

#7 The Effect of Multi-Year Exclusion Fencing on Spring Ephemeral Species Diversity in the Overton Old Forest

Ashlee Caurana, Hannah Fort, William France, Jacob Hackney, Aidan Kron, Sabrina Simpson, Jacob Spears, Raegan Wilburn

Faculty Sponsor: Robert Laport, Department of Biology and Environmental Studies and Sciences Program

The Overton Old Forest is an ecologically diverse urban forest harboring important biodiversity. Of the 350 documented plant species in the forest, many are spring ephemeral wildflower species—emerging for only a few weeks in the early spring—that are only found in high-quality, undisturbed forest habitat. Since the forest was established in the early 1900s, several land-use alterations in Overton Park have impacted the extent of the intact forested section. One section of the Old Forest, comprising ~17 acres, was fenced by the Memphis Zoo to create an interpretive display of native forest habitat, and now represents a natural experiment to evaluate the potential effects of altered anthropogenic use patterns in the publicly-accessible section of the forest vs. the exclusion-fenced portion of the forest. The 2022 Rhodes College Plant Diversity and Evolution class (Bio 322) initiated surveys of the understory and spring ephemeral species in the central Old Forest and the exclusion-fenced section to document potential effects of human exclusion on wildflower species diversity and abundance.

#8 Ensemble Perception of Social Status and Perceived Prosociality

Kathryn Chambers, Sarah DiLuzio, and Anna Parkinson

Faculty Sponsor: Matthew Weeks, Department of Psychology

This study will investigate the ensemble perception of social status and the perceived prosociality of that ensemble, extending upon literature on ensemble perception and perception of prosociality. Ensemble perception refers to the visual system's ability to extract summary statistical information from an array of stimuli. Prosociality refers to behavior that is positive, helpful, and intended to promote social acceptance. Previous research has supported the idea that lower-class individuals are more prosocial than higher-class individuals. Our work will extend this literature by aiming to examine whether this extends to the perception of lower-class individuals are being more prosocial in order to see whether perception matches reality. This will contribute to scholarly work in ensemble perception of social status because there is little research that examines the perception of prosociality in an ensemble. We will conduct this study to investigate a) whether the ensemble perception of social status occurs and b) whether this ensemble perception of social status informs the perception of prosociality in an ensemble. We are currently in the process of data collection, but hypothesize that groups that are rated as having more lower-class individuals will have higher ratings of prosociality.

(F) #9 Initial Real-World Experience with Cenobamate in Adults and Adolescents: A Single Center Experience

Taylor Elliott, Tracee Ridley-Pryor DNP, Andrew J. Gienapp, James W. Wheless BScPharm, MD

Faculty Sponsor: Jonathan Fitz Gerald, Department of Biochemistry and Molecular Biology

Following approval by the U.S. Food and Drug Administration in late 2019, cenobamate (Xcopri) has been utilized to treat adults with focal seizures. Based on its robust efficacy from phase 2 trials, we began using cenobamate in our adolescent and young adult patients whose seizures were not controlled with previously available options. This study expanded its application to this cohort with focal epilepsy and a history of drug-related rash. We conducted a retrospective study of our patients exposed to cenobamate (n=45). We evaluated dosage and serum levels, efficacy, drug interactions, and adverse effects. After gradually increasing cenobamate to clinical effect using the FDA approved dosing protocol, 60% of patients were responders. Adolescents were treated with an average daily dose of 204.0 mg, and adults with 223.4 mg of cenobamate with serum levels of 20.5 µg/mL and 26.7 µg/mL, respectively. Side effects were similar to those seen in prior registry trials. Importantly, patients with a prior history of rash to medications experienced no rashes from cenobamate. This real-world study supports the findings of prior controlled studies regarding its efficacy as a treatment for focal seizures in adolescents and suggests that patients with a history of rash may benefit from this medication.

#10 Diversity of spring ephemeral species in edge vs. central forest habitat in the Overton Old Forest

Karielle Erickson, Nicholas Harrell, Braxton Jeffcoat, Jade Lightburn, Helen Pennington, Khanh Ton, Victoria Tryba, Jalen Womble

Faculty Sponsor: Robert Laport, Department of Biology and Environmental Studies and Sciences Program

At least 350 species of flower plants have been documented in the Overton Old Forest. A large portion of the plant diversity is represented by spring ephemeral wildflowers, which emerge for a few weeks in the early spring prior to leaf-out of the overstory trees. Spring ephemeral species are sensitive to disturbance and are typically only found in high quality, relatively intact deciduous hardwood forests. The health of these wildflower populations in the Overton Old Forest are not well understood given intensive anthropogenic usage of the park, and different histories of disturbance and succession have likely shaped their spatial distributions throughout the Old Forest. Here, the 2022 Rhodes College Plant Diversity and Evolution class (Bio 322) initiated surveys of understory and spring ephemeral species in central Old Forest habitats and forest edge habitats near roads, walkways, and walking trails to better document potential effects of human disturbance on these important and characteristic species of high-quality eastern deciduous forest.

#11 The Effects of Acute Stress on the Susceptibility to Develop Post-traumatic Stress Disorder Using C57BL/6 and DBA2/J Mouse Models

Melloni Cook, Tyler Feddema, and Arrington Moses

Faculty Sponsor: David Kabelik, Neuroscience Program

Post-traumatic stress disorder is a debilitating illness suffered by individuals who have experienced traumatic events, such as combat, sexual assault, vehicle accidents, and natural disasters, among others. For many of these individuals, their exposure to acute stress increases their susceptibility to developing PTSD and can severely impact their daily functioning. This research explored the impact that exposure to an acute stressor (which in this case was restraint stress via a restraining tube) had on fear learning in mice through the fear conditioning paradigm. Exposure to acute stress may have notable impacts on fear learning and may help in determining if it increases PTSD-like behaviors and may give insight into PTSD development in humans. The DBA2/J and C57BL6/J strains of mice are useful subjects for understanding the stress response in an animal model because of their similar genome to humans. Moreover, by studying inbred strains, it can be determined if there are genetic differences in behaviors. We predicted that the mice exposed to the acute stressor will show notably lower movement than control mice because the acute stressor will inhibit fear learning processes. The results show that there were significant strain differences in baseline behaviors, but no other behaviors.

#12 Aspergillus nidulans physical interactions between enzyme PkcA and other proteins during cell growth and division using Bimolecular Fluorescence Complementation.

Kathryn Franks, Oliver Hurst, Terry W. Hill, and Loretta Jackson-Hayes

Faculty Sponsor: Terry Hill, Department of Biology

Fungi are eukaryotic microorganisms whose interactions with humans can be both beneficial and harmful. Our research with the model fungus *Aspergillus nidulans* investigates physical interactions between the enzyme Protein Kinase C (PkcA) and other proteins during cell growth and division using Bimolecular Fluorescence Complementation (BiFC). This technique involves using genetic engineering to tag proteins of interest with complementary markers at one end of the respective proteins. Previous work, in which PkcA was tagged at its N-terminus, was successful in demonstrating several protein-protein interactions, but the resulting strains were poorly viable. In our current work we have successfully tagged PkcA at its opposite end (C-terminus), resulting in fully viable strains. Our poster will describe the methods involved in engineering strains expressing two variants of C-terminally tagged PkcA, and we will present the results obtained by using our new strains to investigate interactions between PkcA and proteins ChsB, ChsC, ChsA, CsmA, FksA, and SepA, which play important roles in fungal cell growth and cell division.

#13 Using Persistent Homology to Analyze the Topological Signature of William Shakespeare and Christopher Marlowe

Abigail Gobble and Jiwoo Lee

Faculty Sponsor: Christopher Seaton, Department of Mathematics

Topological Data Analysis (TDA) is a recent and fast growing field that applies topological and geometric tools to infer relevant features of potentially complex data. TDA aims at providing mathematical and statistical methods to analyze the complex topological structures underlying

data that are often represented as point clouds in Euclidean or general metric spaces. In this talk, we will discuss our ongoing attempt to use the methods of text mining (Gholizadeh, Seyeditabari, and Zadrozny, Topological Signature of 19th Century Novelists: Persistent Homology in Text Mining, BDCC, 2018) to explore the theory that William Shakespeare was a pseudonym employed by several different playwrights. Through the application of the cited paper's methods, we aim to determine unique topological structures for both William Shakespeare and Christopher Marlowe, a Victorian era playwright who has recently been discovered to have coauthored Henry IV with Shakespeare. By comparing the topological signatures of Shakespeare and Marlowe, we hope to gain another perspective to look at the long-questioned authorship of Shakespearean plays.

(F) #14 The Effects of Memphis Weather on Captive African Elephants (*Loxodonta africana*)

Mia Harris, Max Dixon, Joanne Hu, Lauren Cordes, and Jon Pulaski

Faculty Sponsor: Sarah Boyle, Department of Biology

Anthropogenic induced climate change is altering and intensifying global weather patterns. Global warming and extreme weather events have become more prominent, impacting behavioral rhythms for entire ecological communities. The behavioral patterns of African elephants (*Loxodonta africana*) are dependent on the health and quality of their habitat. The effect of weather conditions on animal behavior is even more important for captive animals that are possibly exposed to foreign climate conditions. We investigated the impact of weather conditions on the swaying behavior exhibited by Gina, Asali, Bambi, and Daisy at the Memphis Zoo. We hypothesized that sunnier, brighter days with higher temperatures induce higher levels of swaying behavior by the elephants. We used behavioral scan samplings at 2-minute intervals to quantify swaying behavior for each elephant. In total, we collected 287 hours of behavioral data during the summer of 2021. The results from this study can help elephant keepers revise husbandry routines and renovate the elephant exhibit in accordance with changing weather conditions in Memphis, potentially reducing the amount of time the elephants at the Memphis Zoo dedicate to swaying.

(F) #15 Development of a yeast-two-hybrid assay protocol to investigate physical interactions of EF-hand and IQ-motif proteins in *Aspergillus nidulans*

Trang Ho

Faculty Sponsor: Terry Hill, Department of Biology

EF-hand proteins are calcium-binding proteins that bind to proteins containing IQ motifs. I have previously demonstrated evidence for the interaction of EF-hand and IQ-motif proteins in the fungus *Aspergillus nidulans* by co-immunoprecipitation with Green Fluorescent Protein tag followed by Mass Spectrometry. Specifically, I have identified that the IQ-motif proteins SepG, MyoE and MyoB bind to the EF-hand protein Cdc4; MyoB also binds to the EF-hand MrlC, and MyoE also binds to the EF-hand protein CaM. The yeast-two-hybrid assay can be used to provide independent, confirmatory evidence of the direct interactions of these pairs of proteins. I have established a yeast-two-hybrid assay protocol for use in our laboratory based on Takara Bio USA's Matchmaker Gold Yeast Two-Hybrid System with guidance from Professor Jackson-Hayes. Because the technique is new to our laboratory, I first replicated a positive yeast-two-hybrid result of the interaction between two cell end marker proteins TeaA and TeaC, reported by Higashitsuji et al. (2009), as a control for the modified protocol. Success in demonstrating

TeaA and TeaC interactions via the yeast-two-hybrid assay confirmed our laboratory's ability to identify protein interactions using our developed protocol.

(F) #16 Comparison of Water Molecules Identified in Proteins' 3D Structures Solved by Cryo-electron Microscopy and X-ray Crystallography

Margaret (Ngoc) Hoang, Tim Stachowski, Marcus Fischer

Faculty Sponsor: William Eckenhoff, Department of Chemistry

Over the past few years, along with the established method of X-ray crystallography, single-particle cryo-electron microscopy (cryo-EM) has been developed and used as a new technique to determine 3D structures of biomacromolecules. To compare the presence of water molecules across these two techniques, structures of multiple proteins that have been solved by both cryo-EM and X-ray crystallography were collected from the protein data bank (PDB). The number of water present in 3D structures and their effects on the proteins' properties in two methods were investigated through a statistical analysis. The results indicated that structures determined by X-ray crystallography detected more water molecules than those by cryo-EM and changed differently as resolution increased with the range of 0-3 Å between the two methods. The trend between the number of water molecules and resolution also suggested that no water would be observed at resolution larger than 2.3 Å for cryo-EM and 2.8 Å X-ray crystallography.

#17 RHOK-SAT, Rhodes College's First CubeSatellite

Giuliana Hofheins and Olivia Kaufmann

Faculty Sponsor: Bentley Burnham, Department of Physics

Rhodes College is leaving its footprint in space with a nanosatellite, a CubeSat called RHOK-SAT, which is projected to be ready for launch in June, 2023. RHOK-SAT is sponsored by the NASA CubeSat Launch Initiative. The payload (mission) of the satellite is to characterize novel photovoltaic cells in Low Earth Orbit. These solar cells, developed by the Photovoltaics Materials and Devices Group at the University of Oklahoma, show promise in providing remote power generation for future crewed and uncrewed space missions. The team of Rhodes students has developed specific satellite hardware and software to capture solar cell data while in orbit and transmit that data via radio signals to the Rhodes ground station. The team has also focused on community outreach by bringing space science to local Memphis public schools. Our presentation provides an overview of the work being done by each subgroup of the RHOK-SAT team, as well as the motivation for the experiment. We look briefly at the work completed, and the tasks remaining on the project. We also focus on payload hardware, ground station radio communications, flight software, and outreach work.

#18 An Analysis of the Composition of Tensor Products for Analysis of a Chess Game

Emily Holderness

Faculty Sponsor: Christopher Seaton, Department of Mathematics

Chess is a complicated and intricate game. A chess board is an 8×8 matrix that is composed of layers. The game is played in a two-dimensional space (R²). One method of solving and analyzing a chess game uses a three-dimensional space (R³). Using this method one chess position may have hundreds of submatrices in four or more layers. The tensor product is a

mathematical tool to describe matrices composed of matrices. Tensor products are systems containing multiple subsystems. Sub-systems are described by a vector in a vector space. When tensor products are multiplied by each other, a chess board position is produced. This project will study different compositions of tensor products to construct different chess endgame positions. I will present progress on understanding the tensor product and its use in these constructions. Future work of this study will include analysis of chess endgame scenarios through the use of factorizations of the matrix using tensor products, matrix multiplication, and matrix addition. The manipulation of matrices will allow for the analysis of four-and-five-piece endgame scenarios.

(F) #19 Simulating Transport of Magnetic Microparticles on Disk Array Traps

Eliza Howard, Gregory Vieira, Chris Hoang, Ryan Simms, David Alden Raymond, and Edward Thomas Cullom

Faculty Sponsor: Gregory Vieira, Department of Physics

The manipulation of superparamagnetic microparticles, or beads, by applying controlled, tunable forces without direct external contact has applications in sorting and purifying heterogeneous liquid samples, useful for biology and chemistry, and can be used as components for lab-on-chip devices. This can be accomplished by using an array of magnetic traps. In our set-up, the beads are moved by applying and varying external magnetic fields to create and rotate magnetic traps around the periphery of permalloy discs. We created a computer simulation using Python which replicates bead motion and therefore helps provide a better understanding of the phenomena we observe, as well as the magnetic properties of the disks and beads. Using short-range motion—the repulsion of a bead from one disk to the next—we fit the simulation’s predictions to experimental results and determined parameters for bead magnetic susceptibility and the strength of the magnetic fields from the discs. The simulation successfully replicates and predicts phenomena such as the path a bead takes as it travels, limitations on bead speed, and the correlation between various parameters, such as bead radius or external magnetic field, and bead motion.

(F) #20 Satellite Flight Software and Communications: The RHOK-SAT Project

José Pastrana, Ryan Jones, and Mohammed Hyder

Faculty Sponsor: Phillip Kirlin, Department of Computer Science

The RHodes-OKlahoma CubeSat (RHOK-SAT) is a NASA sponsored project with both an educational and scientific mission. The Rhodes College and University of Oklahoma teams’ scientific mission is to investigate degradation tolerance of novel photovoltaic cells for future space applications. The project has been divided into three student-led teams: flight software (FS), ground station (GS), and hardware. We are members of the flight software and ground station teams and are responsible for designing and implementing the requirements of the satellite’s daily operation, as well as ensuring operational functionality and longevity for the mission duration. This poster will detail the challenges, constraints, and problems faced by both the FSW and GS teams, and the current state of the CubeSat’s software development. Among these challenges include: the choice to develop flight software from scratch, software design philosophy, choice of ground station hardware, and defining ground station transceiver operations.

#21 Forest community analyses of remnant forests in Shelby Co., Tennessee reveal potential eastern old growth forest

Braxton J. Jeffcoat, Aidan M. Kron, Jacob F. Spears, and Robert G. Laport

Faculty Sponsor: Robert Laport, Department of Biology

European colonization of eastern North America resulted in widespread destruction of eastern old growth forest. The loss of these forests has negatively impacted native plant and animal biodiversity over the last several centuries. However, remnant old growth forest is more common than previously thought, with many small pockets of high-quality forest occurring near urban settlements. While harboring important native eastern forest biodiversity and providing important ecosystem services, these forests may also be threatened by continued anthropogenic disturbance, especially if such forests remain “hidden” and unappreciated. Here, we investigate the presence of potential old growth forest elements by characterizing forest community structure in five urban/suburban forests in Shelby Co., Tennessee. We found that most of the forests exhibit high tree and shrub species richness, contain large and old overstory trees representing high basal areas/hectare, and have biotic elements that meet various established criteria for eastern old growth forest. Although the forests are distinct in species composition, likely representing different disturbance histories, these remnant forests also appear to harbor important native biodiversity in a region that has experienced intensive historical anthropogenic disturbance.

#22 Study of the effect of n-3 PUFA on retinal degeneration through Histological Evolution

Muaz Khan

Faculty Sponsor: Gary Lindquester, Department of Biology

Retinal Degeneration (RD) is one of the leading causes of incurable blindness and low vision worldwide. This is caused by irreversible death of photoreceptor cells. Recent studies indicate potential involvement of inflammation in all forms of retinal degenerations. We proposed to test if Omega-3 (n-3) polyunsaturated fatty acids (PUFA) can prevent retinal degeneration in a mouse model by reducing tissue inflammation. Lipid modifying enzymes break n-3 PUFA down and create anti-inflammatory lipid products and thus can help in the resolution of inflammation. We have used a natural mouse model of retinal degeneration, RD10 mice that have a mutation in the Pde6b gene which causes them to undergo rod photoreceptor cell death when exposed to light i.e. from postnatal day 15. These mice were separated into 2 groups. One group received high levels of n-3 PUFA (test group) through diet, and the other received normal diet for 2 months (control) from birth. The extent of retinal degeneration was determined by histological examination of the eyes from the RD10 control and experimental groups.

(F) #23 Functional role of PTEN cellular localization in fusion-negative rhabdomyosarcomagenesis

Wood Kimbrough, Kristin B. Reed, Casey G. Langdon, and Jongchan Hwang

Faculty Sponsor: Kimberly Brien, Department of Chemistry

Rhabdomyosarcoma (RMS) is the most common soft tissue sarcoma in children with survival rates not improving over the last 30 years. RMS is subdivided into two categories, fusion-negative (FN-RMS) and fusion-positive rhabdomyosarcoma (FP-RMS). FN-RMS accounts for 80% of RMS and are genetically heterogeneous without a unifying driving mutation. However,

attenuation of PTEN tumor suppressor function is common either by promoter hypermethylation or copy number loss in 90% and 30% of tumors, respectively. Leveraging our genetically engineered mouse model, our lab conditionally deleted *Pten* in RMS cells resulting in early onset tumors more closely resembling those seen in patients. Surprisingly, we found PTEN loss does not result in increased PI3K/AKT/mTOR signaling. PTEN loss in RMS increased expression of PAX7, suggesting a putative nuclear role of PTEN. It is unclear whether loss of PTEN function in the cytoplasm or nucleus is what drives the phenotype. We designed, constructed, and validated a conditional murine *Pten* allele tagged with either a nuclear localization signal (NLS-*Pten*) or a nuclear exclusion signal (NES-*Pten*). Using in vitro immunofluorescence, we verified Cre-mediated expression and proper subcellular localization of the constructs. We are currently generating NLS-*Pten* and NES-*Pten* transgenic mice to discern the role of PTEN in FN-RMS tumorigenesis.

#24 L-DOPA Dioxygenases from Diverse Natural Product Pathways

Kameron L. Klugh, Paige Jones, Riri Yoza, Larryn W. Peterson, Keri L. Colabroy

Faculty Sponsor: Larryn Peterson, Department of Chemistry

L-DOPA dioxygenase is part of a mini-pathway to the synthon 3-vinyl-2,3-pyrroline-5-carboxylic acid (VPCA) that is elaborated and embedded within the final product structures of lincomycin, anthramycin, sibiromycin, tomaymycin and hormaomycin. Using the VPCA mini-pathway as a starting point, we searched sequence space to identify novel natural product pathways containing a VPCA synthon. From among these novel natural product pathways, representative L-DOPA dioxygenase gene products from *Streptomyces hygroscopicus* subsp. *jinggangensis* and *Nocardia arthriditis* were studied as pure proteins for their stability and activity on L-DOPA and related catechols in steady-state assays for catechol cleavage. These results were analyzed in comparison to characterized L-DOPA dioxygenases from *Streptomyces lincolnensis* and *Streptomyces sclerotialis*.

#25 Design and Synthesis of Antibacterial Compounds to Avoid Efflux-Mediated Resistance in Gram-negative Bacteria

Gabriella A. Krisanic, Jacob D. Greenberg, Emma J. Chow, Eleanor A. Fontana, Campbell A. Brown, Larryn W. Peterson

Faculty Sponsor: Larryn Peterson, Department of Chemistry

L-DOPA dioxygenase is part of a mini-pathway to the synthon 3-vinyl-2,3-pyrroline-5-carboxylic acid (VPCA) that is elaborated and embedded within the final product structures of lincomycin, anthramycin, sibiromycin, tomaymycin and hormaomycin. Using the VPCA mini-pathway as a starting point, we searched sequence space to identify novel natural product pathways containing a VPCA synthon. From among these novel natural product pathways, representative L-DOPA dioxygenase gene products from *Streptomyces hygroscopicus* subsp. *jinggangensis* and *Nocardia arthriditis* were studied as pure proteins for their stability and activity on L-DOPA and related catechols in steady-state assays for catechol cleavage. These results were analyzed in comparison to characterized L-DOPA dioxygenases from *Streptomyces lincolnensis* and *Streptomyces sclerotialis*.

(F) #26 Modeling Genomic Alterations Identified in Pediatric Acute Myeloid Leukemia
Reethu Krishnan, Juan Barajas, Ryan Hiltenbrand, Bright Arthur, Sherif Abdelhamed, Jeffery Klcó

Faculty Sponsor: Elaine Frawley, Department of Biology

Children diagnosed with acute myeloid leukemia (AML) have a relatively poor overall survival and high relapse rate. To improve patient outcomes, our lab seeks to understand genomic alterations that initiate leukemia in children or are enriched at disease relapse. We recently performed a comprehensive genomic analysis of relapsed pediatric AML. KMT2A::MLLT3, DEK::NUP214, RUNX1::RUNX1T1, CBFB::MYH11 and UBTF tandem duplications (UBTF-TD) were among the highly frequent alterations detected. We hypothesize that expressing these genomic alterations in human hematopoietic stem cells (HSCs) will alter hematopoiesis and potentially drive leukemogenesis. To test this hypothesis, we used our recently developed lentivirus system expressing these alterations in human cord-blood CD34+ HSCs to evaluate their impact on self-renewal, differentiation, and proliferation by colony-forming units (CFU) assays, flow cytometry, and growth curve assays, respectively. Our results show that CD34+ cells expressing RUNX1::RUNX1T1, CBFB::MYH11, and UBTF-TD retained stem-cell capacity and increased self-renewal and cell proliferation. However, expression of KMT2A::MLLT3 and DEK::NUP214 indicated bias toward myeloid differentiation, as indicated by increased expression of CD11b—a marker for myeloid cells. These findings provide us with promising models to study genetic alterations that drive leukemogenesis and prompts future studies to investigate their molecular mechanisms to develop targeted therapies for pediatric AML patients.

(F) #27 Pawpaw (*Asimina triloba*) density varies among forests of Shelby Co., Tennessee
Aidan M. Kron, Braxton J. Jeffcoat, Jacob F. Spears, and Robert G. Laport

Faculty Sponsor: Robert Laport, Department of Biology

Pawpaw (*Asimina triloba*) is a unique native species in the forests of eastern North America, representing a temperate member of an otherwise tropical genus of small trees that produces some of the largest edible fruits native to the continent. The species is considered an evolutionary anachronism that is hypothesized to have co-adapted with pre-glacial megafauna that consumed its fruits and dispersed its seeds. The post-glacial extinction of large mammals in North America is thought to have resulted in a shift to smaller mammals filling the pawpaw seed dispersal niche. However, anthropogenic influences on the dispersal and occurrence of pawpaw in eastern forests remain understudied, and it is not clear whether the distribution of pawpaw may be shaped by anthropogenically-mediated habitat disturbance. Here, we investigate potential anthropogenic influences on the density of pawpaw trees in five urban/suburban forests in Shelby Co., Tennessee. We found that pawpaw density was highest in more urban forests with greater apparent levels of anthropogenic disturbance, while suburban forests with large relatively disturbance-free patches had the lowest densities of pawpaw.

(F) #28 Using the St. Jude ProFILE data to assess institutional alignment with the IOM quality aims

Mai An Le, Elizabeth Grace Riley, Miriam Gonzalez, Patricia Urcuyo, Heather Forest, and Paola Friedrich

Faculty Sponsor: Jonathan Fitz Gerald, Department of Biology

The St. Jude Pediatric Oncology Facility Integrated Local Evaluation (ProFILE) tool is a dynamic 360° evaluation of health services delivery that helps care teams and institutions committed to increasing childhood cancer survival define an improvement strategy. To drive fundamental change in health care delivery, the Institute of Medicine (IOM) has proposed six aims: safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity. This study employed a multi-step mapping approach. We first mapped the 1,279 ProFILE variables to the six IOM quality aims. Mapping was performed independently by two authors, then reviewed by ProFILE experts to achieve consensus. We then validated the mapping by running the previously collected data available from two cohorts (one with 13 and one with 17 facilities) and benchmarking institutional data to cohort data. We identified 305 ProFILE variables that reflect the IOM quality aims. More ProFILE questions could be used as proxy for safety, effectiveness, and timeliness aims, than patient-centeredness, efficiency, and equity. This exercise demonstrates the feasibility of leveraging ProFILE data to assess institutional alignment with the IOM quality aims. The results allow illustrating, benchmarking, and engaging with stakeholders in conversations aimed at improving delivery of pediatric oncology care in global real-world settings utilizing this perspective.

#29 Using Fluorescent Reporters to Explore the Relationship Between Unpaired Heterochromatin and Chromosome Segregation in Fission Yeast

Isabella Lewin and Bayly Wheeler

Faculty Sponsor: Bayly Wheeler, Biochemistry and Molecular Biology Program

Meiosis is the process of cell division that gives rise to sperm and egg cells, and errors in meiosis can result in aneuploidy, which is a cell with too many or too few chromosomes. Aneuploidy impacts human health: for example, it is the most common cause of miscarriage.

Heterochromatin, a compact form of DNA packaging, plays an important role in meiosis and the prevention of aneuploidy. Our lab has found that unpaired heterochromatin (heterochromatin found on one chromosome but not its pair) causes meiotic lethality, observed by random spore analysis data. Our goal is to quantify the extent of the lethality and better understand the parameters that cause it. Currently, our lab is using fluorescent reporter genes to determine whether unpaired heterochromatin is associated with chromosome mis-segregation during meiosis. This work will allow us to define how unpaired heterochromatin hinders normal meiotic processes.

(F) #30 Collaborative Coding for Quasar Observations with the James Webb Space Telescope
Hadley Lim and Lily Whitesell

Faculty Sponsor: David Rupke, Department of Physics

NASA's next flagship observatory, the James Webb Space Telescope, was successfully launched Christmas Day 2021. Commissioning of the observatory is ongoing. The Early Release Science Program Q3D will be one of the first programs scheduled on the telescope. The scientists in Q3D

will study quasars--actively accreting, supermassive black holes--in three dimensions (two spatial and one spectral). In preparation for these observations and in collaboration with scientists from other institutions, from 2020-2021 we translated the data analysis software IFSFIT from the scientific programming language IDL to Python. This software will fit spectral lines in the near-infrared and mid-infrared ranges to study the stellar, gas, and dust components of galaxies, spatially and spectrally.

#31 Characterizing acquired Chemoresistance to Microtubulin Inhibitors in Breast Cancer using Hs578T TNBC Cell Line

Leona Middleton, Dr. Raisa I Krutilina, and Damilola Oluwalana MSc

Faculty Sponsor: Gary Lindquester, Department of Biology

Triple negative breast cancer (TNBC) is an aggressive breast cancer subtype, characterized by a lack of targetable hormone receptors, poor overall prognosis, and increased risk of chemoresistance. Compared to other breast cancer subtypes, in which therapies target progesterone, estrogen, and HER2 signaling, TNBC therapies rely on general cytotoxic chemotherapies including drugs that alter microtubules. Paclitaxel and Sabizabulin target microtubules with different mechanisms of action; paclitaxel blocks the disassembly of microtubules, while Sabizabulin inhibits microtubule reassembly. For this project, sublines of Hs578T TNBC cells were generated to be resistant to paclitaxel (TxR) and Sabizabulin (SabR) by propagating Hs578T cells over eight months under increasing concentrations of each drug and were used to characterize how chemoresistance changes cell behaviors. First, chemoresistance was confirmed by using the MTS viability assay to determine the IC₅₀ value for each line, followed by proliferation and cell motility or wound healing assays. Both chemoresistant lines were significantly less proliferative and less mobile than the parental Hs578T cells, although Hs57T-TxR was significantly more migratory than Hs578T-SabR. Similar trends were observed in previously established MDA-MB-231 TxR and SabR TNBC cell lines. Overall, chemoresistance significantly affects proliferation and motility in TNBC.

(F) #32 CRISPR Base Editing of Erythroid Progenitor Cells Offers Potential Cure for HbSC Sickle Cell Disease

Mark Minogue, James Papizan, Shondra Pruett-Miller

Faculty Sponsor: Kimberly Brien, Biochemistry and Molecular Biology Program

Hemoglobin SC (HbSC) is a sickle cell hemoglobinopathy caused by the inheritance of two mutant β -globin alleles: one sickle cell disease allele (HbS) and one hemoglobin C allele (HbC). Both S and C mutations occur in the 7th codon of the β -globin gene. HbSC often results in milder, yet still clinically significant disease compared to hemoglobin SS (HbSS) and is the second most frequent sickle cell disease genotype, accounting for 30% of the disease in the US and the UK. Recent studies have had success using the custom adenine base editor ABE8e-NRCH to convert the HbS allele to the non-pathogenic variant Makassar β -globin (HbG). Using CRISPR, we created a HbSC HUDEP-2 cell line from wild type HUDEP-2 cells. We then delivered ABE8e-NRCH, ABEmaxNG, and complementary guide RNAs to the HbSC cells in an attempt to rescue the HbS and HbC alleles simultaneously. In edited pools the HbG frequency was 43% (compare to 47% HbS in control pools) and the frequency of the rare hemoglobin variant Lavagna was 30% (compare to 47% HbC in control pools). The implications of this rare Lavagna/Makassar genotype will have to be studied using an animal model.

#33 Ensemble Perception in Varying Age and Race Ensembles

Katey Kanzler, Ben Barfield, Anni Johnson, Dexter Roland

Faculty Sponsor: Matthew Weeks, Department of Psychology

Ensemble perception has shown that human observers are able to implicitly process multiple emotional faces shown concurrently and extract the average emotion from them. This phenomenon has caused us to examine the notions of in-group vs. out-group age/race bias when perceiving an ensemble and making judgements of social status. Previous research has shown that young adults have an implicit bias association against an out group of older adults, which is not present when looking at their own age (in group). Thus, we predict that the young adults will have a more accurate ensemble perception process on the social status of other young adults compared to the out-group social status of older adults. We will use trials of individual images that will precede the ensemble trials in order to create an expected value of social status for the ensembles. Data for this study is still being collected in the Rhodes College Social Cognition Lab.

#34 Insight into L-DOPA dioxygenase mechanism with 6-substituted L-DOPA derivatives

Kudzai Nyamkondiwa, Trevor Squires, Paige Jones, Keri L. Colabroy, and Larryn W. Peterson

Faculty Sponsor: Larryn Peterson, Department of Chemistry

Dioxygenase enzymes are essential protein catalysts for the breakdown of catecholic rings, structural components of plant woody tissue. This powerful chemistry is used in nature to make natural products as well as degrade plant material, but we have a limited understanding of substrate space and mechanism across the superfamily. To this end, we report the syntheses, redox potentials and pKas of L-3,4-dihydroxyphenylalanine (L-DOPA) derivatives substituted at the 6-position and their characterization as substrates of L-DOPA dioxygenase from lincomycin biosynthesis in *Streptomyces lincolnensis*. In particular, the spectroscopic properties of 6-nitroDOPA provide insight into the steps of the enzymatic mechanism. The applications for dioxygenase cleavage of 6-substituted L-DOPA derivatives to natural product biosynthesis will be discussed.

(F) #35 A Retrospective Study of the Use of Airway Devices in Patients Having Anesthesia for Radiation Therapy

Benjamin Oelkers, Kavitha Raghavan, Vivian Lawrence, and William Eckenhoff

Faculty Sponsor: William Eckenhoff, Department of Chemistry

The use of General Anesthetics has become common place for Pediatric Radiation Therapy and causes many unique challenges for Anesthesiologists. Due to the dangers of radiation therapy, a mesh mask is placed on the face and neck to help focus the radiation on the correct location. However, if molded incorrectly, this can cause obstruction in the patient's airway, limiting the patient's ability to breath. In addition, other patient and disease related factors may result in upper airway obstruction during anesthesia. These factors may necessitate placement of an airway device during radiation therapy anesthesia, the frequent use of which may cause complications such as airway trauma, inflammation and edema causing pain and worsening of airway obstruction. We are conducting a retrospective observational study to analyze the past five years of radiation encounters at St Jude's Children's Research Hospital to identify risk

factors associated with use of airway devices in patients undergoing radiation therapy with the aim of identifying patient factors, disease factors and other factors associated with use of airway devices. Mitigating preventable risk factors will help minimizing the use of airway devices and its adverse effects in patients having radiation therapy under anesthesia.

#36 An Extended Analysis on the Coins-in-a-Row Game

Hawthorne Ramsey and Eric Gottlieb

Faculty Sponsor: Eric Gottlieb, Department of Mathematics

The game ‘Coins in a Row’ by Peter Winkler presents a row of coins with chosen values in front of two players. The two players take turns picking between the two end coins until the last coin is taken; whoever has the most gold wins. These games are known as ‘path’ games. When the number of coins in a path game is even, Player One can use what is called the ‘Even-Odd strategy’ to earn a draw or win. However, no strategy has been found for games with an odd number of coins. The first part of this project focuses on finding a non-losing strategy for these games. Also, we sought strategies that guaranteed larger holdings for the non-losing player for any path game. The other part of this project focuses on more complex games, such as when the coins are arranged that they form the vertices of a partially ordered set. On at least one turn, each player will have more than two options for which coin he/she would like to grab. In these games, we also determine when each player has a non-losing strategy.

(F) #37 Using the St. Jude ProFILE data to assess the Institute of Medicine quality aims in Pediatric Oncology Hospitals in Brazil.

Elizabeth Grace Riley, Ann Le, Miriam Gonzalez, Patricia Urcuyo, Heather Forest, Paola Friedrich

Faculty Sponsor: David Kabelik, Department of Neuroscience

The game ‘Coins in a Row’ by Peter Winkler presents a row of coins with chosen values in front of two players. The two players take turns picking between the two end coins until the last coin is taken; whoever has the most gold wins. These games are known as ‘path’ games. When the number of coins in a path game is even, Player One can use what is called the ‘Even-Odd strategy’ to earn a draw or win. However, no strategy has been found for games with an odd number of coins. The first part of this project focuses on finding a non-losing strategy for these games. Also, we sought strategies that guaranteed larger holdings for the non-losing player for any path game. The other part of this project focuses on more complex games, such as when the coins are arranged that they form the vertices of a partially ordered set. On at least one turn, each player will have more than two options for which coin he/she would like to grab. In these games, we also determine when each player has a non-losing strategy.

(F) #38 Development of Novel FRET-Based Sensor for Ras Activity

Andy Schild, Dušan Garić, and Stanislav Zakharenko

Faculty Sponsor: Elaine Frawley, Department of Biology

Ras GTPase is the key molecule downstream of all tyrosine kinase receptors activated by a variety of growth factors. Ras is also a very prominent proto-oncogene and mutations in this protein can result in a variety of cancers. Since Ras sits at such a critical juncture for the study of

cancer, quantitative measurement of its interactions is important, yet fluorescent measurement systems remain poorly resolved. We are working to develop an improved system for quantitative analysis of Ras interactions with other proteins through Förster resonance energy transfer (FRET). The first sensor for Ras interactions was developed in 2006, and later an improved sensor was developed in 2013, but these models used primitive fluorescent proteins with relatively low brightness. We developed an improved sensor using mNeonGreen and mScarlet, which are more advanced and bright fluorescent proteins, with two mScarlet molecules being conjugated to the Ras binding domain of Raf1, a protein that interacts with Ras, as a fusion protein and mNeonGreen being the partner which is conjugated to Ras.

#39 Inter-cytotype reproductive interactions in *Larrea tridentata* from sympatric and allopatric populations

Jacob F. Spears, Aidan M. Kron, Braxton J. Jeffcoat, and Robert G. Laport

Faculty Sponsor: Robert Laport, Department of Biology

Polyploidy—whole genome duplication—is an ubiquitous genome-scale mutation among flowering plants that can have significant impacts on multiple phenotypic traits and the timing of life history events. Ployploidy is thought to be associated with the evolutionary diversification of flowering plants, and may also be a major driver of rapid ecological divergence and sympatric speciation. While the reproductive interactions among intra-specific ploidies are well-studied in multiple taxa, it remains less clear whether patterns of reinforcing selection—natural selection in areas of sympatry resulting in stronger reproductive isolation than between plants from areas of allopatry—may play a role in the rapid ecological divergence and speciation observed in polyploid species. Here, we perform hand pollinations on greenhouse-grown plants to investigate the reproductive interactions among diploid, tetraploid, and hexaploid *L. tridentata*, a dominant long-lived desert shrub of the southwestern U.S. and northern Mexico. We find that crosses between plants of the same ploidy result in higher fruit masses and seed production than crosses between plants differing in ploidy. These patterns do not appear to differ when plants originate from sympatric populations vs. allopatric populations, and are thus not consistent with broad patterns of reinforcing selection.

#40 Derivatives of 3,4-dihydroxyhydrocinnamic acid at the 6-position as mechanistic probes of L-DOPA dioxygenase

Jessica Steiner, Gisela Xhafkollari, Keri Colabroy, and Larryn Peterson

Faculty Sponsor: Larryn Peterson, Department of Chemistry

Dioxygenase enzymes are essential protein catalysts for the breakdown of catecholic rings, structural components of plant woody tissue. This powerful chemistry is used in nature to make antibiotics and other bioactive materials as well as degrade plant material, but we have a limited understanding of the breadth and depth of substrate space for these powerful enzymes. To this end, we report the syntheses, redox potentials and pKas of 3,4-dihydroxyhydrocinnamic acid (DHHCA) derivatives substituted at the 6-position and their characterization as substrates of L-DOPA dioxygenase from *Streptomyces lincolnensis*. The cleavage of diverse catecholic substrates is an important element of bioremediation. Extradiol dioxygenase cleavage of DHHCA derivatives also promises to yield insight into mechanism and provide synthons for various applications.

(F) #41 Characterizing ZW9's Role in Arabidopsis thaliana Seed Development

Jewelle Stone and Mira Greenberg

Faculty Sponsor: Jonathan Fitz Gerald, Department of Biology

Seed size is an important agricultural trait, but identifying the responsible genes is confounded by several factors. The seed develops from three genetically distinct tissues and the size of the seed is regulated by distinct maternal and paternal inputs. Through whole-genome transcript sequencing, we identified ZW9, a paternally expressed gene that only shows expression in outcrosses between certain Arabidopsis ecotypes. ZW9 is a TRAF-like family protein (tumor necrosis factor receptor-associated factor) associated with immunological, photosynthetic, or environmental stress response pathways in young plants and/or germinating seeds. Initial bioinformatics suggests possible ligase/protease action, involvement in photoreception or neoxanthin biosynthesis, and relation to meprins through the MATH protein domain. Interestingly, ZW9 showed little similarity to well-characterized TRAF-like proteins MUSE13 and MUSE14 in BLAST comparisons. Stock center Zw9 knockouts had parent-specific phenotypes in seed development and we are currently employing CRISPR to create gene knockouts.

(F) #42 Adaptive Functioning in Children and Adolescents with Sickle Cell Disease

Ana Trpchevska, Jennifer Longoria, Victoria Okhomina, Darcy Raches, Brian Potter, Guolian Kang, Andrew M. Heitzer, and Jane S. Hankins

Faculty Sponsor: Katherine White, Department of Psychology

Risk for neurocognitive deficits in sickle cell disease (SCD) is well-established, yet minimal research has evaluated risk for deficits in adaptive functioning. We assessed adaptive functioning in pediatric patients with SCD to test the hypothesis that disease, treatment, and demographic factors were associated with adaptive outcomes. Adaptive functioning of 256 patients, ages 8-18, was measured using the Behavior Assessment System for Children, Second or Third Edition. Linear regression models were used to measure associations between adaptive functioning and age, hydroxyurea use, genotype, and socioeconomic status. Further, we examined the influence of intellectual and executive functioning on adaptive behavior using hierarchical linear regression analyses. Parent ratings of adaptive functioning skills did not differ from normative expectations. Social vulnerability was negatively associated with adaptive scores on most adaptive scales in both genotypes. Hydroxyurea treatment was not associated with adaptive scales. Overall IQ was positively associated with Functional Communication and Leadership only for patients with the more severe genotype. Higher parent ratings of executive difficulties were correlated with lower adaptive scores. Most adaptive scores were in the normal range; however, parent ratings may not fully capture the impact of disease complications and neurocognitive deficits on daily functioning.

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