

URSA

UNDERGRADUATE RESEARCH & SCHOLARLY ACHIEVEMENT

Celebrating UNDERGRADUATE

Research

Creativity

Vision



Scholars Week

April 1-5, 2019

Dear Colleagues and Students,

Please join us as we celebrate undergraduate research, creativity, and vision during our twelfth-annual Undergraduate Research and Scholarly Achievement (URSA) Scholars Week, April 1-5. Research engagement promotes critical thought, methodological fluency, and hones analytical skills. URSA Scholars Week features some of our best and brightest! These students will undoubtedly go on to be thoughtful citizens, industry leaders, and our next generation of scholars and scientists. URSA aims to support research activities that help to prepare students for advanced studies in graduate or professional school and ultimately to become an expert in their career. We invite you to come and hear about these interesting journeys and discoveries.

We are grateful to, and humbled by, the legions of Baylor faculty who support and encourage research experiences for their students, lending their time and resources to the next generation, as we remember our own teachers and mentors who set us along our respective paths. Please support your students and peers by attending the presentations and arts events and learn about a field you knew little or nothing about!

Sincerely,

Nathan T. Elkins, Ph.D.
Director of URSA

Tamarah Adair, Ph.D.
Assistant Director of URSA

Scholars Week 2019

Welcome to
Undergraduate Research and
Scholarly Achievement Scholars Week

Platform Presentations in Bill Daniel Student Center

Monday, April 1, 2019 (1:30 pm) Pages 5 - 15

David J. Alderman . . . Lipscomb
Kayla A. Canava Lipscomb
Sarah Carr White
Liam Cler Lipscomb
Claire C. Costanza . . . Lipscomb
Audrey Crites Fentress
Haley A. Davis Lipscomb
Ashley Dyer White
Kendall Elliott Beckham
Libby Feray Baines
Annalise Franchina White
Frederick Gillespie Fentress
Leah Goehring Lipscomb

Roshni T. Jaffery Lipscomb
Kyle Langston Lipscomb
Sarah Lathrop Lipscomb
Boyan Leng Lipscomb
Trey Lyon Baines
Tacker Patton Lipscomb
Julia Pantleo Beckham
Alan F. Romero Fentress
Amanda Seaboch Beckham
Paul T. Spore Lipscomb
Mark Cole Sutton Baines
Taylor Weber Lipscomb

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Heather Bayless Beckham
Kayla A. Canava Lipscomb
Claire C. Costanza . . . Lipscomb
Haley A. Davis Lipscomb
Bradie Dean Baines
Ashley Dyer Fentress
Katie Galgano Fentress
Sarah Gendron Fentress
Leah Goehring Lipscomb
Mackensi Holt Fentress

Roshni T. Jaffery Lipscomb
Sarah Jones Baines
Boyan Leng Lipscomb
Trey Lyon Baines
Lexi Rima Beckham
Joshua Robinson Lipscomb
Nicole Salama Beckham
Paul T. Spore Lipscomb
Asia Suarez White
Molli Walsleben White

Tuesday, April 2, 2019 (1:30 pm) Pages 28 - 37

Andre Borba Beckham
Caroline Boylan. Beckham
Sarah Carr Beckham
Libby Feray Fentress
Jie Geng Lipscomb
Tara Gilbert Baines
Lauren Glass Fentress
Catherine C. Haseman White
Cameron R. Kaveney . . . Fentress

Daniel Edwin McCarty . . . Baines
Megan O'Brien. Lipscomb
Kavya Ramagiri. White
Dane Rinehart Lipscomb
Dustin Sanford Lipscomb
Haley Stiles White
Mark Cole Sutton Baines
Emma Villarreal Lipscomb

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Nicholas Anthony Fentress
Julia Castillo. White
Nikita Chapagain Lipscomb
Kyle Desrosiers Baines
Ferrin Gillespie White
Jordan Greer Fentress
Sarah Hamrin Fentress
Emily Messimore Baines

McKenna Middleton White
Kaleigh Reid. Baines
Grant M. Seiter Baines
Kylie Smith. Beckham
Marianne Sullivan White
Matthew Sweere Beckham
Taylor Terlizzese Lipscomb
Hunder Wims Beckham

Poster Presentations in Baylor Sciences Building

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Upcoming Undergraduate

Research Events in the Fine Arts. Pages 137 - 138

PLATFORM PRESENTATIONS

Monday, April 1, 2019
Bill Daniel Student Center
Baines Room

1:30 Libby Feray

Faculty Mentor: Ms. Carol Ann Macaulay-Jameson

An Exploration into Student Curriculum at Old Baylor
[Anthropology]

Abstract: The courses available to students when Baylor University began its first collegiate year of classes in 1847 differ greatly from what Baylor students may expect to see today. Though the university's first students had the flexibility to choose from a few different tracks of study, such as a "Bachelor of Arts" or a "Scientific Degree," these included many rigorous requirements, such as proficiency in Greek, Latin, and a modern language for a Bachelor of Arts. Drawing on the Texas Collection's extensive resources, including course catalogues, student transcripts, and assignments from the period, I will give an explanation of the curriculum offered at Old Baylor and how it shaped the school's early students. Special emphasis will be given to the similarities and differences in the female and male programs of study, which became more pronounced after the 1851, when male and female students were separated between two different campuses in Independence, Texas.

Trey Lyon

Faculty Mentor: Ms. Carol Ann Macaulay-Jameson

An Overview of the Second Field Season at Barnhill Rockshelter #6, An Early Archaic Site in Central Texas
[Anthropology]

Abstract: This presentation provides an overview of the second year of excavations by the Baylor University Archaeological Field School at Barnhill Rockshelter #6 (41CV1649) in Coryell County, Texas. Last season, a looter's pit was profiled, exposing well-stratified deposits toward the rear of the rockshelter. The focus of this year's field school was to excavate by natural levels along this profile in order to learn more about the natural and cultural depositional events that occurred within the rockshelter. Excavations exposed four features, all dating to the Early Archaic period: a large oxidized sediment lens, a small burned limestone rock cluster, a pit, and an earth oven. Matrix was collected from each stratum and from each feature for phytolith and macrobotanical analyses. Out of the work that was accomplished this year, we have established a number of research domains that will guide future excavations at the site.

Mark Cole Sutton

Faculty Mentor: Ms. Carol Ann Macaulay-Jameson

The Evolution of Baylor's Theology

[Anthropology]

Abstract: This presentation explores the history of Baylor University's theology department beginning with its first theological school at Independence, Texas. By tracking the publications of the faculty and the hiring of new theologians, the development and the direction of Baylor's theology department can be traced through the late 19th and early 20th centuries. This will reveal both the impact of social movements and economics pressures on the institution, how the university responded and evolved, and how it impacted present-day Baylor.

Monday, April 1, 2019
Bill Daniel Student Center
Beckham Room

1:30 Kendall Elliott

Faculty Mentor: Dr. Sarah Ford

Clothing and Agency in Catharine Maria Sedgwick's *Hope Leslie*
[English]

Abstract: In this research paper, I examine clothing in Catharine Maria Sedgwick's *Hope Leslie*, a sentimental novel that addresses the relationships between the Puritans of the Massachusetts Bay Colony and the Pequot tribe. My focus is on the effect that garments have on the agency of Sedgwick's characters, Native American and Puritan alike. I incorporate various scholarship into my paper, including research on the characters of *Hope Leslie*, Puritan views of clothing and ornamentation, and the sociological importance of dress as a means of self-identification. Through analyzing specific scenes from the novel that focus on individual action, I argue that Sedgwick intentionally designs each character's wardrobe either to assert their identity or to disguise some aspect about them, ultimately showing readers how clothing can give characters agency. My research is significant because readers often overlook smaller details like dress in literary works. Especially in a novel that deals with polarizing issues like race relations and religion, clothing can appear to be trivial and insignificant. However, my examination of garments reveals that Sedgwick clothed each of her characters thoughtfully, and that the Puritans were wrong to think that clothing is only a tangible manifestation of materialism and idolatry. While there is plenty of scholarship on both colonial dress and on Sedgwick's novel, my research marries the two and is the first to broach Sedgwick's expert use of clothing as a means of enacting a character's agency.

Julia Pantleo

Faculty Mentor: Dr. Sarah Ford

Sleeping in the Snare: The Threat of the Familiar in *Wieland*
[English]

Abstract: Teeming with murder and insanity and teetering between the natural and supernatural worlds, Charles Brockden Brown's *Wieland* (1798) rationalizes America as a new and independent nation, as well as cautions her inhabitants. While many scholars have deemed that Brown's greatest fear is the outsider, as illustrated by the figure of Carwin, I argue this is not the case. Instead, Brown uses *Wieland* to show that the greatest threat to this new America are those already inside.

In “Sleeping in the Snare: The Threat of the Familiar in *Wieland*”, I present the arguments of scholars Robert S. Levine, Eric A. Wolfe, and David Seed, all of whom claim Carwin, the mysterious foreigner and ventriloquist, is the greatest threat to the characters in novel and to America as a whole. However, using textual evidence, along with the research of Elizabeth Barnes, Barbara Judson, and the theories of Sigmund Freud, I show that the greatest threat in the novel is not the foreigner, but is the domestic figure of Wieland, the murderer who hears the voice of God and tries to kill his entire family. I also illustrate that the New World location of Wieland’s attacks and his sister Clara’s escape to England further prove that it is the familiar that is most dangerous.

Many of Brown’s works are warnings to the new America. By properly identifying what he believes threatens his new nation, scholars can better understand this tumultuous time in American history and identify the fears of its inhabitants.

Amanda Seaboch

Faculty Mentor: Dr. Sarah Ford

A Place at the Table: Eudora Welty and Toni Morrison’s Use of Food within Community

[English]

Abstract: The hearty, Southern hospitality of a well-cooked meal is apparent in Eudora Welty’s *Delta Wedding* and Toni Morrison’s *Paradise*; however, while everyone eats, not everyone has a place at the table. Previous scholarship has connected Welty and Morrison’s thematic use of race in their writings, but little research has explored how food plays an integral role in forming or destroying communities. My research connects the two Southern writers by studying how the characters use food in drastically different ways. The food eaten, prepared, and displayed in *Delta Wedding* is used to show the exclusivity of the Fairchild’s community whereas food is used in *Paradise* as a way to unite the Convent women into a familial community. In *Delta Wedding*, the scene in which Ellen bakes the coconut cake and the scenes involving Partheny’s patticake reflect the family’s negative characteristics. In *Paradise*, the food involved in Gigi’s appearance at the Convent and Consolata’s feast for the Convent women highlight the group’s unity. By examining the use of food in each work, one gets a deeper understanding of how the emphasis on status and wealth in the Fairchild house is in opposition to the accepting nature of the Convent women. Welty uses food in *Delta Wedding* to segregate the community and to bring about harm whereas Morrison uses food in *Paradise* to bring inclusion and healing to the community

Monday, April 1, 2019
Bill Daniel Student Center
Fentress Room

1:30 Audrey Crites

Faculty Mentor: Dr. Ivy Hamerly

State Failure in Syria: Analyzing the Assad Regime
[Political Science]

Abstract: The 2011 revolts spreading throughout the Arab world marked a time of change. For some countries, such as Tunisia, these protests led to democracy. Other countries, like Syria, were not so lucky. By 2014, Syria ranked 4th on the Fragile State Index. The cause of state failure in Syria stems from the actions of the Assad regime that created regional disparities, as well as the governmental response to the protests that followed. To show this, I focus on the Ba'ath Party regime under Hafiz Assad, who ruled from 1970- 2000, and Bashar Assad, who took control after his father's death in 2000. I look at how state failure is measured and apply two models of state failure to Syria. First I apply Herbst's model of state failure, where I look at the importance of interstate war during a state's development. I analyze the effects war had on taxation and nationalism in Syria. Next, I use Rotberg's model of state failure, focusing on leadership and policy decisions. In this section I analyze the use of education by the Assad regime to gain legitimacy, corruption, and the effects his economic policy had on the fragility of the state. I conclude that Rotberg's model is more accurate in describing the case of state failure in Syria.

Frederick Gillespie

Faculty Mentor: Dr. Ivy Hamerly

Determining the Cause of Ethnic Conflict
[Political Science]

Abstract: High levels of diversity and a large population size makes Nigeria a perfect country for studying ethnic tension and conflict. When analyzing the source of ethnic conflict in the world there are two popular competing thoughts: the primordialist model and the constructivist model. The primordialist model claims that ethnic conflict comes from a history of ethnic division between different ethnic groups. The constructivist model asserts that ethnic conflict is a result of ethnic division that is emphasized by politicians. Politicians stress these divisions, so they can create a reliable electorate from one of the divided factions. Both models are applied to the case of Nigeria in order to see which is most effective in determining the cause of ethnic conflict. In order to determine this the current state of Nigeria and the history of Nigeria

are compared with the predictions of each model. The model that best predicted the history and current state of affairs in Nigeria is deemed the most accurate. The results showed that constructivist model is clearly the best at predicting the cause of ethnic of strife in Nigeria. Because the constructivist model is the most accurate, political scientists should not resign themselves to the notion that ethnic divisions are historic antipathies that take centuries to resolve because they took centuries to manifest. Instead we should focus on encouraging the softening the governments and politics in troubled areas, so they focus on unification instead of fragmentation.

Alan F. Romero

Faculty Mentor: Dr. Ivy Hamerly

Venezuela's Regime Change Toward Democracy
[Political Science]

Abstract: In a comparative critical test, the Modernization model and the Elite model support the claim that Venezuela is more likely to democratize because of the inequality between rich and poor instead of democratizing through closing the gap in between rich and poor. This study starts by explaining some history behind the Venezuelan regimes and how the country ended up in the brink of an economic collapse. It considers the periods of democracy, dictatorship, and socialism that Venezuela experienced and how it helped or damaged the country. Before laying down the models of democracy, the paper explains the crucial episodes in Venezuela's history where their infrastructure failed to compete with the international market due to inner and outer factors. Then, the study introduces both models and their indicators that correlate with a consolidated democracy. The paper builds a roadmap through two indicators of each model which are the voter turnout and the polity scores. Building from those indicators, the study illustrates how these findings translate into the current issues of Venezuela. Finally, it concludes that the Elite model predictions are more accurate to the current situation in Venezuela and lay a transparent explanation that correlates with the indicators of democracy than the predictions of the Modernization model. The Elite model ends up being more practical to explain the evident gap between rich and poor, and it accurately predicts Venezuela's lack of democratization and the national pursue of it.

Monday, April 1, 2019
Bill Daniel Student Center
Lipscomb Room

1:30 Kyle Langston and Taylor Weber
Faculty Mentor: Dr. Marty Harvill
The First Undergraduate Laparoscopic Surgical Lab
[Biology]

The accessibility of healthcare related coursework at the undergraduate level is underwhelming. This is believed to be partially responsible for the noticeable dropout rates seen in pre-health students during their first and second year of undergraduate coursework. Creation of a laparoscopic surgical course helps to improve this disparity between what pre-health students' interests are and what they are taught during their initial years in school. The course was built on four fundamental pillars believed to foster students' success: lecture material over medically relevant topics, carefully designed course requirements to allow students plenty of time for their core science classes, opportunity to conduct and present a research project, and access to student mentorship. In its first year, the course will result in six surgically relevant research presentations as well as twenty-six students receiving a Certificate of Undergraduate Laparoscopy. In coming years, the course will be expanded and more research will be done to determine whether or not it will improve pre-health retention rates among Baylor students.

Liam Cler, Sarah Lathrop and Tacker Patton
Faculty Mentor: Dr. Dena B. Quigley
Study of Cardiovascular Response to Psychological Stress in Undergraduate Student Population Comparing Science and Non-Science Disciplines
[Biology]

Abstract: Stress, a physical or emotional stimulus perceived as abnormal, induces physiological alterations within the human body which are characterized by increased heart rate (HR) and elevated blood pressure (BP). The magnitude of response to a stressful environment is dependent upon the intensity of the stressor and the effort that must be expended in order to overcome a situational challenge. The primary objective of this study is to develop an experiment that will identify the changes in cardiovascular functioning that occurs in humans, specifically college undergraduates, during psychologically stressful stimulation. Moreover, this study focuses on psychological stressors during a standard intelligence test in order to measure cardiac function via blood pressure cuff and echocardiography

(ECG). Stress levels of undergraduates pursuing academic majors in a scientific discipline were examined during the testing period and were juxtaposed against the results of students pursuing non-science degrees. Statistical analysis of HR and BP for science and non-science majors yielded statistically significant results when subject resting heart rate was compared to subject heart rate at the end of the testing period. These findings indicate that science and non-science majors both experienced an increase in stress levels during the testing period. However, science and non-science majors also had significantly different baseline data. Limited analysis due to sample size prohibits a definitive conclusion on the relationship between academic major and stress response to testing. Further research is needed to investigate these differences and whether or not specific academic majors impact stress responses.

Paul T. Spore, Kayla A. Canava, David J. Alderman, Claire C. Costanza, Haley A. Davis, Leah Goehring, Roshni T. Jaffery, and Boyan Leng

Faculty Mentor: Dr. Jacquelyn R. Duke and Dr. J. Thad Scott
Denitrification Rates of Facultative Anaerobes in Oxidic Turbid Waters: A Study of Microhabitats on Suspended Sediments [Biology]

Abstract: Oxidic waters are traditionally thought to support a relatively insignificant amount of denitrification because of the availability of oxygen. Recent work in this field has suggested a relationship between suspended sediment and denitrification rates in oxidic water because of the creation of anoxic microhabitats on the surface of these sediments. Suspended sediment source and concentrations were manipulated to determine if anoxic microhabitats increased denitrification rates in the upper mixed layer. Oxidic waters were sampled and dosed with varying concentrations of lacustrine or riverine sediments. These samples were analyzed for differences in denitrification and aerobic respiration rates from N₂:Ar ratios and O₂:Ar ratios. There were no significant differences between the denitrification rates from samples treated with varying sediment source or concentration. Over the first three days, all samples showed a similar trend with rapidly increasing N₂ levels because of increased anaerobic denitrification. However, it was observed that the nitrate, a limiting factor, had been depleted by day three, preventing further denitrification. The N₂ concentrations were highly variable for the remaining six days of the experiment as a result of unknown biological processes. A net increase in N₂ gas showed increased denitrification in all experimental units.

Monday, April 1, 2019

Bill Daniel Student Center

White Room

1:30 **Sarah Carr**

Faculty Mentor: Dr. Cristian Bratu

Pixar chez les Français: How the Dessin Animé Challenges the American Approach to Animation
[Modern Languages and Cultures]

Abstract: Over a hundred years have passed since the first narrative feature film, *Voyage dans la lune*, and the medium has diversified in form and technique as technology advances, permitting filmmakers to reach both a more widespread and more specialized audience. Animation in America exemplifies a form that engages a different type of viewer, namely children, whilst evolving into a near niche genre. However, in France, animated films, known as dessin animé, are far from specialized and command the attention of national and international populations. What separates the French studio from its American counterpart is an ability to undertake sensitive topics without undermining their solemnity. French filmmakers tend to employ animation as a storytelling platform equal to the other genres of film, whereas the American industry creates unfamiliar worlds, often servicing talking animals as characters, separating them from our reality, and thereby belittling or disguising any inherent significance. This paper is interested in examining how the French dessin animé differs from animation in the United States, seeking to establish a connection between verisimilitude and the perception of the seriousness of the themes presented, giving special attention to *Finding Nemo* and *Avril et le monde truqué*.

Ashley Dyer

Faculty Mentor: Dr. Richard Duran

Competing Modes of Ethical Thought in *Les Misérables*, The Musical
[Modern Languages and Cultures]

Abstract: *Les Misérables*, the famed novel written by Victor Hugo, was first published in 1862 before being adapted to the French musical stage in 1980 with lyrics from Alain Boubil and Jean-Marc Natel. The musical has since enjoyed tremendous popularity and has reached audiences beyond that of the novel itself, even meriting an English adaptation in 1985. This study will analyze the ethical implications within the original French musical *Les Misérables*, focusing predominantly on the song lyrics and what they reveal about the characters' thoughts and motivations. I will evaluate the two main, seemingly

diametrically opposed, characters – the thief-turned-mayor Jean Valjean and the steadfast policeman Javert – through the lens of several different branches of moral philosophy, most fully centering on deontology and utilitarianism. Javert presents a strict moral legalism that embodies deontology and remains static throughout the musical, while Valjean’s moral philosophy evolves with each interaction, though he remains in constant conflict with Javert’s moral framework. At the start of the musical, Valjean follows a utilitarian concept of ethics before rejecting it in favor of a moral philosophy centered around love. The message of the musical is not a complete rejection of the legalism that Javert excessively exemplifies, but rather a reminder that moral philosophy is more complicated than theories suggest and that empathy and love are the keys to living ethically.

Annalise Franchina

Faculty Mentor: Dr. Richard Duran

The Parisian salons influence on politics and society

[Modern Languages and Cultures]

Abstract: Throughout French history, the salons in Paris have played a significant role. From art to philosophy, the salon influenced how people thought for nearly two centuries. The Salon started in 1667 to showcase the art of the recent graduates of École des Beaux-Arts. The Salon was a place that young artists could display their work and cultivate critical awareness. An artist’s work being showcased in the Salon represented success and royal favor. The Salon ran up until the mid 19th century when the avant-garde movement began. Over time the Salon became a place of cultural discussion. By the 18th Century, the salons became a place where the philosophers and social elite would meet. It became a place of intellectual discourse. The discussions at the Salon surrounded current events, politics, and philosophy. It had significant influence over how Parisians and foreigners thought especially during the enlightenment period of the 18th century.

Monday, April 1, 2019
Bill Daniel Student Center
Baines Room

3:30 Bradie Dean

Faculty Mentor: Ms. Carol Ann Macaulay-Jameson

A Glimpse into the Daily Lives of Baylor University's Female Students at Independence, Texas
[Anthropology]

Abstract: Established in 1846 in Independence, Texas, Baylor University's Female Department, destined to become Baylor Female College, was one of Texas' first colleges geared towards women. Additionally, Baylor's female students witnessed critically important events and rapid cultural shifts from the founding of the university through the Civil War and Reconstruction to its relocation to Belton in 1886. It is of particular interest to understand what daily life was like for these women during such changing times. This presentation examines archival documents in order to bring to life the college experience of these women, such as living arrangements, conduct expectations, dress code, leisure time and entertainment.

Sarah Jones

Faculty Mentor: Ms. Carol Ann Macaulay-Jameson

Clark vs. Burleson: A Formative Feud in Baylor's History
[Anthropology]

Abstract: Baylor University was chartered in 1845 in the quite prosperous town of Independence, Texas, and quickly became a notable institution in the antebellum South with its revolutionary policies on coeducation with men and women. Nevertheless, the onset of Dr. Rufus Burleson's presidency in 1851 initiated controversial reforms on these coeducational policies, which sparked one of the most notable feuds in the university's history between Burleson and the Female Department's principal, Dr. Horace Clark. The contention between the two men consisted of mostly malediction and occasional slander, but the contentious relationship between the departments intensified until the eventual removal of much of the male faculty to Waco in 1861, headed by Burleson himself. Such strife between the men appeared to be the result of an internal struggle for power, especially considering Burleson's envy towards Clark's success, but Burleson's own misogynistic opinions may have spurred the substantial divide between both the men and Baylor University's male and female departments. The purpose of this study is to explore these potentially misogynistic views from which seemed to stem much of the

Clark-Burleson feud, and to raise the question as to how this conflict in the foundational years of Baylor's development had formative effects on the university's progression.

Trey Lyon

Faculty Mentor: Ms. Carol Ann Macaulay-Jameson

The (Mis)adventures of the Men at Old Baylor.

[Anthropology]

Abstract: This presentation provides a glimpse into what life was like for Baylor students when the university was located in Independence, Texas. University Catalogs, the Board of Trustees Minutes, the diaries and correspondence of students provide insights into what a typical day was like on campus, circa 1850-1886. Focusing primarily on the male campus on Windmill Hill. Of particular interest, are the misadventures and the consequences suffered by Baylor students when they strayed from their studies.

Monday, April 1, 2019
Bill Daniel Student Center
Beckham Room

3:30 Heather Bayless

Faculty Mentor: Dr. Sarah Ford

Social and Physical Space in “Delta Wedding”
[English]

Abstract: Space operates as a geographical, physical, and mental symbol. The spaces and places in Eudora Welty’s *Delta Wedding* allow for an exploration of racism in the south that a less mobile plot would not allow. I examine how geographic distance determines social exclusion for characters such as Laura McRaven, the young cousin to the Fairchild family who arrives under the pretense of a vacation, though at the end of the novel she is presented the choice of remaining with the Fairchild clan permanently. While critics focus on the symbolism behind Laura’s potential decision to stay or to return home, I press how the concern is not if she stays with the Fairchilds or not, but how her the treatment she receives as an foreigner through the novel is indicative of the destructive mindset of the family as a whole. Using Welty’s own “Place in Fiction” essay, I explain how relationally-distanced Robbie Fairchild – a Fairchild only by marriage, not blood – uses an insider-vs.-outsider mentality to put down the slave Pinchy in order to elevate her own worth in a family that has yet to accept her into the fold – a fold that becomes not just one of kinship but of shelter and space in which to live. Descriptive places form the historical context and the literary landscape that grant for a deep exploration of physical and conceptual racism and familial tension.

Lexi Rima

Faculty Mentor: Dr. Sarah Ford

Feeding the Body, Feeding the Spirit: The Relationship between Food and Trauma in *Paradise*
[English]

Abstract: In her novel *Paradise*, author Toni Morrison illustrates the importance of feeding one’s own body and spirit by likening food and the act of eating to sexuality and sexual encounters. The women of the Convent attempt to survive with their traumas from sexual assault through integrating food into the way they interact with and perceive sex. *Paradise* demonstrates the ways in which trauma has separated the women’s bodies and spirits, but it also demonstrates the mechanism by which the women attempt to reclaim bodily autonomy: food.

Although critics have explored the radical transformations of the women exposed to the Convent's healing abilities, little scholarship has recognized the effect of food and its sexual connotation on the female characters' reclaiming of their own bodies. Furthermore, this analysis of food and sex also ties into previous critical work illustrating the binary that Morrison presents between the body and spirit. However, there remains a gap in the literary research that fails to acknowledge food as the merging element between this body and spirit dichotomy. Morrison expertly uses food as a sexual mechanism in order to converge the two, while simultaneously also creating a link between food and power, this power stemming from sexual security and self-acceptance.

Through *Paradise*, Morrison expertly demonstrates authentic representations of sexual trauma as well as mental illnesses, specifically eating disorders. Ultimately, this powerful connection claims that control over one's food is power over yourself and others.

Nicole Salama

Faculty Mentor: Dr. Sarah Ford

Braving the Future: The Romance Plot in Washington Irving's "The Legend of Sleepy Hollow"
[English]

Abstract: Washington Irving's "The Legend of Sleepy Hollow" appears throughout American culture in a plethora of different formats, including Disney's cartoon, *The Adventures of Ichabod and Mr. Toad*, FOX's detective twist television series, *Sleepy Hollow*, and Tim Burton's movie starring Johnny Depp, *Sleepy Hollow*, among others. These modern renditions illustrate the significance of Irving's 1820 publication on the formation of American history and culture. Irving's story portrays the American anxiety present a few years after the Revolutionary War. His use of a gothic story illustrates the American fear of the unknown and fast-approaching future. To crystallize the choices before the young nation, Irving utilizes a romance plot in the gothic tale. Irving's comparison between Ichabod Crane, the town's schoolmaster, and Brom Bones, a native of Sleepy Hollow, in their competition for Katrina Van Tassel, a young heiress, presents the romance plot as a metaphor for the American choice between adhering to tradition and progressing towards the future. Previous scholarship examines Ichabod's discordancy with the landscape and people of Sleepy Hollow, the prevalent use of food imagery, and Irving's comparison between Katrina's suitors themselves. My argument includes a necessary comparison between Katrina's suitors and her father. Irving's focus on the father signifies that despite America's official separation from England, newfound Americans were not ready

to face progress and change on their own. Just as Katrina follows the example her father sets in choosing a husband, Americans also continued to look for an example to follow.

Monday, April 1, 2019
Bill Daniel Student Center
Fentress Room

3:30 Ashley Dyer

Faculty Mentor: Dr. Ivy Hamerly

Ethnic Conflict in Myanmar: A Demographic and Institutional Analysis
[Political Science]

Abstract: Myanmar, situated in Southeast Asia, has been engaged in ethnic conflict for over fifty years with no end in sight. This continuous conflict raises the question of what causes such violence between ethnic groups and which of the state's characteristics make it particularly vulnerable to such inter-ethnic hostility. I will answer this question by analyzing the nature of ethnic conflict in Myanmar – specifically between the Bamar and Rohingya groups – and then by applying two different models of the causes of ethnic conflict to evaluate how well they explain Myanmar's situation. I will first evaluate the conflict in Myanmar through the model put forth in Posner (2004) that posits that the size of the ethnic groups relative to the arena is determinative of the occurrence of ethnic conflict. I will then apply the model put forth in Fearon and Laitin (2003) that argues that conditions that favor insurgency – particularly weak state capacity and rough terrain – make ethnic conflict more likely. Fearon and Laitin's model is more useful in explaining Myanmar's ethnic conflict than is Posner's model, as the institutional factors more accurately predict the conflict while the population factors fail to fully explain the presence of conflict based off of Myanmar's situation. This research question is important because it helps to understand the causes of ethnic conflict in order to know how best to take action to mitigate or defuse the violence not just in Myanmar, but in states around the world that experience inter-ethnic hostility.

Katie Galgano

Faculty Mentor: Dr. Ivy Hamerly

The Deterioration of Venezuelan State Capacity and How to Respond
[Political Science]

Abstract: Venezuela was once the richest country in South America, but in the last several years its capacity has rapidly declined, leaving many of its citizens without basic necessities such as food and medicine. With the situation growing more serious, the international community is confronted by two important questions: what caused the decline of Venezuelan state capacity and how should the international community

respond? Through testing two models of state fragility on the case study of Venezuela, I probe these questions. The Bellicist Model, championed by Jeffrey Herbst, argues that state fragility is caused by a lack of interstate wars. Herbst writes that interstate wars force a country to either increase its capacity to defend itself or be engulfed by the stronger state. Robert Rotberg provides an alternate theory, arguing that state fragility is a result of poor leadership. Rotberg's Leadership Model contends that poor leadership results in the inability and/or unwillingness of the state to provide public goods to its citizens. I argue that the Leadership Model is the more accurate theory and use this as a basis for my recommendations of how the international community should respond to the crisis unfolding in Venezuela.

Sarah Gendron

Faculty Mentor: Dr. Ivy Hamerly

Syria's Path To State Fragility

[Political Science]

Abstract: Hundreds of thousands of people have been killed in the last decade as a result of the Syrian Civil War. Syria's rapid path towards complete state failure has led to millions of Syrians being classified as eternally displaced, with over more than ten million requiring medical health care assistance and immediate humanitarian aid. Millions have already fled the state, with more and more escaping the horrors of the civil war every day.

There have been many attempts to explain the path that led Syria to such an alarming level of state fragility. One widely respected explanation argues that interstate war was crucial to the formation of European states and the lack of this kind of war between African states in their road to independence has caused them to be unable to properly consolidate power and develop a strong state. Another perspective argues that nation-states fail due to leadership decisions that cause the state to fail on delivering public goods to the citizenry, thus causing the state to lose legitimacy in the eyes of the people. I have applied both of these models to the situation in Syria, and ultimately reached the conclusion that the leadership model has proven to be more accurate in predicting Syria's path to state fragility.

Mackensi Holt

Faculty Mentor: Dr. Ivy Hamerly

ISIS: Motivations of the Islamic State

[Political Science]

Abstract: In order to effectively create counterterrorism strategy, it is important to understand the motivations of terrorist organizations. Starting with a brief historical discussion of the Islamic faith and the foundations of the creation and beliefs of ISIS, I then compare and contrast two competing models of understanding terrorist motivations in order to determine

which model most accurately predicts the actions of ISIS. The first model is Martha Crenshaw's Strategic Model which argues terrorists are rational actors who attack civilians to reach a stated political goal. The second model is the Natural Systems Model, which emphasizes that members join terrorist organizations based on the perceived social benefits of being in the community. Drawing on factual reports of the activities of ISIS, online interviews with defectors, explanations of Islam from members of the faith, and a consultation with an English translation of the Quran, I determine that the Strategic Model most accurately predicts the actions of ISIS and hypothesize how this can advise US counterterrorism strategy.

Monday, April 1, 2019
Bill Daniel Student Center
Lipscomb Room

3:30 **Haley A. Davis, Claire C. Costanza, David J. Alderman, Kayla A. Canava, Leah Goehring, Roshni T. Jaffery, Boyan Leng, and Paul T. Spore**
Faculty Mentors: Dr. Jacquelyn R. Duke and Dr. J. Thad Scott
Denitrification by Facultative Anaerobes in Oxic Water Columns
[Biology]

Denitrification may take place in the upper mixed layer of lakes in anoxic microhabitats located on suspended sediments. This process is known to be affected by availability of organic matter and nitrate concentrations. Multiple experiments were conducted to analyze the denitrification of facultative anaerobes suspended in oxic water columns as a function of variable nitrate, suspended sediment, and organic matter concentration. The first experiment showed increased denitrification rates when nitrate and organic matter were added, singularly and in combination, to the water column. In the second experiment, at low nitrate concentrations, denitrification rates were not significantly different regardless of suspended sediment source or concentration. However, the accumulated N_2 was proportional to the amount of nitrate added to the experimental units, suggesting that it may have been a limiting factor. In the third experiment, at the lowest nitrate concentrations, we expected N_2 to be limited by dosed nitrate concentrations regardless of sediment concentration. In samples with highest nitrate concentrations, we expected denitrification rates to be greater than those observed in low nitrate treatments and to vary as a function of the suspended sediment concentration. These experiments show that denitrification does take place in anoxic microhabitats within oxic zones, but can be heavily influenced by availability of limiting factors.

Joshua Robinson

Faculty Mentor: Dr. Daniel Romo

Synthesis of Novel Gracilin A Derivatives as Immunosuppressive and Neuroprotective Lead Compounds
[Chemistry and Biochemistry]

Abstract: A marine sponge-derived diterpene, gracilin A, possesses an unusual diacetoxo furanose ring in its tricyclic structure. This natural product and derivatives have recently been found to have effects related to cyclosporin A through interaction with cyclophilins A and D, and thus have the potential for immunosuppression and neuroprotective effects with the latter activity leading to the potential for treatment

of Alzheimer's disease. In collaboration with the molecular modeling group of the Baylor Mini-Pharma Team, we have designed a new derivative of gracilin A that potentially not only has increased affinity with cyclophilin D but also a selective binding with cyclophilin D over cyclophilin A, a requirement for a neuroprotective lead compound devoid of immunosuppressive effects. This molecule will be synthesized and assayed. These studies will expand the current SAR profile of the gracilins. Currently, synthetic procedures towards synthesizing a monoacetoxy gracilin A derivative are being explored and optimized to provide a more efficient synthesis.

Monday, April 1, 2019
Bill Daniel Student Center
White Room

3:30 Asia Suarez

Faculty Mentor: Dr. Lizbeth Souza-Fuertes

Songs of Revolution: A View of the Music of Latin American Dictatorships

[Modern Languages and Cultures]

Abstract: One aspect of daily life that changed during and after the military dictatorships that tormented much of Latin America was music. In some of these countries, new genres arose and evolved, such as the growth in popularity of merengue and the beginning of the género típico in the Dominican Republic. Also, music was used as a way to oppose the dictatorship during a time of utter social suffering. Singers and groups like “Nueva Canción Chilena” in Chile and composer and singer Chico Buarque in Brazil used their lyrics to transmit their subliminal messages of opposition over the radio to inspire a movement of the people against the regime. There are similarities between the different genres and the way they were sent out to the masses, as well as the responses from the respective government authorities in those countries. Some such artists faced unspeakable injustices for their causes including prison time, torture and expulsion from their own country. However, history and the progression of change through the music reveals a great deal of information about the regimes, their leaders and resolve of the people living through this era. This work will center on the similarities between the genres of music, the history and origin of each type and the evolution of the music in these countries.

Molli Walsleben

Faculty Mentor: Dr. Paul Larson

Divine Appointment and the Appointee: Mary, Jerome, and Berceo

[Modern Languages and Cultures]

Abstract: Gonzalo de Berceo’s 13th century Marian miracle collection has long been considered decisive amongst scholars, as it has undoubtedly helped to shape the canon of medieval Spanish literature. Accordingly, literary scholar John Ester emphasizes that Berceo was, “The first who wrote brief narratives in Spanish verse whose name we know” (Keller 23). Gonzalo de Berceo’s translation/adaptation of a 12th century Latin miracle story, “Jerónimo, el nuevo obispo de Pavía” recounts the story of Jerome, who ultimately ends up becoming, with Mary’s help, the new bishop of Pavia. The story has two functions: first, it teaches listeners about both Jerome and Mary,

reinforcing the importance of icons in the Christian life, and second, the performance of the story is an act of praise for Mary in which listeners may participate. Overall, the story reinforces the public's knowledge about who Mary is and her importance in the lives of her followers, especially when she works alongside God. This paper will explore how this story works to reinforce Mary's identity and her power as the mother of God as it celebrates the Christian experience in Spain's thirteenth century.

Tuesday, April 2, 2019
Bill Daniel Student Center
Baines Room

1:30 Tara Gilbert

Faculty Mentor: Dr. Sara Alexander

A Secluded Sanctuary: Examining Kamchatka as a Land of Opportunity for Climate Change Adaptation
[Anthropology and Environmental Science]

Abstract: Kamchatka peninsula is located on the far eastern tip of Russia and is home to 315,000 people, about 14,000 of whom comprise six indigenous tribes. Kamchatka's chains of volcanoes constitute a dense region of geothermal energy; the territory is rich in undammed rivers and thriving wildlife populations. The economy is largely dependent on fishing and crabbing, which leaves the region prone to climate change-related fishery decline. Outsiders were not allowed into Kamchatka until 1990; therefore, this peninsula is virtually untouched when it comes to extrinsic social, cultural, and political influences. However, Kamchatka's unique landscape and strong cultural heritage give it the potential to be an ideal archetype for how a society can institute sustainable practices in order to best utilize and preserve their wide array of resources while adapting their lifestyle to prospective climate change issues. This presentation will 1) provide historic, cultural and social context with respect to Kamchatka, 2) evaluate the historical, contemporary, and probable impacts from climate change the territory faces, 3) explore and analyze the current strategies and policy in place in regard to environmental resource management and sustainable economic practices, and 4) examine potential approaches that the people of Kamchatka can employ to establish a comprehensive course of action to build a resilient community readily adapted to a changing climate.

Daniel Edwin McCarty

Faculty Mentor: Ms. Jennings Sheffield

A Lost Heritage: The Jewish History of Waco
[Art & Art History]

Abstract: The agency and industry of prominent Jewish Wacoans has gone largely unobserved and unrecorded by academic historians. This oversight needs to be corrected in order to preserve the integrity of the historical record of Waco. It deeply saddens me that so many influential Wacoan lives and legacies have been omitted from our history owing to indifference to a cultural background by those who were empowered to preserve them. I intend to contribute a small volume of images as a way to raise awareness of the role played by Jewish citizens of Waco

in the hope to correct the history books to include a community of people who have been critical to the development of Waco, Texas. An inaccurate historical record of early Waco (devoid of reference to Jewish contribution) cannot be allowed to usurp Jewish legacies, and the details of the city's past cannot be permanently forgotten. Their loss in the history books is the city's loss.

By juxtaposing images captured by photographs from the past, next to my own contemporary recapturing of the same places and subjects, I intend to provide the viewer proof of the history that has gone unrecorded. The focus of my work is on the buildings, homes, and sacred places and presenting them as they exist (or do not) today. All the places captured feature sites and buildings that held an important role to the history of Waco. In many cases, the disparity is dramatic and leaves sections of the city unrecognizable.

Mark Cole Sutton

Faculty Mentor: Dr. Garrett Cook

“Lord, Teach Us to Pray”: A Comparison of the Contextual Functions of Baptist and Catholic Prayer
[Anthropology]

Abstract: This presentation discusses a comparison of the contextual functions of Baptist and Catholic prayer in service. The research is qualitative using in depth interviews on three levels, theological (academics/theologians), ministerial (clergy), and social (observer observations and conclusions). This allows for a unique framework. The project pursues the function of prayer at an ideal level, what prayer should be, and then at an administrative level, what is or is desired to happen. Then the observations of the researcher concerning the rituals within various services enables a more socio-functional approach rather than just a theological one. Thus, the first section sets up the boundaries and limitations of the research as it stands. The second section identifies the similarities between the two denominations while the third section identifies the tensions. It is these two sections that reveal the potentiality for new discourse and conversation, as well as the beginnings of concrete examples of common purpose at a fundamental level that has seemingly not been well expressed between these groups. Finally, the future of the research will be outlined and how it may provide a practical benefit to the participants.

Tuesday, April 2, 2019
Bill Daniel Student Center
Beckham Room

1:30 Andre Borba

Faculty Mentor: Dr. Frieda Blackwell

Antonio Machado and the New Elegy
[Modern Languages and Cultures]

Abstract: The process of grieving the loss of a loved one is universal in human experience, and poets have traditionally addressed this pain through the use of the elegiac form. Antonio Machado's "El crimen fue en Granada" uses this tradition to express his pain and reconcile the death of his close friend and contemporary, Federico García Lorca, executed by a Fascist firing squad in his home town of Granada at the start of the Spanish Civil War in 1936. The poem is an elegy; however, Machado makes important changes to the traditional structure to provide a more realistic account of the grieving process. "El crimen fue en Granada" is divided into 3 sections, and begins with an account of the crime itself, blaming the perpetrators rather than the inevitability of death. The second section of the poem adopts a more customary depiction of death, personified as a gypsy that Lorca welcomes, a tribute to the Romancero Gitano. The significantly shorter final section emphasizes the fact that the crime occurred in Lorca's Granada, calling on its people to prevent similar tragedies. Although this poem does not follow the traditional elegiac structure, the changes Machado implement allow for a more accurate depiction of the human experience of grieving death as well as the opportunity to make a political protest against the poet's murder.

Caroline Boylan

Faculty Mentor: Dr. Frieda Blackwell

The Mysterious Portrayed by Color and Light in "Una antigualla de Sevilla"
[Modern Languages and Cultures]

Abstract: Ángel de Saavedra, also known as the Duke of Rivas, a Spanish writer during the romantic period, produced works often characterized by a sense of mystery and the purposeful use of color and light. In his ballad "Una antigualla de Sevilla" (1841) that narrates an event from the life of Pedro I of Castille, a fourteenth century king, Saavedra uses the application of color and light to strengthen an already enigmatic and obscure mood. The poem creates an air of mystery through vivid descriptions and use of the language of colors. This work by Rivas highlights emotions and mystery to offer a portrait of Pedro, whose epithet was "El Cruel". Retelling a story based in Spain's history, he

includes the negative elements, such as the cruelty of the king and his torture of an innocent elderly lady. Through his use of color, especially black, and light, with the main symbol of a lamp, Rivas weaves a thrilling mystery that epitomizes the characteristics of this romanticism, allowing his readers to relive emotionally a moment from their national history.

Sarah Carr

Faculty Mentor: Dr. Frieda Blackwell

La España negra in Larra's La nochebuena de 1836

[Modern Languages and Cultures]

Abstract: Mariana José de Larra's essay, La nochebuena de 1836 clearly reflects its historical context. In 1836, the first Carlist war reached its third year whilst the Constitution of 1812 was restored, and Church properties were turned over to the state. Amidst this political turmoil, society in Spain became stagnant, lost in the conflicting forces at war within her walls. Driven by a frustration over the hypocritical society that preferred entertainment to productivity, perverted justice and discounted modern education, Larra depicts this situation in his essay, arguably comparable to la España negra, or Black Spain. In reality, this term would not emerge until the twentieth century applied to the works of José Gutiérrez Solana, but Larra anticipates the concept in La nochebuena. España negra refers to a state of stagnation dating back to the Inquisition that arose out of suspicion, ignorance and hostility toward anything not Spanish. Larra's protagonist, preferring, like the rest of the country, to remain in the dark about its problems, offers a window into the mentality of la España negra before the term was popularized. In a reversal of roles, the protagonist's servant illuminates the hypocritical state of society, comparing it to the theatre Fígaro has just attended, and this unlucky prise de conscience leads the narrator to hopelessness as he considers his country's future.

Tuesday, April 2, 2019
Bill Daniel Student Center
Fentress Room

1:30 Libby Feray

Faculty Mentor: Dr. Deirdre Fulton

Hannah's Song as a Strategic Introduction to the Samuel Scroll
[Religion]

Abstract: Many scholars agree that Hannah's song of praise to Yahweh in 1 Samuel 2.1-10 is likely a later insertion into the text. Though the phrase in v.5 that "the barren has borne seven" could justifiably have come out of Hannah's mouth, the other parts of the short song touch on ideas and themes the narrative has not developed yet, such as victory in battle and kingship. I argue that a later editor chose to include this piece in order to frame and highlight major themes that follow in the narrative of the lives of Samuel, Saul, and David. First, I discuss the much debated textual history of the song and explain that while it is likely a late addition to the Samuel narrative, the song itself may have been composed in an earlier part of Israel's history. This, in turn, has bearing on the strategic selection and placement of the song at the beginning of the Samuel scroll. Next, I examine how the song introduces key themes that run throughout the book's narratives of its three main characters, namely the holy sovereignty of Yahweh and his reversal of human fortunes. Finally, I propose that the song's concluding verses of 9-10, which include both Deuteronomistic language and the celebration of Yahweh's anointed king, may function as a type of thesis or lens through which to view the scroll of Samuel. Throughout, I demonstrate that Hannah's song is a fitting and even strategic introduction to the narrative that follows it.

Lauren Glass

Faculty Mentor: Dr. Deirdre Fulton

Rahab's Role in Joshua as a Foreign Woman
[Religion]

Abstract: Joshua 6 tells the story of the destruction of Jericho, with Rahab as a key figure. Rahab hides the Israelite spies, and her status as a foreign woman juxtaposes her heroism and importance in the conquest of Jericho. In this paper, I analyze the importance of Rahab's character and the significance of her foreignness. As a foreign woman and a prostitute who nonetheless chooses to faithfully follow God, Rahab is the prime example of God using unexpected individuals to deliver His people. Foreign women in the Bible are often the perpetrators of negative events, such as the destruction of Samson as a leader and the seduction of King Ahab to follow other gods. However,

Rahab's role leads to positive results for Israel. There are several hints at sexual acts throughout the Rahab story, which is normal in biblical depictions of foreign women. There is also some ambiguity in Rahab's life in that the only information given is Rahab's occupation, social status, nationality, and existence of her family, which is common in the portrayal of foreign women. In this paper, I argue that Rahab's occupation as a prostitute is vital for the success of the destruction of Jericho. The location of her home, her economic and social independence, and her ability to play dumb because of the implications of her profession work together to bring the Lord's people into the land. Finally, I argue that Rahab is a unique character who becomes a model foreign woman in the Bible, and proves that anyone can be used to further God's plan.

Cameron R. Kaveney

Faculty Mentor: Dr. Deirdre Fulton

Samuel: The Correction of Samson

[Religion]

Abstract: The biblical stories of Samson and Samuel contain many similarities. Both of their mothers are barren before divine intervention and both devote their children to the Nazirite lifestyle. In addition to their similar birth narratives, Samson and Samuel also occupy similar roles in their adult lives. They both act as judges for Israel in a time when Israel is facing opposition from the Philistines, and are the only two judges to do so. These similarities seem to suggest that there is a deep theological connection between Samson and Samuel, especially in view of Judges 13:5 and 1 Samuel 7:12-14. In Judges 13:5, Samson is described as the one who will begin to deliver Israel from the Philistines, and as can be seen in his narrative, he does not succeed in delivering Israel out of the hands of the Philistines. Later however, in 1 Samuel 7:12-14, the Philistines are described to have been subdued during Samuel's life. It would seem that Samuel has completes Samson's task, but later we read that Israel is still warring against the Philistines during the reign of David. However, by reading the anointing of David by Samuel as a transfer of mantle, David's defeat of the Philistines can be read as Samuel's accomplishment by proxy. By taking an in-depth look at the lives and achievements of Samson and Samuel, this paper will show that Samuel is a correction of Samson and is able to complete what Samson is only destined to begin.

Tuesday, April 2, 2019
Bill Daniel Student Center
Lipscomb Room

1:30 Jie Geng

Faculty Mentor: Dr. Daniel Peppe

Early Paleocene Paleoclimate Reconstruction Using Leaf
Physiognomy from the San Juan Basin, New Mexico
[Geosciences]

Abstract: Previous work has shown a decrease mean annual temperature (MAT) following the Cretaceous-Paleogene boundary ~66.0 Ma which is thought to have contributed to the relatively low diversity flora in the early Paleocene. However, this research has focused on the Northern Great Plains of North America with little work from southern North America limiting our understanding on regional paleoclimatic changes. The San Juan Basin (SJB), located in northwestern New Mexico, preserves a nearly continuous sequence of fossiliferous early Paleocene terrestrial deposits and is an ideal location to extend the early Paleocene paleoclimatic record to southern North America. Here we present paleoclimate estimations of the first ~1.5 myr following the K-Pg boundary using leaf physiognomy from the SJB.

Fossils leaves were collected from Ojo Alamo Sandstone and lower Nacimiento Formation dated to ~66.0 to 64.5 Ma. Digital leaf physiognomy (DiLP), leaf margin analysis (LMA), and leaf area analysis (LAA) were used to estimate MAT and mean annual precipitation (MAP). Leaf life span was estimated from the relationship between petiole width and leaf mass per area (M_a). The paleoclimate estimates indicate warm (DiLP: 19.4 – 27.4 °C, LMA: 24.3 – 17.7 °C) and wet (DiLP: 1544 – 1906 mm/yr, LAA: 1514 – 2330 mm/yr) climate representing a modern tropical seasonal forest biome. A general trend of cooling temperature is observed consistent with the trend observed in the Northern Great Plains. The majority of measured leaf morphotypes are deciduous ($M_a = 68.8 \text{ g/m}^2$), which agrees with the climate reconstruction of a tropical seasonal forest.

Dane Rinehart, Megan O'Brien, and Emma Villarreal

Faculty Mentor: Dr. Rebecca Sheesley

Organic Carbon and Elemental Carbon Exposure during Baylor
Tailgates
[Environmental Science]

Abstract: Incomplete combustion of organic and biomass materials can temporarily elevate atmospheric concentrations of carbonaceous aerosols near a combustion source. The relative magnitude and close proximity of combustion

sources related to barbecued and wood-smoked meat are hypothesized to increase atmospheric concentrations of carbonaceous aerosols beyond standard background levels. A field study conducted at Baylor University measured ambient concentrations of organic carbon (OC) and elemental carbon (EC) at five different Baylor University tailgate events during the 2018 college football season. Student researchers walked around popular tailgate areas with personal aerosol sampling devices attached at shoulder height. Thermal-optical analysis of collected aerosol samples was used to determine the average ambient concentrations of both OC and EC for each tailgate event. In order to understand faster changes in EC over the course of each tailgate event, a “real-time” EC monitor, the aethalometer, was deployed at a fixed location within the central tailgate area. These measurements were then averaged to give 30-minute time resolution of EC concentrations for each event. Personal exposure was found to be significantly higher for individuals at tailgate sites where meat smoking was in progress. Meteorological factors such as variations in temperature and wind velocity have the potential to alter spatial and temporal distributions of carbonaceous aerosols during tailgate events. The potential human health impact from OC and EC exposure at college football tailgate events will be discussed.

Dustin Sanford

Faculty Mentor: Dr. Lorin Swint Matthews

Molecular Dynamics Simulation of Dusty Plasma in Micro-Gravity
[Physics]

Abstract: A complex (dusty) plasma consists of ions, electrons, and micron-sized solid particles, commonly referred to as dust. An interesting aspect of complex plasma is its ability to self-organize into dust liquids, 2D and 3D dust crystal lattices and 1D dust chains. The resulting interaction between the dust and the flowing plasma creates an ion wakefield downstream from the dust, with the resulting positive space region modifying the interaction between the grains and contributing to the observed dynamics and equilibrium structure of the system. The PK4 experiment onboard the International Space Station allows for the investigation of the formation and dynamics of dust structures in microgravity, where the weak ion wakefield interactions play a larger role in determining the system dynamics. Here we present a molecular dynamics simulation capable of resolving the dynamics of extended dust structures on both ion and dust particle time scales. The results are compared with experimental data from the PK4 experiment.

Support from NASA Grant number 1571701, and NSF Grant numbers 1707215 and 174023 is gratefully acknowledged.

Tuesday, April 2, 2019
Bill Daniel Student Center
White Room

1:30 Catherine C. Haseman
Faculty Mentor: Dr. Sergiy Kudelia

Examining the patterns of terrorism in Tunisia after the Arab Spring
[Political Science]

Abstract: After the Tunisian revolution in 2011, the number of terrorist attacks rose sharply, reaching almost thirty incidents registered in 2015. That year alone Tunisia experienced more terrorist attacks than in the preceding forty years producing the highest ever annual death toll (81 fatalities). Although the intensity of terrorist activity has been gradually declining since then, the country remains a popular recruitment ground for extremist Jihadist groups operating in Libya, Egypt and Syria. Tunisia's case offers a unique testing ground for political science theories explaining the rise of terrorism. Four theories are particularly relevant in analyzing terrorism patterns in Tunisia. One points to the weakness of democratic institutions, which have been established following decades-long authoritarian rule. While these institutions offer promise of greater political representation and accountability, they often fail to function effectively generating addition discontent among the public. At the same time, democratic institutions create space for organizations capable of violent action and, hence, enable terrorists to plan and carry out their attacks. Another theory suggests that the lack of socioeconomic prospects create grievances against the new regime and push them to join extremist groups. The third theory points to the role of religion in Tunisia and examine the extent to which a secular political culture contradicts the rise of Islamist sentiments within society. Finally, the fourth theory focuses on the role of a spillover effect from neighboring states in the region. Ongoing civil wars in Libya or Syria create opportunities for radicalized youth to acquire military training and return home with skills and ideological commitment that predispose to violent action. This project aims at comparing the explanatory power of these competing theories through field work in the capital of Tunisia and interviewing local law enforcement officials, scholars and journalists specializing in terrorist groups. We will then study independent variables mentioned most frequently and examine possible alternative explanations that could build on existing theoretical accounts.

Haley Stiles and Kavya Ramagiri

Faculty Mentor: Dr. David Bridge

How Donald Trump Has Created Changes in Environmental Politics

[Political Science]

Abstract: This paper applies Mahoney and Thelen's (2010) institutional change strategies to the early presidency of Donald Trump. Specifically, we focus on environmental policy, showing how the Trump administration pursues change by locating itself within two dimensions. First, the wording, scope, and reasoning behind any set of rules varies from institution to institution and helps sculpt the range of choices available. This grants change agents (i.e., Trump) low or high discretion in interpreting rules. Second, there is almost always some level of resistance from status quo defenders. They can be weak or strong in their ability to protect existing policies by vetoing change agent policies.

We explore environmental policy changes—and their respective strategies—that fit within the four types, as laid out by the two dimensions. They are as follows. Low discretion + weak vetoes: without an ability to use an institution to his advantage, and with defenders having little ability to fight back, Trump has simply “displaced” certain rules. Low discretion + strong vetoes: not able to displace an institution because its defenders are strong, Trump has sought to add rules on top of existing rules to change political actor's behavior. High discretion + weak vetoes: when Trump can dictate the operations of an institution with little resistance, he has transformed it to suit his agenda. High discretion + strong vetoes: facing stiff resistance on some issues, Trump has sought to slowly undermine certain ideas by reframing their substance and their discussion points.

Tuesday, April 2, 2019
Bill Daniel Student Center
Baines Room

3:30 Kyle Desrosiers

Faculty Mentor: Dr. Mia Moody-Ramirez

#WeAreNotHaram: Intersectionality for Queer Muslims in New Media

[Journalism, Public Relations, and New Media]

Abstract: This article examines issues of intersectionality within representations of LGBTQI people in new media forms. Traditional media, including print and television news media often neglect to accurately portray the diversity within the Queer community. Instead, representations frequently pander to stereotypes and contribute to simplistic view of the nuanced relationship between racial/ethnic identities and sexual/gender orientation. They focus on sexuality as a factor separate from race or religion, and frequently portray white, affluent, cisgender gay men and women at the expense of racial and sexual “others.” This article concludes despite common hegemonies preventing effective, intersectional representation of Queer identities in the traditional mass media, new media has great potential. Twitter’s accessibility allows increased free information sharing and connectivity among disenfranchised and underrepresented groups, such as Queer Muslims. Because of its accessibility, Twitter packs myriad opportunities for increased awareness and connectivity for Queer and gender non-conforming people of color.

Emily Messimore

Faculty Mentor: Dr. Stephen M. Sloan

In the Shadow of The Mountain: Stories from Soldiers in Tay Nihn

[History]

Abstract: I will present on twelve oral history interviews I conducted with a group of Vietnam Veterans who served together in a mechanized Army unit. Their interviews were heartfelt and eye-opening as they detailed the struggles of experiencing a war that had been going on for years before their arrival and returning home to a country that asked them to forget it all. The men served around the mountain Nui Ba Den, and their interviews highlight the lasting psychological impact the mountain has had upon their memories of the war. They lived in the shadow of the mountain while in Vietnam, but their interviews show that they have continued to live in the looming darkness of a mountain of memory since their return home.

My goal is to educate my generation on the complexity and humanity of the Vietnam War, including the psychological, physical, and emotional wounds of Vietnam Veterans. Real people experience and are affected by the stories we read in our history books, and often reduce to facts and figures. Through quotes from the interviews I have conducted, along with pictures and maps of the subjects they discuss, I hope to highlight the life of a young soldier in 1969 and the struggles they have carried with them the past fifty years. In culmination, I will discuss the healing aspects of oral history and memory and share the importance of asking a generation of soldiers who were once silenced to tell their stories.

Kaleigh Reid

Faculty Mentor: Dr. Andrea L. Turpin

Does Legal Vice make a Virtuous City? Exploring the Reaction of the People of Waco, Texas to the City's Legalization of Prostitution in the Gilded Age and Progressive Era [History]

Abstract: This project examines the voices in and around Waco that supported or opposed the city's legalization of prostitution in its red-light district known as 'The Reservation.' This research aims to shed light on the social attitudes of the Gilded Age and Progressive Era in the South through analyzing the gender, profession, and socio-economic class of these individuals. This research uses primary sources such as sermons, newspaper articles, and city and organization registries, along with histories of Waco and prostitution during these historical eras.

Key Words: prostitution, Waco, The Reservation, moral reform

Grant M. Seiter

Faculty Mentor: Dr. Charles M. North

Treasure in Heaven: Returns to Schooling in Clergy Labor Markets [Economics]

Abstract: Despite the status of churches and Christian organizations as major inputs toward nonprofit sector productivity in the United States, the study of the labor markets for clergy has been limited in the social sciences. One possible reason is that clergy are often considered to have a low responsiveness to market forces; they are believed to follow a "calling" to a profession that has little regard for economic incentives. Even so, many congregations and/or denominations expect their clergy to be well-educated, with at least a bachelor's degree and often a graduate degree as well. Such expectations raise questions about career alternatives for young people considering entering the clergy. With this paper, I join a growing literature that explores the financial incentives facing members of the clergy. Using cross-sectional U.S. Census Bureau data from

1950-2010, this research provides a descriptive study of clergy compensation relative to other occupations, examining changes in the returns to schooling. I find significant statistical evidence that supports a higher rate of return to schooling for non-clergy and an increasing gap between clergy and non-clergy returns over all periods. Additionally, the data suggest that clergy could be a substitute for schooling for less educated African Americans, and that increasing returns to schooling for women could explain the rising feminization of the clergy profession.

Tuesday, April 2, 2019
Bill Daniel Student Center
Beckham Room

3:30 Kylie Smith

Faculty Mentor: Ms. Holly Shi

China's "Grab the Talent" War: How Second-Tier Cities Fight to Develop

[Modern Languages and Cultures]

Abstract: Following the opening of the markets in the 1970's by Deng Xiaoping and the rapid development in the 2000's, first-tier cities rose to prominence and accumulated mass amounts of talent, research, and development. A side effect of this rapid development of cities such as Beijing, Shanghai, Guangzhou, and Shenzhen was the limiting of development on the East coast of China, leaving many cities in the Northeast and center of China lacking in talent and development. However, due to the recent emphasis on high-speed rail and the nation-wide push from high-speed development to high-quality development, second-tier cities now have a competitive edge and have begun what is called a "Grab the Talent" war, competing against both first-tier cities and other second-tier cities to attract talent and entrepreneurs. I argue that the talent retention policies that second tier cities, specifically Chengdu, Wuhan, and Shenyang, adopt focus on providing HuKou (legal resident status of a city), stipends, and housing subsidies, which leads to policy homogenization. While talent retention policies are useful and necessary to put second-tier cities on the map, the homogenization of policies is leading to the ineffectiveness. In order to counter the effects of this, second-tier cities should focus on developing certain industries rather than pushing for mass talent and should diversify their approaches to talent retention policies.

Matthew Sweere

Faculty Mentor: Ms. Holly Shi

China to America: How Higher Brothers is using hip-hop to help people relate to Chinese culture

[Modern Languages and Cultures]

Abstract: In the late 1970s, the musical genre of rap was developed in the United States by inner-city African-Americans and became the foundation of what became known as hip-hop culture. It stemmed from block party dance music, which used loud percussive beats to energize a crowd, and quickly morphed into a tool for social commentary. Over the past few decades, rap has evolved, but one thing has remained constant during those years: China's censorship of media. Even since

the Cultural revolution ended in 1976, the Chinese government has heavily restricted news and media outlets from expressing speech and opinions contrary to the CPC (Communist Party of China). Since 2012, when Xi Jinping became General Secretary of the CPC, censorship has become even more extreme. With the environment for artistic expression so oppressed in modern China, it is hard to imagine rap, a constantly evolving musical genre with frequent calls to people to rise against oppression, ever finding a foothold within a Chinese culture overseen by a government desperate to keep the status quo. That is what makes the international success of the Sichuan rap group Higher Brothers even more astounding. With songs like “Made in China” and “We-Chat,” Higher Brothers has opened the door for foreigners to experience and relate to Chinese culture. Even more impressively, they have done so without angering the CPC. With their subtle nationalist lyrics and trap beats, Higher Brothers has developed a successful blend of Chinese and Western culture and turned it into many hits.

Hunter Wims

Faculty Mentor: Ms. Holly Shi

The Impact of Basketball on Chinese Society

[Modern Languages and Cultures]

Abstract: I would like to discuss the impact of basketball on China’s social and economic setting and why basketball strikingly resembles many values that are important in Chinese culture. Using both Chinese and English articles and videos, I want to give a brief history of how basketball made its way to China and its extreme rise in popularity over the last 20 years. Brought by missionaries in the late 1800s, basketball has been played in China almost since its inception in 1891. For decades, however, it was not played in the mainstream until two NBA players of Chinese heritage, Yao Ming, and later, Jeremy Lin, emerged as popular NBA stars. They have helped unify the country in their support of these players. Additionally, in the mid 1990s, there was the creation of the Chinese Basketball Association, now known as one of the premier leagues in the world outside of the National Basketball Association. These developments have helped basketball grow within China among the younger generation, who look up to Yao and Lin as well as famous stars such as LeBron James, Stephen Curry, and Kobe Bryant. Along with the promotional value and entertainment revenue of these players for China, basketball also presents the bond of teamwork that is highly valued in Chinese culture. Especially with many children in China since the 1980s growing up as only children, basketball is a great avenue to learn how to work with others effectively toward a common goal.

Tuesday, April 2, 2019
Bill Daniel Student Center
Fentress Room

3:30 Nicholas Anthony
Faculty Mentor: Dr. Joe Coker

B.H. Carroll: The Voice of Texas Prohibition in the late 19th Century
[Religion]

Abstract: B.H. Carroll, a 19th and early 20th century leader within the Baptist Convention of Texas, championed many causes. He went from an atheist to a Christian to a leader within the Baptist Church during his lifetime. One of the quite interesting and controversial topics he championed was as a leader of the prohibition movement within the State of Texas during the late 19th century. Carroll's early run-in with alcohol and his keen understanding of its negative effects led him to form a progressive prohibition position. Carroll made a progressive stand on prohibition starting in the early 1870s that came to a culmination in the statewide prohibition campaign of 1887. Carroll's early stance on prohibition within his church and with the county primed him to become the champion of the cause in the statewide campaign and subsequently a voice of wisdom for future campaigns in the early 20th century. Carroll's writings and actions, beginning with the resolution he drafted in 1873 at the First Baptist Church of Waco, his debates in San Antonio and Waco, and his speech in Padgett's Park, show that Carroll was a courageous, eloquent, and well-voiced spokesman of the prohibition cause who helped to define the movement in Texas and the stance of the Baptist Convention of Texas.

Jordan Greer
Faculty Mentor: Dr. Joe Coker

William Jennings Bryan: Prohibition and Convenience Fundamentalism
[Religion]

Abstract: William Jennings Bryan was an instrumental figure in both the national prohibition and Fundamentalist movements of the early twentieth century. However, his involvement in these two movements were not without resistance. The motives behind Bryan's social platforms were often questioned and his ambitious ideologies about societal reform were ridiculed. Nonetheless, his fingerprints remain all over the Fundamentalist's temperance movements. This research presentation will offer an overview of Bryan's involvement in the early twentieth century reform of moral thought, specifically focusing on prohibition and Fundamentalism. The

main argument is as follows: Though his support of national prohibition in the early twentieth century was rooted more in moralism and humanistic reform than it was in Biblical interpretation, William Jennings Bryan often leaned on Fundamentalist thought and action when it supported his reformed stances on political issues such as prohibition.

Sarah Hamrin

Faculty Mentor: Dr. Laurel E. Zeiss

Theology and Allegory in the *St. Matthew Passion*

[Music History]

Abstract: J.S. Bach used musical allegory in both his sacred and secular works to express his interpretation of theology and personal faith. Analysis of the interaction between music and text, harmony, and melody reveals considerable information about the theological thought behind his musical works. For example, numbers 38-42 of the *St. Matthew Passion*, which depict Peter's denials and Judas' betrayal, demonstrate how Bach used number symbolism, cross motives, and the interaction between voices to engage listeners and express his Christian faith. Bach's congregation would have heard the *St. Matthew Passion* once without a score; therefore, studying the musical contrasts and structure further enhances our understanding of the tools Bach employed to convey the theological message. Through this and his other musical works, Bach serves as a theologian, musician, biblical scholar, and preacher, and there is a wealth of meaning and theological significance in Bach's music that can only be exposed if and when the disciplines of music and theology are connected.

Tuesday, April 2, 2019
Bill Daniel Student Center
Lipscomb Room

3:30 Nikita Chapagain

Faculty Mentor: Dr. Michael K. Scullin

Effect of sleep restriction on stress and learning challenging chemistry concepts

[Psychology and Neuroscience]

Abstract: Many students sacrifice sleep for the sake of their coursework. The effects of sleep deprivation on mood, and academic performance is one that most students would agree to have experienced. Organic chemistry is notorious for pre-medical students switching career paths. And, while other studies suggest that sleep restriction hinders learning, and increases stress sensitivity, it has not been investigated whether sleep restriction contributes to student barriers in learning Organic Chemistry. We recruited 100 college students, none of whom had taken organic chemistry, to sleep normally (9 hours time in bed) or restrict their sleep (6 hours time in bed) prior to taking a virtual lecture. The virtual lecture included several introductory topics (cis and trans isomerism, carbon chirality, E and Z isomerism, and R and S stereoisomer configuration) and participants were further queried about their stress levels and how well they anticipated they would learn the materials. We found that female participants experienced greater stress prior to learning the organic chemistry material, and lower expectations for learning performance, particularly when they had restricted their sleep the previous night. Despite their low expectations for learning, in this controlled laboratory setting, these sleep-restricted female participants were able to learn the materials to similar levels as male and well-rested participants. These findings have implications for classroom settings in identifying participants at risk for diminished motivation (e.g., due to high stress or poor learning expectations) and subsequent risk for drop out.

Taylor Terlizese

Faculty Mentor: Dr. Michael K. Scullin

The Importance of Sleep in College Students

[Psychology and Neuroscience]

Abstract: There is a myth about college that says you can only have two of the three: social, study, and sleep. Very frequently, students see sleep as the expendable choice. It is evident, however, that the loss of sleep greatly impacts the quality of students' academic performance. In multiple studies conducted by our lab, we taught students STEM material and tested their

knowledge with a follow up test that required both basic recall and more advanced integration of what the students had learned. In a study testing the effect on time of day and learning, we tested students' performance on STEM material and found that learning and testing during their afternoon dip was detrimental to their performance. Another study we conducted found that students who sleep less report higher levels of stress and show lower levels of creativity. Additionally, we found that worse sleep contributes to worse performance on more difficult questions on a STEM test. The key to better academic performance is simple: just sleep on it.

Tuesday, April 2, 2019
Bill Daniel Student Center
White Room

3:30 Julia Castillo

Faculty Mentor: Dr. Frieda Blackwell

Carmen Martín Gaité's *Entre Visillos* and *Female Agency* in Franco's Spain

[Modern Languages and Cultures]

Abstract: The novel *Entre Visillos* by Carmen Martín Gaité, published in 1958 and winner of the prestigious Premio Nadal, critiques Francoist rhetoric using double discourse. Because of censorship imposed by the Franco regime after the Spanish Civil War, any critique of the regime or its vision for Spain could not be explicit. This novel chronicles six months in the lives of sixteen-year-old Natalia as well as her friends and acquaintances in a provincial capital. It portrays them from multiple narrative perspectives. Viewed superficially, *Entre Visillos* communicates the events in the lives of a group of young people without comment, using the social realist style or 'slice of life' technique. Taking the novel's interactions with its socio-historical context into account leads the reader to view the work in part as an assessment of the inadequacy of Francoist values as applied to the lives of real women. The Franco regime, in its desire to return to an antiquated vision of Spain's past, advocated an archaic role for its women. Martín Gaité gives her protagonist traits which set her completely apart from the regime's vision of femininity. Francoist values are insufficient for Natalia, whose nonconformist quest for agency is feminist social critique hidden in plain sight. In criticizing its context, the novel becomes a universal cry for freedom for all young women seeking agency and empowerment.

Ferrin Gillespie

Faculty Mentor: Dr. Paul Larson

The Grand Image of Mary and Her Crowd

[Communication Sciences and Disorders & Modern Languages and Cultures]

Abstract: Gonzalo de Berceo was and continues to be one of the most iconic and influential authors within early Spanish literature. Through his writings, Berceo, a man of the church, was able to connect with the people from small towns all over Spain and provide them with stories that revealed the marvelous glory and grace of the Virgin Mary. Through each of the fable-like tales told within his collection entitled *Miracles of Our Lady*, Berceo further added to the image, character, and strength of the Virgin while also presenting a call to action to his readers. In

the case of St. Peter and the monk of bad order, this particular call to action deals with the necessity to act with intentionality following the realization of how the condition of someone's inward being ultimately affects and is further revealed through their outward appearance.

McKenna Middleton

Faculty Mentor: Dr. Frieda Blackwell

“Salomé” and the Inclusion of Women in History

[Modern Languages and Cultures]

Abstract: History in patriarchal societies omits the perspective of women. This characteristic of the “official” history affects many literary traditions, including Christian history. However, Spanish author Lourdes Ortiz highlights this discrepancy in traditional history through her story “Salomé (1987),” based on the gospels of Mark and Matthew. The gospel authors present Salome, although they never identify her by name, as a heretic because she asks for the head of John the Baptist. At the most literal level, Ortiz converts the young woman into a person with agency by sharing Salome’s version of the events. Furthermore, the repeated mention of John’s eyes comes to symbolize how his character sees as a person unlike other men’s eyes that objectify women. By the end of the story, Salome’s self-perception shifts from object of desire to an acting agent. Ortiz’s story subverts traditional grand narrative history through humanization of Salome and by retelling her story from her perspective. In this way, Ortiz suggests that Salome is not a transgressor, as the traditional biblical history claims, but rather a victim of the society that rejects the experience of women, taking a postmodern stance that challenges the dominant grand narrative.

Marianne Sullivan

Faculty Mentor: Dr. Lizbeth Souza-Fuertes

Mexico’s Need for an Egotistic Foreign Policy

[Modern Languages and Cultures]

Abstract: Mexico-US relations in the last two years have changed drastically with the onset of two new presidential elections, Donald Trump in 2016, and the recent Mexican election of Andrés Manuel López Obrador in 2018. Hidden under the rise of new political climates and media frenzy in both countries lied a pressing concern for the new implications if not urgencies to Mexico’s foreign policy. Under a leftist socialist president, Mexico’s foreign policy is considered egotistic as it hopes to reestablish a flourishing national economy and independently reestablish bilateral relationships with neighboring countries and expand others abroad.

Recent news, such as U.S. asylum policy, has forced Mexico to comply with foreign laws that disregard not only Mexico's northern economy, but a voice in this pressing matter. These bilateral relations, especially with the United States, have proven detrimental to Mexico's sovereignty and ability to establish a prominent image with their neighbor, and recent issues such as immigration and diplomacy have left Mexico in the hands of continuous US pressure. This analysis will establish the most pressing concerns for current Mexican-US relations using current news, and evidently argue the urgent changes if not pressures that the MORENA party must address to secure Mexico's prosperous future.

POSTER PRESENTATIONS

Monday, April 1, 2019

4:00 - 5:00 p.m.

Baylor Sciences Building

First Floor

Board 1 Austin Johnson

Faculty Mentor: Dr. Sara Alexander

Withering Wheat in the Shadow of Drought – West Texas Wheat Farmers' Responses to Recent Changes in Weather Patterns

[Anthropology]

Abstract: Scholars in a number of disciplines have conducted research on the impact climate change is having and will continue to have on the production of various agricultural crops in the mid-west, south and southwestern United States, but very little research has addressed these impacts from the farmer's point of view and in terms of how farmers understand, respond to, and plan for weather and climate in their agricultural production systems. Climate change is projected to reduce wheat yields by 43-68% in the United States, leading to predicted adjustments in acres farmed and diminished production levels (USEPA 2007). The overall goal of this project is to examine West Texas wheat farmers' awareness and understanding of climate change and any adjustments they are making to their farming system in response to their levels of risk perception. Specifically, the study proposed is intended to explore the nature of knowledge farmers have regarding recent changes in weather patterns, particularly recurring drought, and climate change; to determine their understanding of the impacts climate change is having and will continue to have on their wheat production; to document adjustments they have made over the last 10 years particularly in water and soil management; and to identify their perceptions of risk regarding impacts on wheat production.

Board 3 Reagan Van Coutren

Faculty Mentor: Mr. Timothy L. Campbell

Preliminary Analysis of Avifaunal Humeri from Swartkrans [Anthropology]

Abstract: In this study, we present preliminary results from an analysis of avifaunal remains recovered from the hominin-bearing site of Swartkrans, South Africa. The specimens represent part of the SKX microfaunal assemblage, a collection of fossils excavated between 1979-1986 from Members 1-3 of the cave site. These deposits are

Early to Middle Pleistocene in age and date to ~ 2.0, 1.65-1.07, and 1.04-0.62 Ma respectively. To date, relatively little has been published on the birds from Swartkrans, although seven orders and 11 families have previously been identified from these deposits (Watson 1991, 1993). In this preliminary analysis, we examined 71 nearly complete to complete bird humeri from the SKX collection. Identifications are based on overall gross morphology and the presence of synapomorphies indicating phylogenetic placement. In total, specimens from six orders and four families have been identified with the majority of specimens (n=54) attributed to the most diverse avian clade, Passeriformes (song birds). Nineteen specimens from three families, however, represent new records for the site. Newly identified families include the Psittacidae (parrots, NISP=10), Hirundinidae (swallows and martins, NISP=8), and Turnicidae (buttonquails, NISP=1). These preliminary results demonstrate that a greater diversity of birds was present at Swartkrans than has previously been recognized. Moreover, these birds point to a past diversity of habitats around the cave including wet grasses and forests or woodlands.

Board 4 Ryan Martinez

Faculty Mentor: Mr. Timothy L. Campbell

Analysis of sexual dimorphism in auricular surface shape [Anthropology]

Abstract: In this study, we test for shape differences in pelvic auricular surface morphology between males and females. Changes in auricular surface morphology are well documented and are commonly used to age skeletons in many forensic and archaeological settings. While, several studies have explored the use of auricular surface to determine sex, these methods have not been widely adopted. Alternately, the pubis is commonly used in determining sex of and, as such, the ability of the auricular surface to inform on an unknown individuals sex remains largely untested. In this study we use 2D Geometric Morphometrics to test for sex differences in auricular surface shape in a series of specimens of known sex housed at the Grady Early Forensic Anthropology Laboratory, Texas State University. Outline data were acquired from standardized, digital photographs of the auricular surface and shape variables generated using Elliptic Fourier Analysis. Shape variables were then distilled utilizing Principal Component Analysis, differences between sex were tested using MANOVA, and classification rates assessed using Canonical Variates Analysis (CVA). This study builds on previous research that examined sex differences in the auricular surface by exploring shape differences using new methods.

Board 5 Samantha Heczko and Samantha Houghton
Faculty Mentor: Mr. Timothy L. Campbell

Analysis of Tooth Degradation Using Common Household Chemicals

[Anthropology]

Abstract: As enamel is the hardest tissue in the skeleton, the recovery and analysis of teeth are important elements used for identification in many forensic cases. Several corrosive chemicals can damage skeletal tissue and are easily accessible as household cleaning products. Due to the availability of these chemicals, criminals may attempt to use these substances to obscure evidence in order to inhibit identification of their victims. In order to test the effects of readily available caustic chemicals, we submerged 18 artiodactyl molars in separate 8 oz containers of six different household products: nail polish remover, toilet bowl cleaner, dish detergent, granite cleaner, apple cider vinegar and metal polish. Mass was measured at the beginning and end of the trial period. Additionally, the teeth were photographed every 48 hours for two weeks and gross changes including color, texture, and integrity were recorded. Previous studies have shown submerging teeth in chemicals changes the teeth's character and weight and this study builds on previous research by exploring a variety of readily available household chemicals.

Board 65 Maxwell Tacker, Frances Prewitt, James Iler, Jared Frisbie, and Connor Paw

Faculty Mentor: Dr. Jonathan Hu

Laser Audio Surveillance Device Using Michelson Interferometer

[Electrical and Computer Engineering]

Board 66 Benjamin Jones and Logan Sparks
Faculty Mentor: Dr. Linda Olafsen

Surgical Applications of Nitinol

[Electrical and Computer Engineering]

Abstract: With the brisk progress of medical technology, it has become necessary to develop methods to rapidly deploy catheters and other imaging or treatment devices during a surgery. One of the biggest problems faced is navigating the various arteries and more specifically, changing direction at branches along those pathways. Nitinol is a shape memory alloy of nickel and titanium which has biocompatibility with the human body and therefore could potentially be used for endovascular navigation. The wire can be programmed to bend above body temperature with the application of a current. This would allow a surgeon to transport the necessary medical devices to the site of need more quickly

than can be achieved by current insertion methods. This research presents the programming of Nitinol wire and the response of various diameters to differing levels of current. We show the degree of response (bending) with increasing current through Nitinol wire as well as the time required for the Nitinol wire to achieve a full response.

Board 67 Zachary Kearney

Faculty Mentor: Dr. Seung Hyun Kim

Optical Cavity Based Biosensor Fabrication Process Enhancements

[Electrical and Computer Engineering]

Abstract: Optical cavity biosensors are a low cost detection method currently considered for point-of-care diagnostics. Point-of-care biosensors enable simple, localized diagnostic or prognostic testing for the patient. The optical cavity structure fabrication process begins with two glass substrates. Foreign particles are removed from the surface before a thin layer of silver is sputter-coated onto the substrates, creating partially reflective surfaces. Next, spin-on-glass (SOG) is spun onto each substrate and covered by a sputter-coated layer of silicone dioxide (SiO₂). One substrate receives a layer of SU-8 and ultraviolet (UV) glue. The substrates are then bonded together. The previous bonding method employs bonding SU8 layers which limits the fabrication processes and leads to inconsistent results. The new bonding method using UV glue enhances the fabrication process and has potential to produce a greater volume of usable samples. To experimentally demonstrate the device fabricated using new bonding method, refractive index measurements are performed. Light waves from two laser diodes at wavelengths 830nm and 880nm propagate through the sample. A CMOS camera measures the intensity changes as different refractive index fluids are introduced into the optical cavity. The measured average pixel intensity is compared to the simulation results to determine sample fabrication accuracy.

Board 68 Desirae Carrasco

Faculty Mentor: Dr. Christie M. Sayes

Quantitative analysis of nanometer-sized features imaged via electron microscopy

[Environmental Science]

Abstract: As imaging analyses expand into a variety of research fields, there is an increased need to develop innovative post-processing methods to support micrograph interpretation. Data can be clearly presented to the scientific community by, first, measuring the length and width of specific features within the image with specialized

and customizable characterization software and, second, presenting the quantitative data sets as histograms. In support of these innovative methods, the data presented in this project highlights length and width measurements of cellulose fibers, nickel colloids, and lung cell mitochondria in an effort to record subtle changes in each sample before and after subjected to experimental conditions. Not only can the transmission and scanning electron microscopes provide a qualitative assessment of structural changes, but post-processing analysis can also provide semi-quantitative data. The CellSens software (Olympus America Inc., Center Valley, PA) was used to measure the size and enable area calculations. Images with densely packed structures with overlapping features cannot be measured with a high degree of confidence. However, improved sample preparation can provide more efficient quantitative analysis. Ultimately, we aim to use machine learning algorithms to automatically measure the nanometer-sized structures in the collected images. We intend to utilize this software to gain quantitative data in support of current projects. This computer software has provided a user-friendly form of imaging analyses and the ability to characterize the physiochemical/biological structures of the test substance of interest.

Board 69 Erika Barron

Faculty Mentor: Dr. Christie M. Sayes

Surface Functionalization of Silver Nanoparticles: Novel Applications for Insect Vector Control
[Environmental Science]

Abstract: Vector control has become a public health crisis for humans, animal wildlife, and plant health. While most vector eradication methods have focused on pathogens spread in human populations, pathogens that spread in plant populations are equally detrimental. The current methods utilized to fight against these diseases are only partially effective or safe for humans, animals, or plants. When it comes to insect vector control, a conceptual paradigm shift is urgently needed. This work proposes a novel synthetic scheme to produce a nanoparticle pesticide core-shell conjugate to be used as an active agent against pathogens carried by arthropod vectors, such as psyllids. This project includes four major experiments to address the issue of citrus greening disease. First, silver and copper nanoparticles were synthesized with a positively charged surface coating of either polyvinylpyrrolidone or polyethylene glycol using heat and pressure to reduce metal ions to their zero-valent form. Second, the resultant nanoparticles were characterized for molecular composition (energy dispersive X-ray spectroscopy), stability (dynamic

light scattering spectroscopy), and functionality (Fourier-transform infrared spectroscopy). Each particle sample was also imaged using electron microscopy. The immediate next steps are to test the nanoparticles for arthropod uptake using an artificial feeding system. Lastly, efficacy of particle uptake into the psyllid will be assessed. The overall goal of this research project is to synthesize and characterize nano-enabled pesticides for safe and efficacious drug delivery to vectors (psyllids) and/or host (orange trees).

Board 70 Avani Verma, Tonya Torabi, and Charles Schaub

Faculty Mentor: Dr. Melinda A. Coogan

Is History Doomed to Repeat Itself?

[Environmental Science]

Abstract: Information collected from the geologic record helps scientists and policymakers analyze the sequences of events that may lead to sudden climatic shifts, which then can be used to develop remediation and adaptation policies for coastal zones. Previous research into past warming events show changes in ocean circulation patterns and oxygenation that are similar to what is currently being recorded. The Siberian Traps volcanic event, which occurred 252 million years ago during the Permian Period, resulted in massive releases of CO₂ of more than 1.4 x10⁴ ppmv. The result of this release was a global warming and ocean hypoxia event leading to the worst mass extinction known. A similar event occurred during the Eocene Epoch, 58-37 million years ago where cycles of hypo-thermals generated significant influxes of CO₂ into the atmosphere resulting in global warming. With the advent of advanced computer modeling, scientists believe that one day the quantity of CO₂ in the air and ocean will start to match Eocene and Permian concentrations. Predictions indicate reaching approximately 2.0x10³ ppmv CO₂ could lead to Eocene-level warming. Various agencies report that reconstructed global mean surface temperature for the early Eocene Epoch is only 9-14°C higher than today. If left unchecked, current anthropogenic activities are predicted to cause an approximate 1.5°C increase in overall temperatures by 2100 with devastating results to terrestrial and marine ecosystems. Considering that current global warming has the potential to reach the intensity reported by previous studies, human society needs to implement policies to help remediate climate change.

Board 71 Madison Jeha

Faculty Mentor: Dr. Melinda A. Coogan

Waste Savers and the Psychology of Recycling Behaviors.
[Environmental Science]

Abstract: Recycling is a sustainable practice that most people have heard of, but the Environmental Protection Agency (EPA) estimates that only 34% of Americans participate, or do not participate properly. According to the EPA, each American on average generates 4.4lbs of waste a day, of which only 1.51lbs is recycled, leaving approximately 1.51lbs in the waste stream that could also be recycled. In some cities, either recycling is not available or may only be available for a subset of locations, such as apartment complexes. The goal of this research project is to investigate whether recycling participation increases once residents in an apartment complex are made aware of the importance of reducing waste through recycling efforts; then to see if the practice of recycling increases once recycle bins are made available. Data will be collected by first obtaining background information regarding general knowledge of recycling through an anonymous online survey and followed by placement of recycling bins inside each residence. After the recycling bins have been made available for one month's use, another survey will be provided that investigates potential behavioral changes and increased knowledge regarding waste habits. Other studies have not found significant differences in recycling rates when correlated with socioeconomic status, however education on recycling and encouragement from others in the household has resulted in increased rates of recycling. This study is intended to increase available data regarding recycling behaviors in the U.S.A. and investigate how to potentially improve recycling efforts among residents representing a subset of the population.

Board 79 Hope Schroeder

Faculty Mentor: Mr. Bruce W. Byars

Presence of *Acropora palmata* and *Acropora cervicornis* along the Florida Keys from 2009 – 2013 in comparison to Ocean Surface Temperature Anomaly
[Environmental Studies]

Abstract: As our modern world faces many environmental problems, our ecosystems are continually changing and adapting. The largest, most productive underwater ecosystem is coral reefs. Some of the most spectacular reefs in the United States are located around the Florida Keys. Coral reefs are invaluable as they provide economic incentive, natural storm barriers, high biodiversity, unique habitat, breeding grounds, CO₂ absorption, and other

numerous ecosystem services. Due to extreme variation in environmental factors including: rising ocean temperature, acidification, and photosynthetically available radiation, these shallow water tropical coral reefs may shed their symbiotic zooxanthellae and bleach under such stress (Barnes, 2015). These conditions have ignited increased awareness and focus studies on coral disease and bleaching to understand what processes are causing the deterioration. Global mortality of corals due to bleaching has increased at unprecedented levels during the last several decades. Mapping coral presence in the Florida Keys over time will clearly show where concentrated problem areas are, as well as provide a starting block to focus conservation efforts. This study has aimed to show 1) Where previous *Acropora* corals lived, and how their distribution has changed over the past 12 years, and 2) how the distribution trend relates to sea temperature anomalies.

Board 90 Beau A. Brooks

Faculty Mentor: Dr. Barbara Castanheira Endl

Exploring Asteroseismic Models and Fitting Techniques with White Dwarf Stars

[Physics]

Abstract: Beneath the photosphere of every star exists a dynamic compound structure that is markedly difficult to observe with modern observing instruments. As a practical solution, we utilize the concepts within asteroseismology as a lens for discerning the interiors of stars. The total mass, effective temperature and chemical makeup of variable stars can be revealed by observing pulsation modes and cross-referencing them with those of simulated numerical models. Due to their relatively simplistic structure, hydrogen-rich white dwarfs (DAVs) are used to quantify the effectiveness of various modelling software and fitting techniques. In particular, this project serves to further analyze the efficiency of two software, WDEC and MESA, as well as various fitting methods, in predicting the internal structure of synthetic stars. A wide temperature range of 10500 – 12000 K, as well as a mass range of 0.65 – 0.79 M_{\odot} , is explored to further improve the procedure of comparing real-world observational data to computational model grids.

Board 91 Jack Causey

Faculty Mentor: Dr. Howard Lee

Epsilon-Near-Zero Properties Inside Hollow-core Fibers Filled with Aluminum Doped Zinc-Oxide
[Physics]

Abstract: Our research focuses on the study of light inside nano-sized optical wires. We hope to uncover properties of materials inside these fiber optics by shining a super continuous laser through them. Aluminum doped Zinc-Oxide (AZO) is one of these materials. We found wavelengths (1340-1440) at which light is completely absorbed. This can be used for tunability by varying the carrier concentration in AZO.

Board 92 Catherine Arndt

Faculty Mentor: Dr. Howard Lee

Dependable Automatic Mechanical Exfoliation of Two-Dimensional Materials

[Physics and The Institute of Optics, University of Rochester, NY]

Abstract: Two-dimensional (2D) materials, or monolayers, such as molybdenum disulfide (MoS₂) and graphene are commonly used in photovoltaics and semiconductors due to their direct bandgap structure and increased electrical conductivity¹. Exfoliation methods used to create 2D materials are costly in both time and money. We present an automatic exfoliation machine which demonstrates dependable production of MoS₂ monolayers using the Scotch-Tape method. To increase the surface area and uniformity of the monolayers, the effects of the velocity and exfoliation angle on MoS₂ are optimized at 20.9°C. A 300% increase in success rate, 94% reduction in time, and 3.5x increase in surface area are observed as compared to manual Scotch-Tape methods. This method of rapid and reliable exfoliation facilitates the development of on chip lasers², quantum light emitters³, and mid-infrared photodetectors⁴.

1 Kin Fai Mak. et. al. (2010) Physical Review Letters, 105, 136805.

2 S. Wu. et. al. (2015) Nature, 520, pp 69-78.

3 C. Palacios-Berraquero. et. al. (2017) Nature Communications, 8, 15093.

4 S. Yuan. et. al. (2018) Nano Letters, 18 (5), pp 3172-3179.

Monday, April 1, 2019

4:00 - 5:00 p.m.

Baylor Sciences Building

Second Floor

Board 102 Vasu Goel, Cade Cowart, and Simbarashe Masando

Faculty Mentor: Dr. Annie T. Ginty

Blunted Cardiac Responses to Stress are Associated with Increased Risky Behaviors

[Psychology and Neuroscience]

Abstract: Background: Blunted cardiac reactions to acute psychological stress are associated with adverse health and behavioral outcomes, such as greater impulsivity. It has been proposed that blunted cardiac reactors are more likely to engage in self-reported risky behavior. However, there has been minimal research examining the association between cardiac stress reactivity and behavioral measures of risk taking. Hypothesis: Diminished cardiac reactivity would be associated with greater propensity for risk taking on a standardized behavioral task that measures attraction to risky decision making. Method: 78 participants (Mean (SD) age = 25.6 (9.9) years; 50.7% Caucasian, 67.9% female) completed a 10-minute baseline rest and a standardized stress task. Heart rate (HR) was measured every 2 minutes throughout both periods. Reactivity was the difference between average stress and average baseline values. Participants completed the Game of Dice Task, which measures risky betting behaviors. Safe bets have a probability of winning at 50% and higher, while risky bets were lower than 50%. Risk taking behavior was the difference between safe and risky betting behavior. Results: Participants with lower HR reactivity tended to take more risks, $\beta = 0.256$, $t = 2.137$, $p = 0.036$, $R^2 = 0.238$. Conclusions: Results indicate that blunted cardiac stress reactivity is associated with an increase in risky behaviors. This implication is important for studies linking blunted cardiac stress reactivity to poor decision making and subsequent adverse health outcomes. It could be possible that measuring cardiac reactivity can identify individuals at risk for addictive behaviors and poor impulse control.

Board 103 Bayley J. Richardson

Faculty Mentor: Dr. Annie T. Ginty

Can simple instructions impact your levels of stress? Brief cognitive reappraisal is beneficial in reducing the negative psychological impacts of stress.

[Psychology and Neuroscience.]

Abstract: Cognitive reappraisal is changing the way a stressor is perceived to improve emotional and behavioral responses. Previous research indicates that delivering reappraisal instructions before a task or having a reappraisal intervention can reduce deleterious effects of stress (Jameison et al., 2012; 2016). However, many studies have failed to create an adequate control group. The current study aims to investigate if reappraising biological stress during a standard laboratory stressor can alter physiological arousal. Participants included 118 undergraduate female students (age 18-22 years, 55% Caucasian) who attended an in-person laboratory session. Heart rate and blood pressure were measured during a 10-minute resting baseline period and a standardized mental arithmetic task. Heart rate reactivity was derived for the task (stress – baseline). Participants were randomly assigned to one of three conditions: anxiety evoking, biological reappraisal, and control. Participants self-reported whether the stress levels were debilitating or facilitative before and after completing the task. No significant differences were found between the three groups for cardiovascular reactivity ($p > .43$), performance ($p = .92$), or stressfulness ($p = .54$), but the reappraisal group viewed stress as less harmful to their upcoming performance ($p < .05$). Similarly, there were no group differences in physiological stress intensity ($p = .25$), but participants in the reappraisal condition reported physiological responses to be more facilitative ($p = .001$). Reappraisal instructions appear to correlate with more positive stress interpretations. Future work is needed to better understand if findings extend to other populations (e.g., non-students, males).

Board 104 Vi Luong, Hannah Gruman, and Juliette Ratchford, M.A.

Faculty Mentor: Dr. Annie T. Ginty and Dr. Sarah A. Schnitker

The Role of Religiousness in Diminishing Psychological Response to Stress

[Psychology and Neuroscience]

Abstract: Research indicates that religiosity promotes beneficial outcomes such as resilience (Kasen, Wickramaratne, Gameroff, & Weissman, 2012), self-esteem (Gebauer, Sedikides, & Neberich, 2012), and

positive affect (Lavrič, & Flere, 2008). However, the existing literature is ambivalent regarding whether religiosity leads to better physical health, specifically lower baseline blood pressure (Koenig, 2012; Edmondson et al, 2005). In this study, our main goal was to better understand the relationship between religiosity and physiological response to stress. We hypothesized that 1) higher religiosity would lead to lower blood pressure during a 10-minute baseline period and during a 10-minute stress task and 2) high religiosity would predict pre-task confidence and post-task positive affect by way of resilience. Participants were 92 individuals (female, 69.2%; White, 48.9%; mean age 26.65, SD= 10.72). Participants completed self-report questionnaires, were provided a mental arithmetic stress task (PASAT), and had blood pressure readings taken during the baseline and stress task. None of the examined paths connecting religiosity and resilience to physiological reactivity to stress during the engagement in the task were significant. However, religiosity predicted resilience, which in turn predicted pre-task confidence and post-task positive affect; $\chi^2(6) = 40.94, p < .001, CFI = .96, TLI = .89, RMSEA = .08, SRMR = 0.06$. Although there were no differences in physiological processes, religiosity was positively correlated with higher resilience, confidence in task-completion ability, and positive affect following the stressful task. More research is needed to determine the mechanism by which religiosity may improve confidence and affect.

Board 105 Bekka Anderson

Faculty Mentor: Dr. Annie T. Ginty

Neuroticism and the Physiological and Self-Reported Responses to Stress

[Psychology and Neuroscience]

Abstract: Background: Neuroticism, a trait that causes individuals to experience more negative emotions, has been linked to higher levels of perceived stress, diminished cognitive load, increased chances of “burnout” at work due to high stress and developing mental disorders. However, little research examines the link between neuroticism, physiological reactions to stress, and perceived levels of stress. The few studies examining this relationship have found a negative correlation between neuroticism and heart rate reactivity. Hypothesis: People who reported higher levels of neuroticism would also report higher levels of stress and higher physiological stress responses than those with lower levels of neuroticism. Method: 88 participants (Median (SD) [range] age 26.7, (10.7) [18-62], 67.9% female, 51.7% Caucasian) completed a 10-minute baseline period, the EPQR Personality Test to measure levels of neuroticism, and a 10-minute mental arithmetic stress task (PASAT).

Heart rate (HR) and systolic blood pressure (SBP) was taken every 2 minutes during the baseline period and PASAT. Reactivity was calculated as task — baseline.

Results: Using SPSS, we found that participants who scored higher on neuroticism had higher self-reported stress levels ($r=.545$, $p=.01$). Neuroticism was unrelated to stressor-evoked HR ($r=-.142$, $p=.198$) but negatively correlated with stressor-evoked SBP ($r=-.281$, $p=.010$). Conclusion: As predicted, neuroticism was linked to higher levels of self-perceived stress, consistent with findings that suggest neuroticism increases the risk of developing mental disorders. However, neuroticism appears to blunt cardiovascular responses, although it is unrelated to cardiac responses. More research is needed to see long-term effects of neuroticism on health and stress responses.

Board 106 Rachel Radke

Faculty Mentor: Dr. Annie T. Ginty

How Does Perceived Socioeconomic Status Relate to Health Outcomes?: Blunted Cardiovascular Responses to Stress [Psychology and Neuroscience]

Abstract: Previous literature has suggested that perceived socioeconomic status (SES) and adverse experiences are strongly related to health outcomes, specifically blunted cardiovascular responses and hypoarousal in physiological reactivity (e.g., Ginty, Masters, Nelson, Kaye, & Conklin, 2016; Ginty and Conklin, 2011). In the present study, we investigated if individuals with lower perceived SES would have suppressed stress responses as indicated by pulse reactivity and systolic blood pressure. The participant demographics ($n = 88$) were as follows: 67.9% female, 51.7% Caucasian and an age range from 18 to 62 years ($M = 26.9$, $SD = 10.7$). Participants completed the MacArthur Scale of Social Status, a 10-minute baseline period, and 10-minute mental arithmetic stress task. Blood pressure and heart rate were assessed throughout the baseline and stress task. Results indicated that 1) decreased pulse reactivity was related to lower perceived SES ($r = 0.29$, $p = 0.007$) and 2) lower systolic blood pressure was associated with lower perceived SES ($r = 0.24$, $p = 0.027$). Thus, it appeared that those with lower perceived SES had blunted cardiovascular responses, potentially relating to negative long term health consequences. Further research is needed to better understand the relationship among actual SES, perceived SES, and cardiovascular responses.

Board 107 William G. Burton, Sarah E. Williams, Katherine E. Weir, Ryan A. Anaya and Danielle A. Young
Faculty Mentor: Dr. Annie T. Ginty

Perceptions of Stress Pre- and Post-Task and Stressor-Evoked Heart Rate Responses

[Psychology and Neuroscience]

Background: Perceptions of stressfulness can be related to cardiovascular measures of physiological arousal, such as heart rate (HR). Research concerning self-report stress ratings of an acute psychological stress task and HR responses has produced equivocal results. Previous research has typically included post-task ratings of perceived stress, but few studies report antecedent ratings of stress in relation to HR reactivity. Aim: To examine if pre-task and post-task self-report ratings of stress are associated with stressor-evoked HR responses. Method: Seventy participants [mean age (SD) = 26.52 (10.46) years, 77.1% female, 52.9% Caucasian] completed two standardized acute stress tasks (mental arithmetic and cold pressor) while HR reactivity was measured compared to a 10-minute baseline for each (task - baseline). Participants rated subjective feelings of stress before and after completing each stress task on a 7-point Likert scale. Results: Regression analyses indicated a significant positive correlation between participants' self-reported stress before the cold pressor and HR reactivity ($\beta = 0.41$, $t = 3.67$, $p < .001$, $\Delta R^2 = 0.171$); there was no significant relationship between HR reactivity and post-task stressfulness for the cold pressor or between pre-task or post-task stressfulness and HR reactivity during the mental arithmetic task. Conclusion: Perceptions of stress prior to completing the cold pressor were associated with subsequent HR reactivity during the task. There were no associations between perceptions of stress prior to the mental arithmetic task and HR reactivity. Perceptions of stress preceding a task where the participant has little control may influence subsequent physiological responses.

Board 123 Ryan Hebdon

Faculty Mentor: Dr. David Kahle

Algebraic Curve Fitting in R
[Statistical Science]

Abstract: Algebraic statistics, the application of techniques from applied algebraic geometry to problems in statistics, brings fresh insight to old and new problems in data analysis. Algebraic geometry studies the solution sets of systems of multivariate polynomials, known as varieties. Over the real field, every variety can be represented by a single polynomial in several variables. In this work we investigate a theoretical construct to determine a best fit

variety to a given set of points in the plane. Viewed from the proper perspective, the method can be seen to be a generalization of the simple linear regression model taught in introductory statistics courses. However, there are some important distinctions. The standard criterion used to determine the best fit regression line is least squares, which minimizes the sum of squares of the model's residuals (RSS). However, as the specified variety is defined by a polynomial whose terms' coefficients are all allowed to vary, the method of least squares breaks down – the RSS is minimized by setting all coefficients to zero. Instead, the coefficients of the best fit variety are given by the eigenvector corresponding to the smallest eigenvalue of the Gram matrix of the design matrix. In this work we examine, via Monte Carlo simulation, the effect of error variance on the best fit variety and how different variety properties affect the resulting variety. This material is based upon work supported by the National Science Foundation under Grant No. 1622449.

Board 124 Elle Eckardt

Faculty Mentor: Dr. Joshua D. Patrick

Bivariate Statistical Analysis of US-EU Exchange Rate
[Statistical Science]

Abstract: Conventional analysis of economic data has usually involved time series methods. The temporal correlation inherent in the data makes the use of these the standard methods. Among the common economic measures that have been analyzed in this way are gross domestic product (GDP), consumer price index (CPI), inflation rates, and exchange rates. In this project, we examined the bivariate relationship between these measures. In particular, we used a vector autoregressive moving average (VARMA) model for the US-EU exchange rate as it relates to GDP, CPI, and inflation rates for both the US and EU. Due to model complexity, each variable is modeled separately to exchange rate. We compare the fits of the VARMA models using mean square error. We also examine the forecasting performance of the models using mean square prediction error.

Tuesday, April 2, 2019
11:00 a.m. - 12:00 p.m.
Baylor Sciences Building
First Floor

**Board 15 Jackie Senyonga, Julia Hawes, Navya Katragada,
Duy Lu, Brianna Marshke, and Chrissy Sessa.**
Faculty Mentor: Dr. Chris Kearney

Mosquito mortality from feeding on pesticide-tagged nectar demonstrates viability of toxic nectar to control mosquito populations

[Biology]

Abstract: Mosquitoes are responsible for transmitting numerous diseases and their populations are often difficult to control. The spraying of pesticides is the most common control method used; however, indiscriminate and widespread spraying has led to numerous ecological problems.

Since the plant *Impatiens walleriana* has been previously shown to be an attractive food source for mosquitoes, we are developing a transgenic *impatiens* that will express toxic peptides that will kill mosquitoes. In order to ensure that *impatiens* will be attractive enough to entice the mosquitoes to feed on toxic nectar, we tested the ability of the nectar to deliver pesticides to several species of mosquitoes. In this study, we labeled the nectar with red dye and red dye/pesticide solutions and allowed the mosquitoes to feed for 24 hours. The presence of red-dye fluorescence in the mosquito gut contents demonstrated that mosquitoes fed on the nectar and consumed the pesticides. This demonstrates the viability of a future transgenic *impatiens* to deliver toxins directly to mosquitoes and be a more controlled alternative to spraying pesticides. This delivery model may help to mitigate the spread of mosquito-borne diseases while protecting vulnerable pollinator populations from off-target effects.

Board 16 Diamond Dominguez
Faculty Mentor: Dr. Arthur Prindle

Investigating Biofilm Dispersal Using Flow Cytometry
[Biology]

Abstract: According to the Centers for Disease Control and Prevention, biofilms are responsible for more than 65% of persisting infections causing them to be a major public health concern and focus of biomedical research. Microorganisms that form biofilms include bacteria, fungi

and protists. Biofilm formation occurs as surface-associated microbial cells form microcolonies and secrete extracellular polymeric matrix. The extracellular polymeric matrix secreted by biofilm associated microbes is essential to the emergent pathogenic properties of biofilms including, multi-drug and antibiotic resistance. Biofilms may form on a wide variety of surfaces such as living tissues, medical devices, and water system piping. Biofilm growth on such surfaces can lead to hospital acquired infections and biofouling. Due to their widespread growth and emergent properties, biofilms are largely unaffected by the use of antimicrobial peptides, antibiotics, and other traditional treatments compared to planktonic bacteria. In the final stage of biofilm formation, bacteria within the biofilm begin to shed or disperse. During this stage microbes transition from a biofilm state into a motile, planktonic state to colonize new surfaces. Dispersal inducing factors prompt biofilm associated microbes to transition to a planktonic state in which they are susceptible to treatment. In order for microbes to transition from a biofilm state to a motile, planktonic state, the expression of certain essential genes must be activated. In *Bacillus subtilis* and other bacteria, the gene Hag is responsible for encoding flagellum assembly in motile bacteria. The gene PnasA, however, is activated in response to nitrogen stress and has been shown to be expressed by bacteria in a biofilm state. Here we will use the expression of PnasA as an indicator of bacteria in a biofilm state and Hag as an indicator of biofilm dispersal. In order to investigate dispersal and the efficacy of dispersal inducing factors, we used flow cytometry to analyze the expression of PnasA and Hag in *Bacillus subtilis* biofilms under varying environmental conditions.

Board 17 Andrew Ensenberger, Devin O’Toole, and Nate Lundquist

Faculty Mentor: Dr. Dena B. Quigley

The Effects of Cardiovascular Exercise on the Mammalian Dive Reflex
[Biology]

Abstract: The Dive Reflex is a mammalian physiological response to immersion in cold water that overrides innate homeostatic reflexes that protect the heart and brain from oxygen deprivation. Typically, the Dive Reflex induces a state of decreased heart rate (Bradycardia) and increased mean arterial pressure (MAP) due to vasoconstriction of afferent arterioles, which increases blood flow to the thoracic cavity. In order to induce the Dive Reflex, subjects would submerge their forehead, which houses the Vagus (X) cranial nerve, in a bowl filled with 5 degrees Celsius water and hold their

breath. Almost all subjects showed a significant decrease in heart rate, and therefore demonstrated the Dive Reflex. Subjects were selected for both the control, undergoing no exercise before demonstrating the Dive Reflex, and then experimental group, who obtained a heart rate of 150 bpm before being submerged. Subjects were then compared to themselves between their control and experimental results. The control group displayed an average decrease in heart rate of 29 beats per minute (BPM) and increase in MAP of 4.2 mmHg. The experimental group displayed an average decrease in heart rate of 49 BPM, and decrease in MAP of 7.9 mmHg. These findings suggest that heart rate will decrease to a baseline level regardless of starting point. The implications of these findings are that the Dive Reflex can quickly reduce one's heart rate from an extreme level, often observed in athletes as well as individuals who are affected by anxiety and panic attacks.

Board 19 Ryan Johnson and Kierra Batiste
Faculty Mentor: Dr. Dena B. Quigley

The Effects of Stretching and Caffeine on Muscle Fatigue
[Biology]

Abstract: When it comes to measuring the grip of the hand we can look at performance in two ways; one would be strength or how strong the grip is, and the other is fatigue or how long the grip lasts. Within our experiment we plan to look at grip fatigue and how introducing different stimuli before performance might affect fatigue. The two independent variables we will be introducing are stretching and taking in caffeine before performance. We hypothesize that stretching will produce the best outcome on muscle fatigue. To further expand on this, we believe that stretching, compared to the control and caffeine groups, will take the longest amount of time for the muscles to fatigue. The null hypothesis in this case would be that stretching does not produce the longest time for muscle fatigue.

Performance in this setting is defined as the duration of a muscle contraction. The focus of this experiment will be on grip fatigue, more specifically how the introduction of different stimuli before performance affect grip fatigue. It is hypothesized that stretching will provide the longest duration of contraction because stretching provides muscles with better stamina and blood flow, decreasing fatigue and increasing the length of the contraction. To test the strength and length of contraction of each participant, the FF-220 Hand Dynamometer will be used to compare time and PSI values of the grip. The overlying application of this experiment is to test what could potentially provide athletes with optimal performances.

Board 20 Tina Shekari and Pranay Malempati

Faculty Mentor: Dr. Dena B. Quigley

The Effects of Natural Sugar vs. Refined Sugar on Heart Rate
[Biology and Honors College]

Abstract: Through this research we are wanting to test how processed sugar and refined sugar differ on its effect on heart rate. In this research we will be using sugar that is seen in candies and the sugar that is seen naturally in fruit, this will be given to participants in the research study. The natural sugar is going to be given through fruit (most likely to be an apple), and the processed sugar will be given through a KitKat. The sugar quantities of the two will be the same so we will have an accurate reading on how the sugar is affecting heart rate. We will have subjects consume the refined sugar and natural sugar on two separate days while fasting for two hours prior to the experiment. The control group will be the participants' resting heart rate without any consumption of sugar. It is hypothesized through this experiment that the refined sugar will affect the heart rate and raise it compared to natural sugar.

Board 22 Boyan Leng, Roshni T. Jaffery, David J. Alderman, Kayla A. Canava, Claire C. Costanza, Haley A. Davis, Leah Goehring, and Paul T. Spore

Faculty Mentor: Dr. Jacquelyn R. Duke and Dr. J. Thad Scott

The Combined Effect of Suspended Sediment and Nitrate Concentrations on Water Column Denitrification Rates of Facultative Anaerobes
[Biology]

Abstract: A previous study showed that there was no significant effect of suspended sediment source or concentration on denitrification in the oxic water column. However, in that study, N₂ accumulation correlated to the amount of nitrate added to the samples. In this study, suspended sediment concentrations, but not sediment source, were manipulated along with varying nitrate concentrations to determine if anoxic microhabitats increased denitrification rates in the upper mixed layer when given sufficient nitrate. These samples were analyzed for differences in denitrification and aerobic respiration rates from N₂:Ar ratios and O₂:Ar ratios. At the lowest nitrate concentrations, we expected N₂ to be limited by dosed nitrate concentrations regardless of sediment concentration. In samples with highest nitrate concentrations, we expected denitrification rates to be greater than those observed in low nitrate treatments and to vary as a function of the suspended sediment concentration.

This experiment provided evidence that denitrification rates in oxic waters were increased by availability of anoxic microhabitats when nitrates were abundantly available.

Board 23 Leah A. Goehring, David J. Alderman, Kayla A. Canava, Claire C. Costanza, Haley A. Davis, Roshni T. Jaffery, Boyan Leng, and Paul T. Spore
Faculty Mentor: Dr. Jacquelyn R. Duke and Dr. J. Thad Scott

Water Column Denitrification by Facultative Anaerobes Increases with Organic Matter and Nitrate Concentrations [Biology]

Abstract: This experiment investigated the drivers of denitrification in the upper mixed layer of the water column, identifying the limiting resources of this process. Organic matter and nitrate resources were manipulated to determine which may be a limiting factor in the denitrification rates. A sample of oxic surface water was subsampled into treatment groups of control, nitrate-spiked, glucose-spiked, and nitrate-and-glucose-spiked. These samples were analyzed for differences in denitrification and aerobic respiration rates from N₂:Ar ratios and O₂:Ar ratios. There were significant differences in O₂ depletion and N₂ accumulation over time between treatments containing glucose, and those that lacked glucose. Samples in which both glucose and nitrate were added also had a significantly greater level of denitrification than those with just glucose or nitrate only. Measurable denitrification occurred even when oxygen levels were approximately 100 μ M. These results support the hypothesis that facultative anaerobic denitrifiers metabolize in the upper mixed water columns of some lakes. Organic matter and nitrate availability may both limit growth of these microbial populations. (210)

Board 24 Batool Unar Syed, Carolyn Carper, and Henry Lyons

Faculty Mentor: Dr. Jason Pitts

Mosquito Surveillance Techniques and Results in Waco, TX [Biology]

Abstract: Mosquitoes are significant vectors for various pathogenic diseases, and due to climate change, some mosquito species may be able to expand into new territories, including Texas. McLennan County is experiencing rapid population growth making mosquito surveillance and dissemination of information about vector-borne diseases of particular interest. Setting up mosquito traps is a necessary public health objective in Texas, especially in the urban areas like Waco. Frequently used trapping methods include odor-baited BGS2 and EVS traps for collecting adults, and

mosquito larvae collections from natural pool sites and human created sites such as used tires. After setting multiple traps and examining larvae and adult mosquitoes using microscopy, the most common mosquito species in Waco, Texas were identified. Mosquitoes were further identified by DNA extraction, polymerase chain reaction, and sequencing of a mitochondrial gene. More efficient techniques could be developed to streamline the identification process. Efficient identification of mosquito species and the additional detection of possible pathogens associated with them can help promote public awareness and improve disease prevention in urban settings.

Board 25 Joelle Kim

Faculty Mentor: Dr. Joseph H. Taube

miR-23a and miR-23b Are Putative Regulators of KDM6A Protein Expression in EMT
[Biology]

Abstract: Cancer cell metastasis is the leading cause of cancer patient mortality. Tumor progression of epithelial cancers is facilitated by epithelial-mesenchymal transition (EMT) and mesenchymal-epithelial transition (MET), reverse processes that enable invasive cellular behavior. Lysine (K)-specific demethylase 6A, or KDM6A, is a key regulator of EMT/MET through histone modification. We have previously determined that KDM6A is not dynamically regulated at the transcription level, and we now aim to investigate whether post-transcriptional mechanisms modulate KDM6A expression patterns. We hypothesize that specific miRNAs target KDM6A mRNA transcripts and inhibit expression of KDM6A protein. Through genomic data analysis and miRNA quantification, we determined miR-23a and -23b as likely post-transcriptional regulators of the EMT-associated protein KDM6A. We then cloned the genes for miR-23a and -23b into a mammalian expression vector to observe miRNA-overexpression effects on in vitro KDM6A expression. Further investigation of miR-23a and -23b's effects on KDM6A may clarify KDM6A's role in metastatic activity and can introduce new targets for research in clinical applications.

Board 40 Sarah Swanson, Kyla Wilwayco, and Minh Park
Faculty Mentor: Dr. Myeongwoo Lee

What is TAK-242 and how does it affect egg laying in *C. elegans*?

[Biology]

Abstract: *C. elegans* is a model organism because they have short life cycles, fast reproduction rates, and a simple nervous system. Therefore, it is easy to measure behavioral and morphological traits and to study signaling pathways. TLR4, a Toll-like receptor, is significant in humans' innate immunity by recognizing pathogen-associated molecular patterns (PAMPs) and activating pro-inflammatory signaling pathways to combat bacterial and fungal infections. LPS is the known ligand for TLR4. TAK-242 and other LPS antagonists are used to treat human patients whose innate immune systems are over-activated by bacterial infections. TOL-1, the only Toll-like receptor in *C. elegans*, also plays a role in pathogen avoidance. In this project, we found that LPS stimulates egg laying. Since *tol-1* mutants cannot respond to LPS, we hypothesize that TOL-1 is the receptor of LPS. Both TOL-1 and TLR4 contain cytoplasmic domains. TAK-242 antagonizes TLR4 by binding to its cytoplasmic domain. However, little is known about TOL-1 and how it triggers downstream signal pathways that cause egg laying. Therefore, we will treat the worms with both LPS and TAK-242 in standard egg-laying assays to see whether TAK-242 can block the egg-laying stimulatory pathway mediated by LPS binding to TOL-1. We will use serotonin, a common neurotransmitter in both humans and *C. elegans*, as our control drug since it is a known egg-laying stimulant in *C. elegans*. This research will contribute to our understanding of how the innate immune system, reproductive system, and nervous system interact.

Board 48 Ifeoma Ikedionwu, Alicia Purtell, and Kaitlyn Clevenger

Faculty Mentor: Dr. Michael E. Moore

Analysis of Students' Trust in Biology Learning Assistants Through the Use of Active Learning

[Biology]

Abstract: Previous research has shown that trust promotes classroom participation during active learning and increases content retention. Learning Assistants (LAs) are a source of knowledge for students in classes in which the LAs were successful. In this study, we analyzed a class of 48 Honors biology students and their trust in their LAs during the semester. LAs ran the class for 45 minutes per week while the students completed activities such as concept maps, role-playing simulations, and test reviews. The activities

were designed to challenge the students and identify misconceptions aimed at increasing trust between the LAs and the students. Over the course of 11 weeks, we analyzed the change in student's trust of LAs by comparing a pre and a post-survey containing questions regarding their trust in the LAs. The survey results showed a significant increase in LA trust for five out of the six questions ($p > 0.05$). This research showed that trust from students in LAs increased throughout the semester. Other research shows that trust is a key aspect in facilitating productive classroom activity. In the future, LAs should be implemented in the classroom as another asset to the teaching team because they are proven to be trustworthy and contribute to learning in class. This is important because students will learn more if they have established trust with those who teach. In the future, there needs to be more research done on students' trust in LAs due to their potentially large impact on student learning.

Tuesday, April 2, 2019
11:00 a.m. - 12:00 p.m.
Baylor Sciences Building
Second Floor

Board 55 Jessica Tinker

Faculty Mentors: Dr. Laura Zambrano-Vazquez and Dr. Paul T. Fillmore

Picturing the Future: A Case for Increasing the Role of Neuroscientific Assessments and Treatments in Speech-Language Pathology Practice for the Rehabilitation of Traumatic Brain Injury Patients
[Communication Sciences and Disorders]

Abstract: Traumatic brain injury (TBI) is a significant public health issue, with millions of new cases every year. This particularly complex condition requires an interdisciplinary team of medical professionals to diagnose and treat each patient. Speech-language pathologists play an important role in this rehabilitation team by assessing, diagnosing, and treating speech, language, cognitive-communication, and swallowing disorders associated with brain injury. This project will explore the value of neuroimaging in this context, and what it can add to the practice of speech-language pathologists.

Results from 20 peer-reviewed articles were considered in this review, which identified areas of potential improvement in the practice of speech-language pathologists working with TBI. Notably, our results suggest that there is a distinct underutilization of neuroimaging in the field of speech-language pathology, and that informing treatments via neuroimaging can significantly impact a patient's care. For example, some studies have found that early neuroimaging assessment can contribute to improved prediction of which patients will best respond to rehabilitative intervention, which can in turn lead to the creation of more effective individualized plans of care.

These findings suggest that while speech-language pathologists currently provide excellent quality of care for their patients, they may also be missing some clinically relevant information that could be provided by neuroimaging. This highlights the need for continuing optimization of the practice strategies of speech-language pathologists who work with TBI patients, and for an

increased role of neuroimaging in the overall context of assessment and treatment planning for rehabilitation of patients who have sustained a TBI.

Board 56 Callie Terrell, Clare Kuhlmann, and Kat Delgado
Faculty Mentors: Dr. Paul T. Fillmore, Ms. Donna C. Powell, and Dr. Kathy Whipple

Effects of Simulated Therapeutic Horse-Riding on Speech Therapy in Adult Brain Injury
[Communication Sciences and Disorders]

Abstract: This study investigated the effects of simulated therapeutic horse-riding on speech therapy in adults who had sustained brain injuries. Therapeutic horse riding has been used effectively in many patient populations (e.g. autism, PTSD, and brain injury), but its mechanisms remain somewhat poorly understood. In the current work, we tested a novel form of this therapy (a mechanical horse), to assess its impact as a supplement to traditional speech therapy. Five participants completed the study (2 female, mean age=67.8), and brain injuries included stroke (CVA), traumatic brain injury (TBI), craniotomy/tumor removal, and mild dementia. Speech and language symptoms included aphasia, apraxia, and dysarthria, among others.

Each patient was assessed both before and after therapy using standard speech-language and cognitive tests, and a resting-state EEG exam. We used a single-subject, multiple-baseline design, in which patients waited to begin riding until baseline sessions were complete. Treatment sessions were conducted twice a week for approximately nine weeks. During each treatment session, patients completed a standardized object-naming test while riding the mechanical horse, followed by individualized speech therapy after dismount. We focused on naming accuracy and speed of response as within-session measures of progress, as well as on overall changes in pre-post assessments.

Data analyses are ongoing, but preliminary results suggest meaningful changes in speech, language and cognitive function following therapy for some but not all patients. We will discuss these results in the overall context of speech therapy following brain injury, and the potential of hippotherapy to improve the outcomes of traditional methods.

Board 57 Kristin Kronenberger and Alyssa Williams
Faculty Mentor: Dr. Paul T. Fillmore

Individual Patterns of Impairment in Auditory Processing and Speech Comprehension Across the Lifespan [Communication Sciences and Disorders]

Abstract: Human oral communication depends on the ability to detect and discriminate between different types of sounds, with speech sounds being among the most important and complex sounds we process. Though adequate hearing is necessary for auditory and speech discrimination, complex deficits which are unexplained by hearing impairment are common. For example, understanding speech in real-world environments can often be difficult, depending greatly on the level of background noise and rapidity of spoken words, even when hearing ability is normal. Furthermore, these difficulties often worsen with age, and the causes remain unclear. The current work relates auditory discrimination abilities to speech comprehension abilities in both younger and older individuals (n=25/group), with a focus on identifying individual patterns of impairment and highlighting which auditory-speech relationships are most significant. We employed a battery of novel auditory processing and speech comprehension tests, using adaptive thresholding methods, and several different measures of performance.

We found that most abilities tested declined somewhat with age, though not on all outcome measures. Also, previous work has generally found auditory discrimination and speech understanding abilities to be minimally related, but we found them to be significantly related, even when accounting for hearing and age effects. Additionally, using normative values from the younger group, we created individualized impairment profiles, highlighting the importance of certain auditory abilities (e.g. gap detection) over others. We will discuss the ways in which these tests might be used to better identify deficits in auditory and speech abilities across the lifespan, even when hearing is normal.

Board 58 Katelyn Lucas
Faculty Mentor: Dr. Paul T. Fillmore, Dr. Geoffrey May, Dr. Evan Gordon and Dr. Steven Nelson

Assessment and Treatment of Traumatic Brain Injury in Veterans Using Electroencephalography [Communication Sciences and Disorders]

Abstract: Traumatic brain injury (TBI) is an unfortunately common condition among returning veterans, often resulting in cognitive and language deficits. In general, many of these deficits are thought to stem from diffuse

axonal injury, which can lead to a generalized decrease in connectivity between brain areas. One promising treatment for this condition is electroencephalographic (EEG) neurofeedback, which can directly target increased brain connectivity via displaying metrics of connectivity in real time, and allowing participants to attempt to change their patterns of electrical brain activity.

Here, we present results from the Regulating Oscillations in Brain Injury (ROBI) study, conducted at the Waco VA Center of Excellence, which was a double-blind, sham-controlled study utilizing EEG neurofeedback. Participants completed a battery of tests prior to and following treatment to assess cognitive and language abilities, and overall quality of life, and 10 to 20 EEG neurofeedback treatment sessions. Data analysis focused on relating various measures of brain function to behavior, both at baseline, and in response to treatment. Results from both the intervention and sham-control groups will be presented to address the extent to which true neurofeedback treatment was associated with increases cognitive ability, language ability, and quality of life. We will discuss this work in the broader context of TBI treatment, and the ways in which neurofeedback may be used to improve cognitive and language function following brain injury.

Board 80 Avery WeHunt

Faculty Mentor: Dr. Andrew Gallucci

Spontaneous Achilles Tendon Rupture in D1 College Sprinter
[Health, Human Performance and Recreation]

Background: This particular case study focuses on a 19-year-old, female sprinter and hurdler on Baylor University's track and field team that sustained an Achilles tendon rupture (ATR) to her right lower extremity. This injury occurred when the patient had come back from winter break. During the first practice of the indoor track season, the patient reported hearing a "pop" after landing a jump over a hurdle. She felt a significant difference in strength and balance, along with pain, in her left calf. Differential Diagnoses: The postoperative diagnosis was a right ATR, which was clear due to obvious deformity and mechanism of injury. This diagnosis was confirmed during surgery. Treatment: After spontaneous rupture, she underwent surgical repair, specifically a right primary repair of the Achilles tendon with an Arthrex SwiveLock x2 implant. Since then, she has transitioned from immobilization with heel lifts to active rehabilitation and therapeutic treatments. Uniqueness: The most recent statistic on ATR's incidence reveals a prevalence 0.012%, with the majority of cases occurring in men in their fourth or fifth decades of life. Also, most ATR's are due to

chronic tendinopathy or tendinosis. However, this patient is a 19-year-old female with no previous history of injury to her right Achilles tendon. Conclusions: The patient is not part of the usual population of ATR sufferers and did not have the same degeneration of the Achilles tendon due to age. So, this case could offer new information on the etiology and prevalence of ATR's.

Board 81 Ann Meiners

Faculty Mentor: Dr. Andrew Gallucci

Bilateral Fractures to Proximal Tibial Growth Plates in Adolescent Male

[Health, Human Performance and Recreation]

Background: A 12-year-old middle school athlete underwent open-reduction surgery to realign a Type V on the Salter-Harris scale bilateral tibial fractures to the epiphyseal plates and a year later is near full recovery, but still in physical therapy. Differential Diagnosis: Type I Salter-Harris fracture, avulsion fracture to tibial tuberosity, prepatellar bursitis. Treatment: The patient underwent open reduction surgery with the addition of screws for stabilization, then was put in a casts for six-weeks and was non-weight bearing. He then underwent physical therapy for six months. The athlete continued to work with the athletic trainer at his middle school after the six months. He has regained his full range of motion (ROM), but is lacking speed and agility as he has prior to the injury. Uniqueness: The mechanism of this injury is incredibly uncommon as well as the bilateral nature. About one percent of epiphyseal fractures are classified as Type V on the Salter-Harris Scale. The athlete was jogging outside on the concrete when he felt one of his legs break, trying to catch himself with the other leg he felt a similar sensation then went down due to the fact that the other leg also broke. The athlete had just undergone a significant growth spurt (6 inches) and was sick just prior to the occurrence of the injury; therefore, he had just gotten off of a round of antibiotics. Conclusion: While type V fractures occur, they hardly occur bilaterally and almost always occur via jumping on trampoline. The mechanism should be further explored and explained.

Board 82 Aldrich Wang

Faculty Mentor: Dr. Andrew Gallucci

Effectiveness of a Shoulder Debridement in a Collegiate Baseball Pitcher

[Health, Human Performance and Recreation]

Background: A collegiate baseball player underwent a debridement for a clinically diagnosed Superior Labral Anterior Posteriorly (SLAP) Tear, and was ruled out

of competition for the season. The patient was first diagnosed with impingement syndrome due to weakness of the infraspinatus, subscapularis, and serratus anterior muscles. An MRI later confirmed a positive SLAP tear of the glenohumeral joint. Differential Diagnosis Impingement, Rotator Cuff Tear, Thoracic Outlet Syndrome, and Biceps Tendinopathy. Treatment The patient received a debridement to treat a SLAP Tear as an alternative to a full surgical repair. The debridement was combined with physical therapy to enhance the recovery process. During physical therapy, the patient focused on regaining range of motion and then strengthening of the shoulder girdle as well as the scapula. Uniqueness SLAP Tears can be seen as a relatively common pathology in baseball players. Debates still exist as to whether a debridement is more effective than a surgical repair. The National Athletic Trainers Association's (NATA) position statement reports that more research has to be conducted in the treatment of SLAP tears. The subject of this study is an example of a pitcher who has successfully returned to play as well as competition after receiving a debridement of the shoulder to treat a SLAP tear, where as many pitchers are able to return to play, but few are able to return to competition levels. Conclusion Research is still inconclusive as to whether a debridement and other alternatives, are more effective in treating SLAP Tears than full surgical repairs.

Board 83 Aaron Gibson

Faculty Mentor: Dr. Andrew Gallucci

Acetabular Labral Tears in an Active Population

[Health, Human Performance and Recreation]

Background: A female middle-distance runner on the track and field team was diagnosed with a hip labral tear after complaining of groin pain during and after activity. Differential diagnosis Muscle strain, femoroacetabular impingement, stress fracture. Treatment The patient was removed from physical activity after the initial diagnosis. During the period of reduced activity, the patient was provided with a variety of modalities, effective for reducing pain. When continuing rehab and beginning return to play protocol, she started out with slow walks on the Alter-G at a fraction of her body weight. She then began a rehabilitative progression to improve ROM, strength and restore proper running biomechanics. The athlete continued to receive modality treatment throughout the treatment process. Uniqueness The accurate diagnosis of a hip labral tear is hard to achieve because of a similar presentation during an evaluation with groin pain. The athlete participated in activity for an extended period of time while complaining of the pain caused by the labral tear. The track and field

athletic trainers came up with diagnoses and treatment plans to focus on eliminating the pain. A period of time passed between the onset of pain and the follow-up with the team doctor as the time was spent trying treat the pain. Conclusion Acetabular labral tears are relatively common in a population who participate in activity that places repetitive stress on the hip. They present with a variety of symptoms in the groin that are commonly seen in other injuries, making for a difficult diagnosis.

Tuesday, April 2, 2019
12:00 p.m. - 1:00 p.m.
Baylor Sciences Building
First Floor

Board 2 **Hope Schroeder**
Faculty Mentor: Dr. Sara Alexander

In the Heat of Climate Change: Resident Understanding of Changing Weather Patterns in Cayo District, Belize
[Anthropology and Environmental Science]

Abstract: Many rural communities and small towns in developing countries rely on a range of natural resources for their livelihoods, as dependence on external resources is oftentimes not economically sustainable. In 1998, the Government of Belize made the decision to support the promotion of “responsible tourism,” which encompasses the elements typically identified with ecotourism, among other ideals. The increasing emphasis on ecotourism in the Cayo District of Belize has been profitable over the last twenty years as the region has transitioned from being solely reliant on agriculture and ranching to becoming largely dependent on ecotourism. The district features a variety of natural and historical resources upon which the industry depends: rainforests, medicine trails based on native flora, water falls, wildlife reserves, butterfly farms, scenic rivers, Maya archaeological sites, caves for spelunking, tubing, zip lining, and more. As climate change threatens natural systems, the livelihoods of local residents in this region dependent on these resources are at risk. Based on surveys conducted in San Ignacio town in Cayo District (Summer 2018), this study (1) determines level of residents’ awareness of recent weather patterns, (2) identifies their understanding of climate change and its’ causes, and (3) explores relationships between education levels, different occupations and perceptions of risk regarding changing climate conditions.

Board 6 **Cesia Marquez**
Faculty Mentor: Mr. Timothy L. Campbell

Boiling Bone: Effects of Prolonged Boiling on Cut Mark Morphology
[Biology]

Abstract: In this study we test if time spent boiling modifies cut mark morphology and thus affects the determination of when a bone was cut (i.e. before or after boiling). Archeological records indicate that many tribes conducted cannibalistic rituals and altered bones into tools, both

activities of which typically require boiling. Research indicates there are two methods used in regard to cooking bones: boiling the bones first and then cutting, or first cutting the bones and then boiling. The purpose of this study is to determine if one of these methods can suggest cannibalism. In this study 9 bovine bones were used with three bones each cut and boiled at 1.5, 3, and 6 hours respectively. Additionally, a second set of nine bones with three bones per trial were first boiled at these intervals and then cut. Bones were then cooled to ambient temperature for 24 hours and air dried for 72 hours. Data collection included measuring length and width of the cut marks along with qualitative descriptions and photography of any noticeable pot-polishing using a dissection microscope. Comparisons were then made between the two sets of bones to contrast any changes produced. As previous studies looking at the effects of boiling have shown, pot-polish along bone edges becomes more apparent with prolonged boiling, this study adds to this body of research by exploring if similar effects occur to cut marks as well.

Board 7 Lauren Noriega

Faculty Mentor: Mr. Timothy L. Campbell

Sharp force tool mark characteristics from saws: The case of finding the weapon
[Anthropology]

Abstract: In this study we assessed if there were any characteristics from sharp force tool mark impressions that could help to identify which tool was used. As saws are often used for body dismemberment during criminal activity, the identification of specific tool marks indicating the type of saw used can help in solving forensic cases. For this research three different types of saws were selected due to their varying size and shape, as well as availability at hardware stores. In this study, cut marks were made on nine bones with three replicates per tool. Tool marks generated were then visually assessed by counting the number of striations and measuring the depth of the furrows using a dissection microscope. These features can be found in the kerf, or cut pattern on the bone, due to the sharp force trauma inflicted. Based on the observations, written descriptions were then made that could potentially be used by forensic investigators to identify the implement utilized. To test the accuracy of the newly generated descriptions, a sample of students were asked to read them and match each bone with the saw type that made each impression. These novel descriptions add to the forensic body of knowledge by further exemplifying what characteristics to look for when determining what toothed cutting implement was used in a crime.

Board 8 Shawn Cleaver

Faculty Mentor: Mr. Timothy L. Campbell

Descriptive analysis of blunt force trauma from variations of hammers on bovine bones

[Anthropology]

Abstract: In this study we assess if different types of hammers leave behind distinct trauma markers and develop novel descriptions that can be used to identify what tool was used. These descriptions are then tested using student participants to determine their accuracy. In forensic cases, determining the instrument responsible for a death is an important part of an investigation. For this study, three distinct types of hammers with unique head shapes were used to create trauma marks: a claw hammer, a tack hammer, and a rock hammer. Marks were standardized using a single individual applying similar force to three bovine long bones per hammer. Descriptions were formed by examining patterns of layered breakage, flaking, and crushed margins near the impact zone. Student participants then used the descriptions to match each cow bone to the associating hammer. The data from participants was then evaluated in order to determine the accuracy of each description. Similar studies involving blunt force trauma found some difficulty ascribing unique characteristics to differentiate blunt force instruments. This study, however, examines whether a beginning model can be created to accurately characterize different marks left by variations of hammers. Further research could build upon this study by including a wider range of instruments capable of generating blunt force trauma.

Board 9 Mara Fields

Faculty Mentor: Mr. Timothy L. Campbell

Analyzing of Ancestry Utilizing Orbital Shape

[Anthropology]

Abstract: In this study, we test the accuracy of using the shape of the skull orbits to determine ancestry in known populations. The shape of the orbits is used to determine ancestry in forensic and archaeological studies, however, these assessments are generally morphoscopic in nature and thus contingent on the practitioner's familiarity and experience. In forensic or archaeological cases where programs like FORDISC are not available, and/or the skull is not complete enough to take most of the measurements required, accurate analyses of ancestry utilizing just the orbits can be beneficial. In this study, we use skulls of known ancestry housed at the Grady Early Forensic Anthropology Laboratory, Texas State University. Outline data were acquired from standardized, digital photographs of the and

shape variables generated using Elliptic Fourier Analysis. Shape variables were then distilled utilizing Principal Component Analysis, differences between ancestry were tested using MANOVA, and classification rates assessed using Canonical Variates Analysis. This study adds to the forensic tool kit by exploring a new quantitative method to assess ancestry utilizing limited cranial remains.

Board 10 Madelyn Addison and Madelyne M. Parr
Faculty Mentor: Mr. Timothy L. Campbell

Identification of tool marks on heated bone
[Anthropology]

Abstract: This study examines the effects of heat on tool marks left by sharp implements on bones and tests if the type of tool used can be identified after a body is heated at high temperature. Heat and sharp tools are frequently used to alter and dispose of remains, however, heat at household cooking temperatures will not completely destroy evidence of trauma on skeletal elements. Previous studies suggest shrinkage in the heated bones may affect trauma marks left on them, however, whether these changes are enough to inhibit identification of the tool used remains unanswered. To address this question we used three tools (handsaw, steak knife, and bow saw) with three replicates each and made cut marks on purchased defleshed cow bones. Cuts were made halfway through and completely through the bone. Variables measured include length, depth, and width of each cut mark and were assessed before and after heat was applied. Heating treatment consisted of placing skeletal remains in a cremation oven at 1600°F for thirty minutes. As previous studies have shown that depth, length, and width of cut marks are all important features in identifying what type of tool was used in a murder, this study adds to the understanding of how heat can modify these features.

Board 72 Saskia Henery
Faculty Mentor: Dr. Melinda A. Coogan

Atrazine: Disrupting Hormones Since 1958!
[Environmental Science]

Abstract: With increasing industrialization and urbanization, environmental pollutants have become more common. One important environmental pollutant falls within the category of EDCs (endocrine disrupting chemicals), which are synthetic chemicals that interfere with naturally produced hormones. Examples of EDCs include phthalates, polychlorinated biphenyls, and pesticides such as atrazine. In recent studies published by the American Academy of Pediatrics, the onset of puberty in girls has fallen by 5 years since 1920, with one of the hypotheses addressing a correlation with the presence of

EDCs in the environment. Atrazine, as the second most commonly used herbicide in the USA, is found at measurable levels in water systems serving 30 million Americans in 28 states. This review investigates the potential EDC effects of atrazine on zebrafish (*Danio rerio*), which is a suitable biological model for furthering our understanding of early onset of puberty in humans. Zebrafish are beneficial for analyzing the potential effects of toxins on human systems due to 70% similarity between zebrafish and human genomes. Additionally, zebrafish are valuable *in vivo* research organisms due to their short gestation period, as well as rapid development and uptake of toxins, when compared to mammals. Hormone effects on zebrafish can be quantified by measuring significant morphological changes, such as caudal fin length and changes in mass, following exposure with environmentally-relevant concentrations of EDCs. In conclusion, this review elucidates how hormone effects on zebrafish following atrazine exposures may be used to investigate toxicity levels that potentially contribute to the early onset of puberty in humans.

Board 73 Aidan Collier and Griffin Drum
Faculty Mentor: Dr. Melinda A. Coogan

Paraquat, Parkinson's, and People
[Environmental Science]

Abstract: Parkinson's Disease (PD) is a neurodegenerative disease that affects millions of people across the world. In recent years, PD has been at the forefront of scientific research, yielding new insights into mechanisms that underlie the disease. One discovery is the role of mitochondrial oxidative stress resulting in the loss of dopaminergic neurons. Human exposures to various pesticides, such as paraquat and rotenone, have shown neurodegenerative effects on mitochondrial complex I due to oxidative stress. Zebrafish (*Danio rerio*) are a popular vertebrate model for neurological research, due in large part to 70% genomic similarity with humans. In addition, genes linked to recessive parkinsonism have been identified in zebrafish, and molecular mechanisms associated with neuronal deficiencies have been characterized for this biological model. Past studies exposing zebrafish to concentrations of paraquat and rotenone have shown negative effects on mitochondrial complex I, which is the same pathogenesis found in post-mortem humans affected with sporadic PD. Additionally, paraquat and rotenone express synergistic neurodegenerative responses, amplifying the overall effects of each and allowing research into movement disorders of zebrafish that may be related to human responses following exposure. These findings play an important role in understanding PD, and help unlock the

secrets associated with genes and pathways of PD. Zebrafish make an excellent PD model, and with continued research may help the scientific community better understand and hopefully one day cure this horrible disease.

Board 74 Jaya Pulipaka

Faculty Mentor: Dr. Rebecca Sheesley

Establishing a methylation method to quantify organic acids in Arctic aerosol

[Environmental Science]

Abstract: The Arctic is currently experiencing rapid change in temperature, sea ice coverage and anthropogenic activity. This change has brought about a “New Arctic” system. For example, Arctic Sea ice extent has been at a historical minimum in the last five years, with the smallest extent observed in summer of 2012. Previous work suggested that reductions in sea ice and increases in surface temperature will increase primary productivity in marine systems and lengthen the growing season in terrestrial systems. These changes in terrestrial and marine systems will impact the atmospheric composition in the Arctic. To investigate these impacts on atmospheric aerosol, baseline carbon and radiocarbon measurements (Barrett and Sheesley, 2017) for 2012-13 have been completed. Based on these results, significant biogenic influence on summertime aerosol in the Arctic, which likely includes organic acids, was identified. This project will utilize analytical chemistry and environmental chemistry to establish a methylation derivatization method for organic acids. The method will initially focus on methylating stearic acid standards using the derivatization reagent, Trimethylsilyldiazomethane. Checks for the efficacy of the method will subsequently be performed utilizing Gas Chromatography Mass Spectrometry. Finally, this method will be applied it to a set of Arctic aerosol samples to measure concentrations of organic acids.

Board 75 Matthew Harrell

Faculty Mentor: Dr. Susan P. Bratton

Examining Microplastic Pollution in Brazos River

Centrarchidae

[Environmental Science]

Abstract: Microplastics, defined as degraded polymer-based particles or manufactured products ranging between 50mm and 5mm in size, are present in marine, freshwater, and estuarine environments. Although a growing number of peer-reviewed studies have examined the intake of microplastics by marine vertebrates, few have focused on their ingestion by freshwater species. This study focuses on

microplastic ingestion by bluegill (*Lepomis macrochirus*) and longear sunfish (*Lepomis megalotis*) from the Brazos River basin in Central Texas. Because sunfish are suction feeders, they can serve as effective indicator species of microplastic pollution. The purpose of this study is to compare levels of ingested microplastic in samples taken above and below sewage effluents. We collected 437 samples, and found microplastic threads in fish collected both above and below sewage effluents. Our findings indicate the presence of microplastics within aquatic food chains above point sources.

Board 76 Priscilla Marie Rosario

Faculty Mentor: Dr. Jay Yoo

Body Image Experiences and Coping Mechanisms of Adolescents with Physical Disability
[Family and Consumer Sciences]

Abstract: Body image concern is significant among adolescents with physical disability, however, not much research has been done to explore their experiences with regards to their body in their own words. This narrative-based approach explored questions about how body image developed over time and how the physical self impacted perceptions and attitudes about their body. Data was collected through semi-structured interviews, using standardized questions with three wheelchair users with congenital physical disability. The Grounded Theory approach guided interpretation of the findings. Throughout the school years, peer pressure and messages about ideal beauty had negative effects on body image and satisfaction with self of those who participated in this study. Conflict was experienced between receiving messages associated with a cultural ideal of appearance and feeling unable to meet that standard. Physical disability played a significant role in mediating messages about body image in the context of social relationships. Permanent functional limitations of the body meant the individual could not adapt to meet expectations. This tension led to feelings of low satisfaction with self-image and negative perceptions and attitudes towards their physical body. Individuals described developing coping mechanisms that integrated positive self-talk to enhance their self-image. This included reframing negative perceptions with faith-based attitudes that affirmed a positive body image based on the self as valuable within the context of how God sees their body. Fortunately, body image attitudes and perceptions experienced change from mostly negative in middle and high school to more positive afterwards.

Board 77 Victoria McKenty**Faculty Mentor: Dr. Jay Yoo**

Tailoring Fashion Therapy (FT) for Mental Health Patients and their Needs

[Family and Consumer Science]

Abstract: The goal of this study is to review the current literature on Fashion Therapy (FT) and explore how FT can be implemented into treatment plans with more personalization for mental patients. FT is a form of cognitive-behavioral therapy that incorporates Appearance Management Behavior (AMB) and Retail Therapy (RT) as tools to achieve a positive body-image and improved self-esteem. AMB looks to behaviors and practices such as hygiene, grooming, skincare, makeup, posture, body language, diet, exercise, and strategic dress (SD), in order to improve self-image and body satisfaction. SD makes up the largest section of AMB, focusing on clothing and dress to strategically highlight and cover features of the body to make the physical appearance seem more attractive to both the patient and others. To do this, SD looks to elements of clothing and dress that include style, silhouette, color, pattern, fiber content, fabric structure, and fit. Mental patients who have previously participated in FT programs have experienced a reduction in anxiety, depression, and obsessive-compulsive behavior, and an increase in their self-esteem, and more realistic ideas of body image. To better treat these symptoms, experts can begin to categorize patients based on their needs. FT can use the study by Lee and Kim (2007) that separated patients into four lifestyle groups: well-being (WB), reasonable value-oriented (RVO), ostentatious consumption (OC), and bad-being (BB), in order to tailor treatment plans to patients' needs. This personalization provides opportunities for more effective treatment of mental health patients.

Board 78 Marie Ament**Faculty Mentor: Dr. Karen K. Melton**

ENGAGE: Positive Parenting Intervention for Vulnerable Populations

[Family and Consumer Sciences]

Abstract: ENGAGE is an eight-week parenting intervention that uses facilitated discussions to teach parenting skills. ENGAGE emphasizes positive parenting - a warm, responsive parenting style which influences a supportive parent-child relationship. Positive parenting skills are associated with creating healthy family interactions. ENGAGE is based on the theory of change that if parents utilize a positive parenting approach, then children will experience a decrease in adverse experiences. The purpose

of this study is to evaluate the effectiveness of ENGAGE in promoting positive parenting practices. The following research question will be addressed: Does parents' successful participation in ENGAGE lead to significant improvement in positive parenting? Change in parenting behaviors will be assessed using a retrospective post-then-pre-test with the Alabama Parenting Questionnaire (APQ).

Board 89 Roberto F Hernandez

Faculty Mentor: Dr. Pedro M. Reyes

Do Summer Bridge Programs Enhance Later Success in Academic Settings?

[Management]

Abstract: Questions are often raised about the usefulness of summer bridge programs. We assess the effectiveness of Michigan State University's Summer Business Institute (SBI). The SBI program aims to provide multicultural students with a week-long experience that helps them transition into their college life. The educational background of these future workforce entrants is important to the effectiveness of firms and the development of managers and workers across the economy. We assess whether MSU's Summer Business Institute leads to increased GPA in their pursuit of an undergraduate degree. Increasing GPA through the initial years at a four-year university will increase the odds of minority students successfully completing their degree. We compare outcomes from the populations of underrepresented and majority students where such programs are not offered with the underrepresented students who participated in the Summer Business Institute. Diversity programs like SBI are generally supported because they are effective (e.g., see the CARE program at Florida State University). We assess the level of effectiveness of MSU Summer Business Institute in this study.

Board 93 Nesta Lenhert Scholer

Faculty Mentor: Dr. Jay R. Dittmann

QIE Card Testing for Upcoming CMS Hadron Calorimeter Upgrades

[Physics]

Abstract: The CMS detector at the Large Hadron Collider (LHC) in Geneva, Switzerland is scheduled to undergo upgrades to accommodate the enormous amount of data that will be collected in upcoming LHC runs. As part of these upgrades, new QIE cards will be installed into the HB subdetector starting in the spring of 2019. We tested and calibrated 870 QIE cards to determine whether they are fully functional prior to installation into the subdetector. After

testing and repairing all repairable cards, 96% of the QIE cards passed and were sent to CERN for continued testing and burn-in.

Board 94 Andrew Baas

Faculty Mentor: Dr. Jeffrey S. Olafsen

Prediction of Virality with Graphlet Distribution

[Physics]

Abstract: The task of predicting virality has far-reaching consequences, from the world of advertising to more recent attempts to reduce the spread of “fake news”. Previous work has shown that graphlet distribution is an effective feature for predicting virality. Here, we investigate the use of aggregated edge-centric local graphlets around source nodes as features for virality prediction. These prediction features are used to predict expected virality for both a time-independent Hawkes model of virality. We use linear regression to predict the number of Hawkes events. Our study indicates that local graphlet frequency distribution can effectively capture the variances of the viral processes simulated by Hawkes process. Furthermore, we identify a group of local graphlets which might be significant in the viral processes.

Board 95 Evelyn Guay

Faculty Mentor: Dr. Lorin Swint Matthews

Simulating the Charging of Dust Particles in a Flowing Plasma

[Physics]

Abstract: The charging of dust particles immersed in a flowing plasma is investigated using a code that combines C++ and CUDA to run a massively parallel simulation on the graphics processing unit (GPU). In this simulation, the dynamics of tens of thousands of ions are computed self-consistently to model their interaction with the charged dust. The micron-sized dust particles are aligned with the direction of the plasma flow, creating a plasma wakefield downstream of the grains. The dust particles are charged through ion collisions as well as by the collection of electrons with an assumed Boltzmann distribution. The goal of this research was to define the parameter space which most accurately matches the charging seen in experiments. The parameters include the time step, the Mach number of the ion flow, and the ion density. The time step used an adaptive leap-frog method to ensure that the program was detecting the ion collisions. Lower Mach numbers and higher plasma densities cause the dust particles to have a larger negative charge. These results will be used to set the parameters for models which self-consistently model the

charging and dynamics of dust grains as they move through the ion wakefield. (Funding from NSF grants PHY-1414523, PHY-1571701 and PHY-1707215 is gratefully acknowledged.)

Tuesday, April 2, 2019
12:00 p.m. - 1:00 p.m.
Baylor Sciences Building
Second Floor

Board 100 Gabrielle Chaney

Faculty Mentor: Dr. Andrew Gallucci

Accessory Navicular Syndrome and its Effects in Adolescent Population

[Health, Human Performance and Recreation]

Overview: A fourteen-year-old baseball player diagnosed with accessory navicular syndrome bilaterally. Differential Diagnosis includes stress fracture, muscular imbalance, tendonitis, and plantar fasciitis. Signs and symptoms of pain during physical activity twelve months prior to surgery included pain during running, jogging, jumping, limited range of motion, tender to palpation on affected area, and change in gait patterns. Treatment a radiograph was performed for clarification on the injury. Patient involved has a simple excision of the accessory navicular bone and was instructed to stay in immobilization boot for one-month post-surgery. Rehabilitation plan consisted of strengthening the posterior tibialis muscle, gaining full ROM, and proprioception. Second surgery was going to be performed bilaterally two months post initial surgery on left foot. Uniqueness is that this syndrome is congenital and can be presented during birth. This genetic abnormality is due to incomplete fusion of the navicular bones during the growth process in the foot, and its symptoms are common amongst adolescents who are physically active at an early age, genetically with twins, and can be presented bilaterally. This disorder is presented early in dancers and females. Conclusion despite this case not having a large effect on the general population, the patient received their diagnosis later than most, but still within the phases where males are developing their growth plates. This case study can provide prognosis on a syndrome that is not commonly diagnosed, especially with young athletes that are physically active in the stages of bone development.

Board 101 Treasure Ramirez

Faculty mentor: Dr. Emily Smith

The economic impact of pediatric surgical care in Somaliland.

[Public Health]

Abstract: In a Lancet Global Surgery 2030 study, its estimated that nearly 5 billion people do not have access to surgical care in low income and middle-income countries (LMICs). In addition, it is estimated that 85% of children in LMICs will have surgically treatable condition by the age of 15. The number one reason for not receiving proper surgical care are financial burdens. Even if care is received, many will face catastrophic health expenditures that could push them into poverty. Dr. Smith and I will be evaluating the economic impact of pediatric surgical care in Somaliland. My objectives include characterizing the financial hospital capacity for hospitals in Somaliland, aggregating and analyzing financial information regarding annual hospital budgeting, allotments of budget to facets such as surgery and anesthesia, estimating patient out-of-pocket expenses for procedures, insurance coverage, or government coverage. The anticipated impact of this research study is a clearer understanding of the financial burden on Somaliland patients.

Board 108 Ebose Ogbemor and Veronica Prince

Faculty Mentor: Dr. Charles Weaver

Media reporting on racial differences in cognition influences hiring decisions

[Psychology and Neuroscience]

Abstract: Throughout the process of recruitment and hiring, hidden bias about the cognitive abilities of certain groups can cause unintentional discrimination and affect how an applicant is evaluated. Implicit bias therefore can put many job seekers at a disadvantage, limiting the diversity of an organization. One common stereotype suggests that individuals of Asian descent are usually more intelligent than their non-Asian counterparts. This stereotype, albeit positive, is often reiterated in American media reporting exploring racial differences in academic performance. As implicit activation of racial stereotypes has been found to influence candidate impressions and hiring decisions (Rattan, Steele, & Ambady, 2017), we aimed to explore the effects of skewed media reporting about Asian Americans' cognitive ability in hiring decisions. Participants were randomly assigned one of four treatment conditions in a 2 (Article slant: Positive Stereotype vs Control) x 2 (Race of applicant: Asian American vs European American) factorial design. After reading an article as part of a seemingly

separate study, participants were asked to evaluate an applicant as part of a hiring study. Participants read a description for a stereotypically math-focused job and a resume with either a stereotypical Asian American or non-Asian American name. We hypothesized participants who read about the stereotype would be more likely to positively evaluate the Asian American applicant for the job. These findings have important implications for the role media reporting on cognitive differences can play in how job applicants are perceived.

Board 109 Ryan Rahman

Faculty Mentor: Dr. Charles Weaver

Confidence and transformation of beliefs in learning
[Psychology and Neuroscience]

Abstract: Students entering an institution of higher education must find effective ways to learn in order to succeed. However, many of those in college struggle to find ways to manage the more demanding curriculum. One of the reasons students have trouble adopting better learning habits is due to their reliance on ineffective learning methods. Despite struggling, students likely maintain these fixed learning habits in part because they are unaware of more effective methods, and in part because of their confidence in their often-incorrect beliefs about studying. Therefore, we attempted to educate students about more efficient learning techniques by first challenging their incorrect beliefs about learning to reduce their confidence in those beliefs. Students indicated their level of agreement and confidence in several beliefs about how people learn before reading reviews by experts on the most effective ways to learn. They then re-rated their beliefs and belief confidence and took a final quiz on the information covered. Students endorsed more correct beliefs about learning after reading the expert information, and having higher belief confidence was more likely to result in correct beliefs. Importantly, those who changed to a correct belief after reading the expert information also had higher confidence in that belief. These findings suggest that confidence can be altered by reading expert information, making beliefs sensitive to change. For future studies, we plan to compare belief change in a group that received expert reviews to a group that did not receive these reviews.

Board 110 Akanksha Mishra, Danna Ramirez, Humaira Choudhury, Jeanene Jackson, Lauren Mounts, Megha Rawat, and Pauleen Diamond

Faculty Mentor: Dr. Charles Weaver

Expert Testimony Allows Jurors to Differentiate Between Biased and Fair Lineup Procedures

[Psychology and Neuroscience]

Abstract: Beginning in 2017, criminal courts in a few states began allowing attorneys to submit the photo lineups viewed by eyewitnesses as evidence to the juries. This addition means that juries can now evaluate photo lineups in conjunction with eyewitness' statements and in-court testimony to assess the accuracy of the identification. Up to this point, the literature regarding eyewitnesses' use of photo lineups and perceived credibility has been minimal at best. Therefore, we gathered mock jurors to look at photo lineups and analyzed their evaluations. We hypothesized that the biased photo lineup combined with memory information would decrease ratings of eyewitness credibility and identification reliability. Mock jurors did evaluate both eyewitness credibility and identification reliability as lower when presented with a biased identification procedure rather than a fair procedure, especially when provided with an expert memory testimony. However, when no memory information was available, both the biased photo lineup and the fair photo lineup lowered the witness credibility evaluations given by the mock jurors compared to jurors that did not see a lineup. This shows that mock jurors probably do not consider the difference between fair and biased lineups on their own when making their decisions on a case, which can be detrimental to an eyewitness's credibility.

Board 111 Alaina Baird

Faculty Mentor: Dr. Charles Weaver

Does Racial Stereotypicality Similarly Affect the Adjectives Associated with Voices and Faces?

[Psychology and Neuroscience]

Abstract: Witnesses are a crucial part of the criminal justice system, but jurors' own biases can shape how they evaluate a witness and his/her testimony during a case. Individuals who are perceived as more stereotypical members of their race or ethnic group are more closely associated with stereotypes about their race or ethnicity (Blair, Judd, & Fallman, 2004). For Black Americans, these stereotypes often can include ideas about criminality and violence (Eberhardt, Goff, Purdie, & Davies, 2004). More importantly, these stereotypes can inform sentencing judgments (Ingraham, 2014). We explored what physical

and personality characteristics people associate with voices and faces of varying stereotypicality. Participants listened to 14 audio clips and rated the perceived race, age, attractiveness, dialect, and racial stereotypicality of the speaker. Participants also filled out a stereotype assessment by rating the voices as they imagine the average American would on a series of adjectives, including those relevant to cultural stereotypes about African Americans, such as religiosity and aggression. Then, participants completed the same assessment for three weakly and three strongly stereotypically black faces. Our findings provide important information about physical and personality characteristics associated with voice and face racial stereotypicality, which may have implications for witness identifications.

Board 112 Melissa Lopez

Faculty Mentor: Dr. Karena Malavanti

Quizzes as a Study Aid: The Effects of Attentional Cues and Testing on Long-Term Learning
[Psychology and Neuroscience]

Abstract: We examined the effects of repeated quizzes on long term memory by observing the relationship between quiz scores and test scores in an introductory psychology course and an upper level neuroscience course. The pre-lecture quizzes are typically used to cue attention to specific topics before lecture while the post-lecture quizzes are used to test learning (Nevid & Mahon, 2009). Previous research shows the testing effect aids in learning and long-term retention of material. Forward testing, or testing interim with studying, has been known to improve performance on later exams (Lee & Ahn, 2018). This could be due to a number of reasons such as attentional cuing, retrieval cuing, and context dependent learning, to name a few. These quizzes also motivated students to attend class daily and on time since they were given randomly throughout the semester. Students who were not present for class when quizzes were distributed received a zero for their quiz grade for the day. Our main concern with this study was whether mastery quizzes aided in long-term learning. An aggregate of topics for each chapter quiz was taken as well as quiz averages for each unit. The aggregate was used to compare quiz performances with exam performances for specific topics. Quiz averages for each student were compared with their unit exam averages. Topics on the repeated quizzes were successfully cued on subsequent exams.

**Board 113 Sarah Lathrop, Luke Moraglia, Precious Mathis,
and Jessica Hoffman**

Faculty Mentor: Dr. Melanie J. Sekeres

Risk Factors and Protective Factors in Chemotherapy-Induced Cognitive Impairment in a Preclinical Breast Cancer Model

[Psychology and Neuroscience]

Abstract: Chemotherapy-induced cognitive impairment (CICI) is commonly reported among breast cancer patients receiving chemotherapy and includes problems in memory and executive function tasks. Previous studies have shown that exercise after chemotherapy can minimize CICI and have a positive effect on hippocampal neurogenesis in rodents (Winocur et al., 2018). We aim to investigate the protective effects of physical exercise and to identify the risks from chronic-mild stress prior to and following chemotherapy treatment in a pre-clinical breast cancer mouse model.

Female transgenic (Tg) mice that develop tumors by 9-months of age and wild-type (WT) mice were used in experiment one. 8-week old Tg and WT mice were assigned a running or a sedentary rearing condition for 6 months before pre-treatment behavioral test battery, followed by chemotherapy or saline treatment, and a post-treatment behavioral test battery. Running is predicted to act as a protective factor against the development of CICI following chemotherapy, while sedentary mice are expected to exhibit CICI following chemotherapy relative to saline-treated sedentary mice. For experiment two, 8-week old WT mice received chemotherapy or saline treatment, followed by 1-month of running, chronic-mild stress, or a sedentary rearing, followed by a post-treatment behavioral test battery. Running following treatment is predicted to minimize CICI, whereas post-treatment exposure to chronic-mild stress is expected to exacerbate CICI. Behavioral test batteries assessed hippocampal-dependent memory formation (spatial water maze, novel object recognition, Y-maze), frontal lobe function (conditional associative learning, non-matching to sample), and anxiety-like behavior (open field, elevated plus maze).

Tuesday, April 2, 2019
4:00 p.m. - 5:00 p.m.
Baylor Sciences Building
First Floor

Board 11 Samantha Lugo

Faculty Mentor: Mr. Timothy L. Campbell

Analysis of bone damage due to dermestid activity
[Anthropology]

Abstract: In this study, we measured the amount of bone lost to dermestid activity on a sample over a 1-3 week time period. Dermestidae is a family of carnivorous beetles, members of which are often used in skeletonizing remains in both forensic and museum settings. As carnivorous beetles their activity is known to cause damage to animal tissue, and thus potentially cause noticeable modifications to skeletal material. For example, a previous study on Neolithic Maltese human skeletal material showed evidence of dermestid activity based on impressions left on the bones from archaeological sites. For this experiment, bones from commercially available chicken wings were used, and their soft tissue was removed in order to obtain the necessary skeletal sample. Twelve bones were then placed in an enclosed tank containing a colony of dermestids. Three bones each were subsequently removed at one, two and three week intervals. Once the remains were extracted, the mass was measured, and any impressions from dermestid activity were photographed and described. As archaeological sites have shown evidence of dermestid activity on recovered skeletal remains, this study adds to our knowledge by exploring the potential time it takes for initial marks to be made in a controlled setting.

Board 12 Austin Johnson

Faculty Mentor: Mr. Timothy L. Campbell

The Effects of Hydrogen Peroxide and Bleach on Bone
[Anthropology]

Abstract: In this study, we test for any damaging effects that different concentrations of bleach and hydrogen peroxide may have on bone. In preparing skeletal specimens for curation and study, low concentrations (~3%) of hydrogen peroxide are often used in order to whiten skeletal elements and eliminate grease, dirt and other materials. Additionally, bleach has also been used for these purposes, however, this is far less common. As such, in this study we test to see if there are any discernable differences in bone weight,

density, and structural integrity. We utilized different concentrations of peroxide and bleach to identify whether there is an optimal chemical concentration for cleaning skeletal material that does not compromise the specimen. In this study, ~5 cm bovine long bone slugs were submerged in four different concentrations of both bleach and peroxide (N=27). A control sample was also submerged in water, and these specimens were soaked for 4 weeks. Quantitative properties measured include weight, height, length, and density with the latter calculated using water displacement. Photographs were also taken pre and post wash for visual assessment of any changes in the bones including color, porosity, texture, etc. This study adds to our knowledge by exploring the variation in bone degradation seen when utilizing these commonly used skeletal cleaning agents. This study helps aid museum curators, forensic scientists, and bone collectors alike.

Board 13 Deja Benjamin and Lexi Gage
Faculty Mentor: Mr. Timothy L. Campbell

The Relationship between heat, time and bone dimensions
[Anthropology]

Abstract: In this study we test the effect of heat for different periods of time on long bone dimensions. Previous studies have found that heat exposure can cause significant alterations to bone. For example, one study showed that heat can cause alterations in bone's crystalline structure and porosity, along with reduction and/or expansion in bone dimensions. In this study, however, time was not a variable. As such, our analysis explores if the length of time a bone is exposed to a set temperature influences bone dimensions. In this experiment, 12 bones were used with three replicates per trial. Bone mass, length and circumference at midshaft were measured from each bone before and after heat was applied. Bones were heated in a convention kitchen oven at 425° and three bones each were removed at one, two, four and six hours respectively. Results from this study thus represent a first step in assessing the effects of heat on bone dimensions and have implication for the accuracy of stature measurements where individuals were exposed to heat for varying amount of time.

Board 14 Tammy Wake
Faculty Mentor: Dr. Katie Binetti
Observable Effects of Water Salinity on Bone
[Anthropology]

Abstract: An experiment was conducted in 2018 to explore the effects of water salinity on bone. At the time there was, and continues to be, limited research on the subject with most studies focused on soft tissue decomposition in aquatic

environments. For the first experiment, five pieces of bone of approximately the same size were cut from a single bone sample. Four pieces were placed into tanks of water of differing salinity levels while the fifth was left as a dry control. Observable changes were noted throughout the ten-week experiment. These experiments produced unexpected results in the bone structure and appearance. The current study attempts to replicate the original experiment with the goal of reproducing the observed structural and morphological changes. Minor modifications were made to handling procedures during the second experiment and the study has covered a longer observation period, however, these modifications were not expected to change the outcome dramatically. I expected that the bones would react similarly in the second experiment as they did in the first, but perhaps with more pronounced changes due to the increased submersion time over an extended observation period (6 months versus 10 weeks). The methodologies of both experiments, as well as the subsequent results, are compared and contrasted in this paper. The results of this study may have implications for paleoanthropology, archaeology and forensic science.

Board 96 Samuel Esparza

Faculty Mentor: Dr. Lorin Swint Matthews

Numerical Modeling of Protoplanetary Disks
[Physics]

Abstract: Protoplanetary disks are the regions around newly formed stars where planets are formed. They vary in radial extent from a few AU to a few hundred AU. The disks are filled with gas and grains of dust that are the leftover mass of the giant molecular cloud which collapsed to form the star. Gravitational forces, turbulent gas flow, residual Brownian motion and Coulombic interaction cause the dust grains within the disk to collide with other dust grains or aggregates. Collisions can have many outcomes; however, planets are formed when these grains stick together and grow into a larger aggregate that in turn collides and sticks with other dust grains and aggregates. This research focused on modelling the aggregation of charged dust particles within a protoplanetary disk. The charge distribution on an irregular aggregate grain was calculated using the Orbital Motion Limited Line of Sight (OML_LOS) method. Very small grains, less than a micron in size, collect only a few electrons or ions. Thus a Discrete Stochastic Charging method was applied to calculate the fluctuating electron and ion currents to an aggregate grain. This data was used to estimate the ratio of electron and ion densities within the plasma which lead to aggregate grain charges of $0, \pm 1e-, \pm 2e-,$ etc..

Board 97 Naoki Ellis**Faculty Mentor: Dr. Lorin Swint Matthews**Mapping the Plasma Potential in a Glass Box
[Physics]

Abstract: The goal of this project is to build a simple model of the dynamics of charged dust particles, confined in a glass box placed on the lower electrode of a GEC cell. The model needs to account for the interactions between the charged dust, plasma, and electric fields from the charged box walls in a self-consistent manner. The charged lower electrode affects the electron and ion densities and temperatures within the plasma sheath. These parameters are determined as a function of the distance from the lower electrode using a fluid model of the plasma. These parameters in turn are used to determine the charge collected on individual patches making up the walls of the glass box, and independently to calculate the charge collected by a dust particle at various heights above the lower electrode. The charges on the box walls are then used to calculate the electric potential within the glass box. The gradient of the potential gives the electric field within the box, which, combined with charge of each dust particle, is used to construct acceleration maps for the particles. These maps are compared to the experimentally-measured acceleration of the dust within the box.

Board 98 Garrett Williams**Faculty Mentor: Dr. Zhenrong Zhang**N-Cadherin Dimerization Attenuated by Cadmium at
Calcium Concentration in Neural Synapses
[Physics]

Abstract: Cadherins are calcium-dependent cell-adhesion proteins that are vital to the formation and maintenance of solid tissues. Neural (N-) Cadherin plays an essential role in early development processes such as angiogenesis and development of the neural plate. Cell-cell adhesion and hence, the integrity of tissue and organ systems is entirely dependent on the ability of two adjacent calcium-bound cadherins to form dimer. The prerequisite of calcium (Ca^{2+}) binding for adhesion begs the question of whether other divalent cations could promote or inhibit dimer formation. Due to its ionic radius and chelation geometry, cadmium (Cd^{2+}) has been shown to substitute for Ca^{2+} in select physiological processes. The studies described here evaluate whether Cd^{2+} binds to N-Cadherin as a heteroligand, thereby disrupting calcium-induced dimerization. Studies were also conducted to predict the effects of Cd^{2+} at relatively low Ca^{2+} concentration, as typical for excitatory neural synapses. This study features both experimental and numerical analysis of ligand binding

and ligand-induced dimerization. Based on the model for ligand-induced dimerization, computational studies of linked equilibria were conducted. These algorithms resolve binding affinity constants for ligand binding to N-Cadherin, and dimerization constants for the self-association of ligand-bound monomers. Experimentally, N-Cadherin was titrated with Ca^{2+} in the absence and presence of Cd^{2+} as monitored by fluorimetry. Monomer-dimer equilibrium experiments were conducted, and then the fraction of dimer was assessed using size exclusion chromatography to determine Cd^{2+} effects on calcium-induced dimerization. Studies were also designed and conducted in vitro at physiologically relevant levels of Ca^{2+} . The ligand binding constants resolved for calcium and cadmium indicated that cadmium binds to N-cadherin with $\sim 4\times$ higher affinity than that of calcium. Further, low levels of Cd^{2+} decrease dimer formation at calcium concentrations found at neurological synapses. Analysis shows that Cd^{2+} disrupts dimerization of N-Cadherin, consistent with its competition for the Ca^{2+} -binding sites. Our observations of dimer disassembly in the presence of Cd^{2+} support the hypothesis that at very low levels, Cd^{2+} will have minimal effect on N-Cadherin mediated cell-adhesion in the body; however, Cd^{2+} at these same levels at excitatory synapses can disrupt cell adhesion and compromise normal neurological processes including the formation of memory and reflex stimulation.

Tuesday, April 2, 2019

4:00 p.m. - 5:00 p.m.

Baylor Sciences Building

Second Floor

Board 114 Luke Moraglia, Sarah Lathrop, Precious Mathis, and Jessica Hoffman

Faculty Mentor: Dr. Melanie J. Sekeres

Elucidating Changes in Memory Over a Lifetime of Stress or Enrichment

[Psychology and Neuroscience]

Abstract: Prolonged stress exposure has been shown to decrease brain and cardiovascular health, increase inflammatory glial response, deplete neurotrophic growth factors, and reduce hippocampal volume and neurogenesis. Behaviorally, stress has been shown to impair memory performance and increase levels of anxiety and depression. In contrast, exposure to healthy lifestyle factors, specifically cardiovascular exercise and environmental enrichment,

contribute to beneficial effects on brain health and cognition, including increased levels of hippocampal-dependent neurogenesis and memory performance. In the present study, we aim to understand the effects that stressful and enriched lifestyles have on these factors over the entire lifespan. Using a mouse model, we examined the changes over the full lifespan (13 months) of subjects raised in environments with exercise and enrichment or daily mild stress.

Board 115 Micah Johnson and Rachel Heurlin

Faculty Mentor: Dr. Michael K. Scullin

A Structural Equation Model on Perceived Stress and Sleep Quality

[Psychology and Neuroscience]

Abstract: In many studies, stress and sleep quality are correlated with each other, but there is little research providing definitive evidence of a causal relationship. Particularly, sleep quality and stress management are important for maximizing cognitive functioning in college students. The goal of this study was to quantify the temporal relationship between perceived stress and sleep quality in college students over the course of one semester. After assessing perceived stress and sleep quality of five hundred and fourteen undergraduate college students from various STEM courses at Baylor University, we intended to examine the relationship between perceived stress and sleep quality. Surprisingly, the results showed that higher stress at Time 1 predicted poorer sleep quality at Time 2 for males, but not for females. Based on these findings, we present a model which illustrates directionality and degrees of influence between males and females.

Board 116 Nicole D'Aoust

Faculty Mentor: Dr. Sara L. Dolan

An Examination of Treatment Utilization and Symptom Reduction After a Computerized Intervention for Women Veterans with a History of Sexual Trauma

[Psychology and Neuroscience]

Abstract: Military sexual trauma affects approximately 23.7% of women veterans utilizing VA care and is associated with health risks including hazardous drinking, intimate partner violence (IPV), and PTSD. Although verbal screenings in primary care are used routinely, computerized interventions can be a low-cost alternative. The Safety and Healthy Experiences (SHE) intervention was developed on this premise and pilot tested with 20 women veterans attending primary care appointments at a large VA hospital. The SHE intervention was associated with reductions in

hazardous drinking (48% reduction), IPV (53% reduction), and PTSD (29% reduction) at 4 months post-treatment. Seeking to understand the components associated with the effectiveness of SHE, we examined the role of increasing mental health treatment engagement. We hypothesized that participation in the SHE intervention would be associated with an increase in women veteran's utilization of VA mental health services. To test this, we used VA medical records to calculate the number of mental health appointments between two months prior to and four months following SHE. Results revealed no significant difference in treatment utilization across time. However, there was a slight nonsignificant increase in treatment sessions between baseline and two-month follow up. Additionally, number of treatment sessions at each time point were not associated with change in symptoms. Therefore, in this pilot of the SHE intervention, increasing treatment engagement did not appear to be the mechanism of action. It is possible that the intervention itself provided sufficient treatment to reduce symptoms, or other unexplored mechanisms of action may account for the efficacy of SHE.

Board 117 Amanda Wright

Faculty Mentor: Dr. Sara L. Dolan

The potential of 3,4-methylenedioxymethamphetamine (MDMA) as a treatment for PTSD
[Psychology and Neuroscience]

Abstract: Introduction: Posttraumatic Stress Disorder (PTSD) is a psychological disorder that is prevalent among 7-9% of the general population and is, comparatively, disproportionately present among veterans. Although there is some success with current treatment methods, a portion of the population is not helped by existing treatments. Exploratory studies and clinical trials of MDMA-assisted psychotherapy have generated excitement regarding the use of MDMA as a potential treatment. Methods: Results from over 20 peer-reviewed articles were considered in this literature review. Articles were obtained from PsycINFO databases using the key terms "PTSD," "MDMA," and "ecstasy." Results: Review of the existing literature shows promising results for the use of MDMA as a therapeutic agent for patients diagnosed with chronic, treatment-resistant PTSD. MDMA's action as an empathogen increases self-disclosure, open-mindedness, and strength of the therapeutic alliance. Physiological and cognitive effects are minimal at therapeutic doses and side effects of recreational dosages are comparable to those of current drugs being used in the treatment of PTSD. Overcoming federal regulations, addictiveness, and potential for abuse are among the barriers present for legalizing MDMA as a PTSD medication.

Discussion: The findings from this literature review suggest that MDMA could be a beneficial added component to psychotherapy for PTSD; particularly for patients with treatment-resistant or chronic PTSD (e.g. veterans). Future research needs to focus on possible long-term effects of using the drug at therapeutic dosages. These results highlight the importance of further research into atypical drugs as treatments for psychological disorders.

Board 118 Alyssa Kaser

Faculty Mentor: Dr. Sara L. Dolan

The Effect of Transcranial Magnetic Stimulation on Working Memory

[Psychology and Neuroscience]

Abstract: Cognitive deficits are commonly present across psychiatric and neurological disorders frequently found in veteran populations such as PTSD, addiction, TBI, and dementia, among others. Of these deficits, impairment in several memory subtypes has been found to greatly impact the individual's cognitive functioning and overall well-being. Working memory, in particular, plays an extensive role in attentional focus, memory retrieval, and decision making; all of which are necessary for adequate functioning. While a number of treatment methods have been implemented to improve this memory subtype, recent research has explored the effects of transcranial magnetic stimulation (TMS) therapy, a noninvasive brain stimulation procedure used to stimulate cortical regions, on the enhancement of working memory. However, the literature remains inconclusive regarding the efficacy of TMS across various populations, indicating the need for further investigation. For instance, research has explored the impact of stimulation of the dorsolateral prefrontal cortex (DLPFC), an area typically associated with working memory function, with mixed results. It thus remains unclear whether DLPFC stimulation is associated with improvements in functioning or worsening of symptoms. Taken together, although these results show promise in the use of TMS to address working memory difficulties, further research is needed to gain a refined understanding of TMS treatment on working memory and the neural correlates involved. This poster will review working memory function impairments across different populations, provide an overview of research regarding TMS and working memory function, and propose questions to address in future experimental design.

Board 119 Meredith Hayes

Faculty Mentor: Dr. Sara L. Dolan

Implementations of Mental Telehealth Interventions to Overcome Barriers of Access to Care for Veterans with Mild to Moderate Depression in Primary Care
[Psychology and Neuroscience]

Abstract: Introduction: Depression is a major mental health issue among veterans. Veterans, particularly those residing in rural areas, commonly face challenges to accessing available mental health services for such mental chronic disorders. Telehealth interventions offer a potential means of overcoming access related healthcare barriers. Methods: A narrative review of the literature (2004-2018) was conducted using PubMed to identify empirical efforts to implement mental telehealth interventions for depression. Search terms included “Telemedicine”, “Depression, and “Veterans”. Twenty relevant peer-reviewed publications were identified and included in this review. Results: Commonly reported interventions delivered entirely by telehealth technologies include depression care management and brief and focused cognitive-behavioral psychotherapies. These interventions were typically delivered by a nurse, psychologist, or social worker, and delivered within mental health integrated primary care clinics. A review of the literature suggests mental telehealth interventions for depression performed as an effective alternative to comparator interventions (commonly the same intervention delivered in-clinic) or usual care. A variety of implementation strategies were used, such as familiarizing staff with telehealth technologies, improved provider training, and external facilitation. Discussion: Mental telehealth interventions offer an effective alternative to in-clinic interventions for depression and have the potential to overcome the barriers, such as the ones set by symptoms of depression and rural distance, that veterans typically encounter when seeking access to mental healthcare. In doing so, telehealth can widely expand the access of care beyond that available through current in-clinic interventions.

Board 120 Viviana Gonzalez

Faculty Mentor: Dr. Sara L. Dolan

The Default Mode Network and Brain Stimulation for PTSD
[Psychology and Neuroscience]

Abstract: Posttraumatic stress disorder (PTSD) is a psychological disorder that develops in a subset of individuals following trauma and is considered a significant public health issue among veterans. Understanding the neurological mechanisms governing PTSD may lead to the

individualization of brain-based therapies. Such therapies could be employed in conjunction with established PTSD treatments, such as trauma and exposure-based talk therapy. Research on the functional and connective abnormalities underlying PTSD suggests altered functional connectivity within the default mode network (DMN) in individuals with PTSD. The DMN is a set of brain regions involved in narrative comprehension and self-referential functions, such as remembering personal experiences. It is a large scale brain network that includes the ventromedial prefrontal cortex (vmPFC), posterior cingulate cortex, medial temporal lobe subsystem, and the dorsal medial prefrontal cortex subsystem. Leading neurocircuitry models of PTSD propose that the vmPFC helps regulate the effects of the amygdala, a major component of the fear circuit of the brain. However, studies have detected decreased resting-state functional connectivity (rsFC) between the vmPFC and the amygdala in PTSD, which may contribute to characteristic PTSD symptoms such as negative affect and hyperarousal. This poster provides an overview of the DMN intra-network and inter-network connectivity aberrations found in PTSD, as well as their implications for appropriate treatments. Transcranial magnetic stimulation (TMS), a noninvasive brain stimulation technique, is discussed in context of the DMN's role in PTSD symptomatology.

Board 121 Kristin Sosa Yanez

Faculty Mentor: Dr. Sara L. Dolan

Effects of Cultural Differences on the Development of PTSD after Combat Exposure
[Psychology and Neuroscience]

Abstract: Research has found that emotional processing impacts health symptoms, including the development of PTSD and other mental illnesses. The way an individual processes their positive and negative emotions is influenced by their culture's prominent dialectical emotional style—the tendency to experience a balance of both positive and negative emotions concurrently. Although, cultural differences have been shown to affect life satisfaction and the intensity of positive and negative emotions, little is known about how differences across cultures regarding the normative expression of emotions can also differentially impact the development of trauma-related symptoms. This poster reviewed the literature on whether cultural influences on emotional expression can differentiate the development of PTSD following combat exposure, given the complex array of negative emotions that can be experienced following combat, such as guilt and shame for moral transgressions (i.e., moral emotions). Research suggests that the relative cultural significance placed on emotions

differentiates the experience of positive and negative emotions. The development of PTSD is suggested to be more negatively impacted by cultures with a non-dialectical emotional style, and less impacted by cultures that promote a dialectical emotional style. This literature review suggest there is a strong relationship between trauma symptoms and the influence culture has on processing positive and negative emotions after combat exposure. The results highlight the importance of better understanding the role of culture in PTSD and its influence on the experience of a wide range of negative emotions associated with combat exposure, including moral emotions, which are negatively affected in trauma-related disorders.

Board 122 Monica Daswani

Faculty Mentor: Dr. Lindsay Wilkinson

The Relationship Between Socioeconomic Status and Choice of College Major
[Sociology]

Abstract: Education plays an important role in people's lives, and choice of college major is one frequently overlooked aspect of education. College major is an important factor because it influences occupational status and job earnings. It is thus important for our society to recognize the impact of childhood conditions on education, including choice of major. This study examines whether socioeconomic factors have an association with the choice of undergraduate college major, based on a student's childhood conditions; and if so, what specific socioeconomic factors have the greatest influence on choice of major. The sample consisted of 111 Baylor undergraduates who were recruited using convenience sampling. The findings reveal that lower- and higher-SES students were more likely to be science majors than any other major. It was also found that a quarter of lower-SES students were undecided. The socioeconomic indicators that had the greatest influence on the choice of college major were (1) whether the student needed a job in high school to provide for the family, and (2) whether the student was able to afford college without scholarships.

Wednesday, April 3, 2019
12:00 p.m. - 1:00 p.m.
Baylor Sciences Building
First Floor

Board 21 Allison Sillah and Alyssa Horton
Faculty Mentor: Dr. Dena B. Quigley

How Does The Source and Amount of Caffeine Affect Human Productivity Levels and Sleep Interference
[Biology]

Abstract: According to the Institute for Scientific Information on Caffeine, caffeine is a natural compound that acts as a mild stimulant in the way of functioning as an adenosine receptor antagonist, blocking the binding of adenosine and resulting in feelings of increased alertness. While caffeine does have a stimulating affect, if consumed in high quantities it can hinder sleep, as well as cause feelings of anxiety and hyperactivity affecting overall productivity. The affects of caffeine on the human body depend largely on the strength, or in other words the source, of caffeine and the amount consumed. We want to determine how the amount and source of caffeine affects participants' productivity levels and how it affects the amount of sleep they receive at night. The goal is to ultimately determine how much caffeine and from what source, yields the highest productivity levels and the least sleep interference. We hypothesize that lower strength caffeine sources taken in amounts greater than four fluid ounces will yield higher levels of productivity, while allowing for maximum sleep efficiency. To test this hypothesis, we will gather six participants and over the course of four weeks, measure the participants' sleep efficiency and productivity levels as related to varying amounts of white tea, black coffee and coca-cola. Productivity will be measured by participants' accuracy in completing a mathematical table of exercises within a specified time limit. Sleep efficiency will be measured by comparing how many hours the participant slept the night they consumed caffeine, with how many hours of sleep they receive normally.

Board 26 Rebecca Modisette

Faculty Mentor: Dr. Joseph H. Taube

Analysis of breast cancer profiles in TCGA by TNBC subgrouping reveals a novel microRNA-specific cluster distinguishing tumor subtypes
[Biology]

Abstract: Breast cancers are diverse diseases comprising specific sub-types with unique characteristics and individual treatments. Patients with tumors that possess hormone receptors—estrogen receptor (ER) and progesterone receptor (PR)—or elevated human epidermal growth factor receptor 2 (HER2) respond to treatments targeted at these proteins. If tumors lack these markers, they are termed triple-negative breast cancer (TNBC) and do not have targeted treatment options. Within TNBC, we can identify intrinsic subtypes by gene profiling. The subtypes include mesenchymal (M), basal-like 1 (BL1), basal-like 2 (BL2), and luminal androgen receptor (LAR). While the biological origins of M and LAR TNBCs have been made evident, the regulatory nodes that set BL1 apart from BL2 TNBCs remain ambiguous. The Cancer Genome Atlas (TCGA) was used to derive small-RNA inclusive RNA sequencing data from TNBC-subtype classified breast cancers. We then identified microRNA-centric regulatory clusters that are likely to create different gene expressions between said subtypes. I then tested a group of these microRNA-mRNA regulatory nodes in cell line models of TNBC and found that specific microRNAs both had expression differences between TNBC subtypes, and re-expression is sufficient to modulate cell cycle and DNA damage-related gene expression networks. These data provide a rationale for genomically-informed treatments in patients with TNBC.

Board 27 Emily Lin and Aadil Sheikh

Faculty Mentor: Dr. Joseph H. Taube and Dr. Leigh Greathouse

Interactions of *Bacteroides fragilis* Outer Membrane Vesicles with Host Cells
[Biology and Nutrition Sciences]

Abstract: Cellular progression to colon cancer is associated with increasing degrees of inflammatory signaling. Factors that affect inflammation include obesity, diet, and commensal bacteria. Gut microbiota can influence host cells and activate downstream inflammatory immune responses, such as through the Pattern-Recognition Receptor (PRRs), including the activation of Toll-Like Receptors (TLRs) and through Outer Membrane Vesicle (OMVs) cargos. Microbial dysbiosis has been correlated with colorectal cancer and inflammatory states. Species belonging to the

genus *Bacteroides* were found to be the predominant genus in stool samples from patients with colorectal cancer. Enterotoxigenic *Bacteroides fragilis* (ETBF) secrete a zinc metalloprotease toxin, BFT, which cleaves e-cadherin. Loss of e-cadherin is a hallmark of the epithelial-mesenchymal transition (EMT). Cells that have undergone EMT demonstrate increased metastatic properties, acquire stem cell properties, and exhibit resistance to therapeutics. We hypothesize that *Bacteroides fragilis* secrete OMVs which may carry small RNA (sRNA) cargo that are able to activate TLRs and which may carry BFT that is able to affect the progression of EMT. To test this hypothesis, we extracted OMVs and characterized them through Transmitting Electron Microscopy (TEM), and protein and RNA content. Our results indicate that both NTBF and ETBF-derived OMVs stimulate TLR activation. However, neither ETBF nor NTBF-derived OMVs were sufficient to induce EMT in Caco-2 colorectal adenocarcinoma cells. Based on these results, we conclude that ETBF and NTBF-derived OMVs do not directly induce EMT in Caco-2 cells. Further research is needed to elucidate if *B. fragilis*-derived OMVs can indirectly affect EMT.

Board 28 Navin Kumar, Megan Vo, and Lillian Hallock
Faculty Mentor: Dr. Marty Harvill

Effects of differing concentrations of progesterone on *Daphnia magna*
[Biology]

Abstract: In order to understand the effects of progesterone in the Waco Wetlands, we measured the change in concentration of progesterone on the survival rates of *Daphnia magna* (*D. magna*). We kept a control group with water and the other groups with three different levels of progesterone. Progesterone is a human hormone found in the water supply of the Waco Wetlands. The idea was to see how higher concentration of progesterone inhibit daphnia life expectancy. Ultimately, the results showed a higher mortality rate when exposed to progesterone.

Board 29 Kamerin Smith, Peyton Mizell, and Lauren Hoogenakker
Faculty Mentor: Dr. Marty Harvill

The Effects of Exposure to Various Frequencies of Noise on the Reproductive Rates of *Drosophila melanogaster*
[Biology]

Abstract: The objective of this project was to explore the effects of noise pollution on the model organism *Drosophila melanogaster*. Three test groups were exposed to different frequencies while the population growth and

behavior of the organisms were monitored. To conduct this experiment, four sound resistant boxes, each containing three vials of *D. melanogaster*, were exposed to varying frequencies. The control group was exposed to a relatively noiseless environment (no additional sound) while the first, second, and third test groups were constantly exposed to frequencies of 200 Hz, 9000 Hz, and 15000 Hz, respectively. After constant exposure for 28 days, we observed that the flies exposed to 200 Hz and 15000 Hz exhibited an overall increase in population size when compared to the flies exposed to 9000 Hz. The specimens' behaviors were carefully observed and recorded across all groups. Notably, the test group exposed to a frequency of 9000 Hz experienced a stagnant period of growth followed by a significant decrease in population size. Additionally, these flies showed a significant decline in activity (i.e. flying) compared to the 200 Hz and 15000 Hz test groups.

Board 30 Sean Ngo and Samuel Fang
Faculty Mentor: Dr. Marty Harvill

The Effects of pH on the Rate of Successful Egg Hatches in *Aedes aegypti*
[Biology]

Abstract: *Aedes aegypti*, a common species of mosquito, is the primary vector for many deadly diseases, such as yellow fever, Zika, chikungunya, and dengue fever. Considerable efforts have been made by public health advocates to educate property owners in vulnerable areas about the risks of leaving out artificial containers that can collect rainwater and become prime breeding grounds for *Ae. aegypti*. With rising CO₂ levels in the atmosphere, the degree of rainwater acidification increases each year. This experiment therefore sought to determine if there was a correlation between solution pH and the rate of successful hatches in *Ae. aegypti* eggs. It was hypothesized that more neutral pHs would see the largest percentage of successful egg hatches, while hatch rates in more acidic or basic solutions would see a diminished percentage. To test this, 10-25 eggs laid from a single cohort of female *Ae. aegypti* were placed in five solutions of different pHs and the viability of the eggs was determined by counting the number of larvae in each solution after an hour. Finally, the data was analyzed using a simple linear regression in order to determine the correlation, if any, between the two variables. No statistical significance was found between pH and hatching viability of *Aedes aegypti* eggs. Further research would have to be done to make a conclusion on the effect of pH on the rate of hatching for *Aedes aegypti* in their natural environment.

Board 31 Joelle Kim and Chloe Meyer
Faculty Mentor: Dr. Marty Harvill

The Effect of Cold Temperatures on Hatching of *Aedes albopictus*
[Biology]

Abstract: The *Aedes albopictus* mosquito is a public health vector for diseases including Zika, Dengue fever, and West Nile fever and is prevalent in southern regions of the United States as well as other countries. The hatching proportions of *A. albopictus* eggs were determined at one control temperature (23.5°C) and two experimental temperatures (8°C, 17°C) and tested to see if temperature affects hatching ability. The difference of proportion between the control and experimental temperatures was significant, with the coldest temperature producing a lower hatching proportion than the medium and room temperatures. Future research can further explore the relationship between temperature and *A. albopictus* hatching rates and viability, which can potentially be used as a predictive measure for disease prevention in varying temperatures and seasonal environments in the US and beyond.

Board 32 Jana Heady, Kathleen Klinzing, and Kevin Thompson

Faculty Mentor: Dr. Marty Harvill

Light Variance Changes Chlorophyll b Production in *Chlamydomonas* sp.
[Biology]

Abstract: The algae *Chlamydomonas* sp. is a multicellular, photosynthetic organism that lives in stagnant ponds. *Chlamydomonas* sp. has a circadian rhythm that uses environmental cues to regulate certain internal processes. Tubs of *Chlamydomonas* were put under varying cycles of light and darkness to test its circadian rhythm adaptability. Readings of chlorophyll b concentration in each sample were taken. The results suggest that a significantly greater amount of chlorophyll b was produced by algae under the randomized light cycle than by algae under any other light cycle. This result contradicts the hypothesis, which predicted that the 12-hour light/12-hour dark cycle would result in the highest chlorophyll b density. This hypothesis was derived from the approximate 12-hour light/ 12-hour dark cycle of natural summer sunlight. However, the findings of this experiment may be supported by the findings of Cross and Umen (1), who found that *Chlamydomonas* sp. divides at the end of a light period or beginning of a dark period when provided light for enough time to grow. The results of

this experiment provide significant evidence that suggests *Chlamydomonas* sp. cell division does not follow a circadian rhythm.

Board 33 Leah Goehring

Faculty Mentor: Dr. Michael E. Moore

Learning Assistant Perceptions on their Effectiveness to Enhance Student Learning

[Biology]

Abstract: Recent research has shown that learning assistants enhance student engagement and satisfaction in STEM classrooms. Learning Assistants (LAs) can be a catalyst to effectively implementing active learning in the class setting and helping improve student grades. In this study, first semester LAs were surveyed to investigate their perceptions of both their role as LAs and their actions to prepare for and participate during class. LA programs have three pillars: content, pedagogy, and practice. These three pillars are crucial for LA success while engaging with students in LA-supported classes. This survey centered around three essential components of learning assistant effectiveness- knowledge about the course material and role as a LA, engagement with students and the professor, and understanding of how to maximize student learning. Results indicate that LAs perceived themselves as being knowledgeable about content and understanding how to maximize student learning. Additionally, LAs perceive themselves as engaging with students and professors less often. While being knowledgeable about content and knowing how students learn are important parts of being an LA, by not spending more time connecting with the students in LA-supported courses, LAs may not be forming the connections necessary for students to accept the information that their LAs are conveying. This potential communication breakdown could cause the benefits of an LA to be significantly reduced or disappear altogether. Future research into the reasons why students do not focus on making connections is warranted. Uncovering these reasons could help instructors provide better LA training and avoid this connection pitfall altogether. (250)

Board 34 Amy Kumar, Shiv Gakhar, Julian Harris-Quanquin, Shelby Story, Bill Vo, and Henry Vo

Faculty Mentor: Dr. Myeongwoo Lee

Genetic suppressors of *str-2* serotonin response defects

[Biology]

Abstract: *C. elegans*, a nematode, is a model organism to study animal behavior and development. The genome of the *C. elegans* shows that there is a similarity between the

genes of the nematode and that of humans. *C. elegans* are widely used because of its rapid life cycle and its small size which makes it easy for laboratory cultivation. The *str-2* gene in *C. elegans* is predicted to be responsible for receptor activity linked to olfactory responses. Through binding of odorants in specific olfactory neurons, *str-2* allows them to detect pheromones, environmental threats, and nutrition, essentially playing a vital role in their behavioral functioning. The egg-laying behavior of *C. elegans* is regulated by its surroundings and can be activated or inactivated through various environmental cues. However, without a properly functioning olfactory system, we hypothesize that *C. elegans* will be unable to initiate standard egg-laying activity through its inability to pick up on these environmental cues even in the presence of serotonin. In this study, we created a mutagenized *str-2* *C. elegans* that was induced by ethyl methanesulfonate (EMS) which would also be resistant to the egg-laying ability response to serotonin. The *C. elegans* were treated and screened to ensure that they represented their ability to lay the most or least eggs in response to serotonin. Egg laying assays were repeated until the offspring was uniform. There is a report that the *str-2* mutants have a decreased life cycle compared to the non-mutants. These mutants had crippled olfactory responses to environmental transmitters, and lacked sensory abilities that hindered life. In addition, we found that the number of offspring produced by the mutants were significantly less than those of the non-mutants.

Board 35 Jonathan Contreras, Dylan Hartsfield, Tymia Marsh, Victoria Phipps, Pam Shalo, and Bethany Shields

Faculty Mentor: Dr. Myeongwoo Lee

A genetic screen to identify genes interacting with HIM-4/hemicentin
[Biology]

Abstract: The *him-4* gene is associated with gonad development of *C. elegans*. A mutation in this gene causes defective cell migration and fragile tissues in the adult. *him-4* is translated into the protein hemicentin which is a component of the basement membrane and plays an important role in gonad functions. A *him-4* (e1267) mutation leads to a higher incidence of males, and low fecundity, due to defective cytokinesis and chromosome instability. In addition, the *him-4* mutation displays a fragile epidermis in adults, due to a defective basement membrane. To analyze the role of *him-4* in gonad formation and function, we undertook a genetic approach to dissect molecular interactions of the *him-4* gene by isolating genetic

suppressors of the *him-4* mutation. Suppression of the *him-4* gene will result in increased viability of adults and their offspring. This genetic suppression can be extragenic, meaning the genetic suppressor is in a different area of the *C. elegans* genome than *him-4*. In order to identify *him-4* suppressor genes, EMS was used to induce new mutations in the *him-4* mutant of *C. elegans*. Then, we isolated the F2 worms producing the most offspring and those phenotypically different from the original *him-4* mutants. There are currently 5 potential suppressors that will be used to help uncover the details of molecular interactions with *him-4*. Further insight into the interactions of cells with their environment, gained through this research, has the potential to be an important step in understanding similar interactions exhibited in human diseases.

Wednesday, April 3, 2019
12:00 p.m. - 1:00 p.m.
Baylor Sciences Building
Second Floor

Board 49 Alex Kietzman

Faculty Mentor: Dr. Bryan F. Shaw

Leukocoria Detected Before Diagnosis of Ocular Disease
[Chemistry and Biochemistry]

Abstract: Leukocoria is indicative of several ocular disorders ranging from amblyopia to retinoblastoma. Ophthalmoscope screenings for leukocoria contain several drawbacks that render it ineffective when administered by primary physicians on undilated eyes. Anecdotal reports and recent literature suggest that trained artificial neural networks may effectively identify leukocoria in potentially diseased eyes. Thus, we developed CRADLE (ComputeR Assisted Detector of LEukocoria), a free smartphone application trained to detect low intensity leukocoria in digital imagery. Longitudinal photographs of 20 test children (n = 23,248) with retinoblastoma, cataract, hyperopia, amblyopia, and Coats' disease were screened on the Google Pixel 2XL. CRADLE detected leukocoria in 16 test children 1.1 years before diagnosis on average. Computer-assisted detection of leukocoria can accelerate diagnoses and lower mortality rates of eye disease, especially in underdeveloped countries.

Board 50 Bruno Brenes

Faculty Mentor: Dr. Elyssia S. Gallagher

Building a temperature controlled liquid fluidics system for H/D exchange-mass spectrometry experiments
[Chemistry and Biochemistry]

Abstract: Hydrogen/Deuterium exchange-mass spectrometry (HDX-MS) experiments provide valuable insights into protein structure and interactions. HDX works by exchanging hydrogens in a protein with deuterium after diluting the protein into D₂O. Following reaction, exchange is quenched by diluting the sample into an acidic, aqueous buffer. At these conditions, the protein is denatured and the rate of exchange for backbone amides is reduced; however, other labile hydrogens back exchange to their protonated form. The denatured, deuterated protein is then digested, desalted, and separated prior to MS analysis. Differences in deuteration for proteins in different conditions can be used to show conformational changes. However, several obstacles limit HDX-MS. During quenching, signal on the

backbone amides can also be lost due to backbone amides exchanging deuterium for hydrogen; called back-exchange. This prevents us from observing the protein's dynamics. Additionally, when an analyte passes through the digestion, trapping, and analytical columns some of the analyte can become "stuck" in the column, creating phantom signals in subsequent experiments; called carry-over. To combat these issues, we are constructing a cold fluidics system that will maintain a temperature of 0 °C that will reduce back exchange. This system will also incorporate two valves, enabling cleaning of the columns to remove left-over analyte, preventing carry over. The unit will increase the overall quality and usability of future HDX data.

Board 51 Emily Ziperman

Faculty Mentor: Dr. Elyssia S. Gallagher

Comparing Theoretical and Experimental Collisional Cross Sections of Carbohydrates to Determine Density Functional Theory Calculation Accuracy
[Chemistry and Biochemistry]

Abstract: Glycans, which are composed of branched, carbohydrate chains, are prominent molecules in biology. Glycans are difficult to characterize with traditional chemical techniques. However, computer simulations, including Density Functional Theory (DFT), can predict molecular structures and properties, e.g. dipole moments and binding affinities. Yet, DFT requires the use of functionals and basis sets, the accuracy of which has not been determined for carbohydrates. We compared two methods and 15 basis sets for glucose and fucose in their neutral, protonated, and ammoniated forms. Each system was optimized for geometry and frequency in Gaussian09. Initial DFT calculations eliminated three basis sets, ccpVQZ, GEN, and GENECP. For the remaining basis sets, molecular parameters from the Gaussian output files were compared against each other. For the series of methods and basis sets, there was greater variation in the calculated dipole moments of fucose (standard deviation, SD=1.5, n=12) compared to glucose (SD=0.68, n=12). These calculated parameters should be constant for a single carbohydrate, thus this lack of precision indicates that error exists for the structures calculated using different basis sets and methods. A visual comparison of the predicted geometries was done by overlaying the C5-C6 bond of the sugars, which confirmed variation between the calculated structures. Next, we will obtain theoretical collisional cross sections (CCS) using the program MOBCAL. Currently, we are experimentally analyzing carbohydrate-adducts by ion mobility-mass

spectrometry and calculating CCS values for these systems. The experimental CCS values will be compared to the theoretical CCS to find gross error in these DFT calculations.

Board 59 Alyssa Van Vossen

Faculty Mentor: Dr. Yang-Soo Yoon

Effect of Frequency Maps on Consonant Perception Enhancement in Electric Acoustic Stimulation [Communication Sciences and Disorders]

Abstract: We aimed to determine the optimal frequency map by testing normal hearing listeners using Electric Acoustic Stimulation simulation. Consonant recognition was measured with four different frequency maps: large gap, slight gap, meet, and overlap between acoustic and electric frequency boundaries. The gap frequency map generated the optimized performance of consonant perception.

Board 60 Courtney Hammit

Faculty Mentor: Dr. Yang-Soo Yoon

Spectral Integration in Normal Hearing Listeners [Communication Sciences and Disorders]

Abstract: This study aimed to determine how the ability of normal hearing listeners to integrate different spectral information presented across ears is influenced by sequential and dichotic listening mode. Spectral integration on consonant recognition was measured without and with the novel processing under the two listening conditions. Results showed the similar spectral integration patterns under both sequential and dichotic listening conditions. Consonant perception similarly improved as well with the signal processing under both sequential and dichotic listening conditions.

The auditory system integrates comparable, contrasting or a combination of these two speech- acoustic cues detected and processed by each ear. In this study, conducted with normal hearing (NH) listeners, we aimed to determine whether the spectral integration occurs differently when contrasting frequency components are presented sequentially and dichotically across ears. The idea behind this question is that NH listeners might have ability to integrate different spectral information across ears when contrasting spectral information is presented with a time gap across ear. However, this ability might be limited when the same contrasting spectral information is presented dichotically across ear. The purpose of this study is to compare the spectral integration in NH listeners between sequential and dichotic listening conditions by measuring consonant perception in quiet.

Board 64 Olivia Moses

Faculty Mentor: Dr. Lakia M. Scott

Teaching Upper Elementary Students Media Literacy Skills
Using Animated Movies
[Curriculum & Instruction]

Abstract: Parents and family members alike have always shown concern for their children's television and movie watching habits. Questions arise about the appropriateness and influence of content regarding these types of media. There is a need to consider how media literacy is taught to younger audiences. Commonly, media literacy curriculum and lessons are focused, well-needed and intended, on discerning the validity of a source however, younger students, at example, elementary ages, aren't being equipped to critically view media directly targeted for them. Animated movies shape children's culture and the ways they view the world. This study examined the experiences of elementary youth when learning about media literacy and attempted to understand their process regarding the construction of media. Another goal of this study was to prepare students to question things seen in the media as well as learn about influences media has on their societal perspectives. Findings of the study revealed that students were significantly more interested in constructive activities in comparison to deconstruction during lessons. Recommendations for teachers, parents, and media literacy specialists with regards to increasing media literacy education and practices for elementary-aged students are provided.

Board 84 Andrenita Achane

Faculty Mentor: Dr. Andrew Gallucci

Non-Traditional Approach to Shin Splints
[Health, Human Performance and Recreation]

Background: An 18-year-old freshman collegiate cross-country runner has reoccurring injury of bilateral shin splints. Differential Diagnosis Stress fractures, compartment syndrome, abnormal lower body biomechanics, muscle strain. Treatment Currently participating in a rehabilitation plan that focuses on stretching, strengthening, pain control and a change in footwear to provide more supinated support. Uniqueness Patient presents with reoccurring bilateral shin splints and there is a non-traditional approach to rehabilitation. Instead of singlehandedly treating the symptoms of the shin splints, we have decided to focus on offsetting her pronators by targeting the proprioceptors that cause the excessive pronation. The rehab also focuses on strengthening the patient's fallen arch. By doing exercises such as towel curls, toe raises and even single leg balance,

the patient is able to target those little muscles and help to create a better base of support. Along with this, we have changed her shoes for medical arch support and have been working to correct her biomechanics. Other unique factors involving shin splints would be its correlation to the female athletic triad, nutrient and wellness deficiencies, and environmental conditions Conclusion There is a very high incidence of shin splints but very little research on effective preventive techniques. Athletic Trainers need to understand the importance of treating the root of the injury of shin splints in order to treat as well as get rid of the problem. The non-traditional approach to the patient's rehabilitation allows for the problem to be fixed.

Board 85 Hannah Kim

Faculty Mentor: Dr. Andrew Gallucci

Effectiveness of Non-Operative Treatment of Partial UCL Tears in Collegiate Baseball Players
[Athletic Training]

Background Two left-handed collegiate outfielders opted out of ulnar collateral ligament (UCL) reconstruction surgery, instead treated with platelet rich plasma (PRP) injections and rehabilitation programs. Differential Diagnosis medial epicondylitis, flexor-pronator strain, thoracic outlet syndrome Treatment Patients treated with PRP injection at the proximal side of the UCL with at least a day of rest before starting light range of motion (ROM) exercises. The next week patients followed a rehabilitation program focusing on full end-ROM and isometric strengthening. Once full range of motion was established, concentric exercises as well as cuff weights and higher repetitions were implemented for strength. Approximately at week 8, patients began overhand throwing program. At the end of throwing program, patients reported recreation of initial signs and symptoms. Uniqueness Growing evidence supports PRP injection in quicker return-to-play (RTP) than surgical intervention. Baseball players that undergo surgical intervention approximately take 20 weeks until RTP, with PRP injection it is estimated to be 12 weeks until RTP. Both patients failed with the PRP injection, underwent surgical repair of the UCL, and did not RTP for the season. Both patients were left-handed outfielders which is unique because UCL injuries are more commonly seen in pitchers. Conclusion Effectiveness of RTP rates using PRP injection as a treatment is extremely dependent on grade of tear, location of tear, past history, rehabilitation timeline, as well as patient's response to the PRP injection.

Board 86 Victoria Rogers

Faculty Mentor: Dr. Beth Lanning

Evaluation of the Texas 2018 Demonstration of the Summer Electronic Benefits Transfer for Children Pilot
[Public Health]

Abstract: Summer can be a particularly trying month for families struggling with food insecurity due to increased access barriers to food procurement. In 2018, the United States Department of Agriculture implemented the Summer Electronic Benefits Transfer for Children (SEBTC) pilot demonstration in Elgin, TX, and Georgetown, TX. This program provided monthly food benefits of approximately \$30 to qualifying families to help curb hunger during summer months. In partnership with Texas Department of Agriculture, the researchers conducted a process evaluation of staff preparedness, program implementation, benefit usage, and reach and usability. The researchers utilized a variety of qualitative and quantitative methods including phone interviews, electronic surveys, and focus groups to evaluate program staff and participant experiences with the program. Several themes were identified, including the need for more staff training, general support for the program, increased quantity of food purchased, and decreased food choices at end of the month. Findings of the program were presented in a report to the Texas Department of Agriculture and will be used to inform and refine future implementations of the pilot.

Board 87 Jordan Lyles

Faculty Mentor: Dr. Heather L. Hudson

Bilateral Ulnar Nerve Subluxation In Collegiate Baseball Pitcher

[Health, Human Performance and Recreation]

Background: A 20-year-old collegiate baseball pitcher presented with chronic bilateral subluxation of the ulnar nerves and experienced ulnar neuropathy. Differential Diagnosis Medial epicondylitis, Snapping triceps syndrome, C8 radiculopathy, Thoracic outlet syndrome, cubital tunnel syndrome Treatment To prevent the nerve from further subluxation, the patient chose to undergo subcutaneous anterior transposition of the ulnar nerve in only the right arm. The patient then worked with a physical therapist to gain full range of motion that was lost after surgery. Uniqueness Although the occurrence of injuries such as cubital tunnel syndrome and ulnar neuropathy is common among baseball pitchers due to the repetitive stress placed on the ulnar nerve, what makes this case study unique is that the patient presented with bilateral subluxation of the ulnar nerves despite pitching solely with his right

arm. There was also no other known pathology other than ulnar nerve subluxation, which is not common because typically ulnar nerve subluxation is present in addition to cubital tunnel syndrome or other anatomical deformities that would cause the ulnar nerve to sublux or dislocate. Conclusion Without a thorough evaluation, the cause of the patient's neuropathic symptoms may have been overlooked or misdiagnosed due to the prevalence of neuropathy in baseball players.

Board 88 Isabella Brown

Faculty Mentor: Dr. Bracy V. Hill II

Hunting for Change: A History of Women Working to Break the Domestic Sphere

[English]

Abstract: The project attempted to look at how women and the 'feminine' were depicted in the late-nineteenth/ early-twentieth century as hunting evolved into a sport in the United States and how did this depiction correlate to the actual experiences of women at that time. The projection of femininity by males in regards to society and sport, the participation of women in the sport, focusing on the public perception during the time. When did the turning point on the attitudes of females in hunting occurred? This project will attempt to discover a big shift in ideals that explains the mindsets of individuals during and around times of war. This project will utilize primary source materials in sporting journals, diaries, books, paintings, as well as other secondary sources from academic perspectives. The sources, primary and secondary, are available through various electronic subscriptions made available through Baylor libraries, in the Texas Collection, at the Baylor Institute for Oral History, and in regional museums.

Wednesday, April 3, 2019

1:00 p.m. - 2:00 p.m.

Baylor Sciences Building

First Floor

Board 36 Lily Wise, Abigail Antrich, Nathan Barker, Jayla Harsley, Kelle Henry, and Meredith Owen
Faculty Mentor: Dr. Myeongwoo Lee

Identification and Characterization of Alcohol Resistant *Caenorhabditis elegans*
[Biology]

Abstract: According to the NIH, 86.4 percent of American adults reported drinking alcohol at some point in their lifetime. Alcohol consumption is prevalent among Americans with as many as 26.9 percent of Americans adults reporting binge drinking in the past month. Exposure to alcohol can lead to damage in the brain, liver, and heart among other health issues. *Caenorhabditis elegans* is a model organism that is also affected by alcohol consumption. When *C. elegans* are exposed to alcohol and they become intoxicated, they are paralyzed until they are restored to an alcohol-free environment. This experiment aims to isolate and characterize mutant *C. elegans* that exhibit resistance to the effects of alcohol exposure. Initially, *C. elegans* were exposed to EMS in order to make mutants that were resistant to intoxication. The mutated worms were tested in 70% ethanol fume, and those demonstrating alcohol resistance were isolated for further testing. Since genes that are affected by ethanol in *C. elegans* are related to orthologous human genes, the mutant effects on the worm's genes could be correlated to effects in humans. Sensitivity in the *C. elegans* species could be applied to human sensitivity to alcohol as well as other addictive drugs. Further studies on the effects of addictive drugs on *C. elegans* could also contribute to finding solutions on reducing the sensitivity to said drugs in humans.

Board 37 Lauren Kirsch, Tristin Chaudhury, Catera Farlough, Jannine Gamayot, Grace Rodriguez, and Savannah Weinberg

Faculty Mentor: Dr. Myeongwoo Lee

Genetic suppressor of *che-3* serotonin respond defect
[Biology]

Abstract: *che-3* is a cytosolic dynein heavy chain within *Caenorhabditis elegans*. This motor protein acts in intraflagellar transport and maintains structural integrity of

sensory cilia structures. When mutated at the *che-3* genetic locus, the mutants show progressive developmental defects of the chemosensory cilia. In this mutant, *C. elegans* lose olfactory abilities and are unable to detect and respond to factors in their environment and therefore cannot respond to serotonin stimulation properly. Normally, wild type (N2) *C. elegans* produce more eggs in the presence of serotonin. Our goal was to test the relationship between serotonin and the olfactory senses within *C. elegans*. It is not known why *che-3* is less responsive to serotonin. To address this, we mutagenized *che-3* and found a suppressor that recovers the mutant's response to serotonin. We created various trials to test a *che-3* mutant suppressor that produces more eggs in the presence of serotonin than the wild type. The mutagenized *che-3* were bred to yield the recessive F2 generation and placed in serotonin solutions to observe the number of eggs produced. The experiment was repeated many times to yield a consistent outcome. The results that were observed in *che-3* mutants, compared to the wild type, produced more eggs in the presence of serotonin when the suppressing mutation occurred. In the future, further testing of *che-3* mutants could aid in our understanding of the human response to serotonin and the effects of serotonin uptake within human chemosensory structures in the brain.

Board 38 Nate Lundquist, Kolton Fletcher, Meredith Kim, Zach Wight, Jon Schmidt, and Mohammad Nabi
Faculty Mentor: Dr. Myeongwoo Lee

Serotonin effects on *cat-1* mutants of *Caenorhabditis elegans*
[Biology]

Abstract: *Caenorhabditis elegans*, common soil dwelling nematode, are frequently used as model organisms for developmental genetics. In this paper we focus on the *cat-1* gene, which is orthologous to the human SLC18A1 gene. The CAT-1 protein exhibits dopamine and serotonin transmembrane transporter activity and is classified as a vesicular monoamine transporter (VMAT). It is an integral part of serotonin and dopamine transport, ensuring proper amounts of each in the synaptic vesicles of neurons by creating a charge gradient across the vesicular membrane. While the CAT-1 protein is localized to the synaptic vesicle, it is also expressed in the gonad and nervous system and has a profound effect on feeding behavior, locomotion, and the reproductive system of *C. elegans*. In humans, the improper function of VMAT proteins has been previously implicated in a number of neuropsychiatric disorders, specifically depression. In *C. elegans*, serotonin causes a noticeable increase in egg laying and locomotion. However, in the *cat-1* gene knockouts, egg-laying is considerably reduced even in serotonin solution. One way to potentially

alleviate the effects of such deleterious mutations is to induce a suppressor mutation. A suppressor mutation, or synthetic rescue, is an additional mutation that reverts the phenotype of an already existing mutation. Through induced mutagenesis with ethyl methanesulfonate (EMS), we mutated the *cat-1* mutant and selected strains from the F1 and subsequent F2 generations based on data collected from egg-laying assays. Through our research, we can attempt to rescue the *cat-1* phenotype, restoring proper levels of the serotonin response level by measuring egg-laying in serotonin solution. This research is ongoing and will continue with further egg-laying assays in an attempt to identify a strain with the desired suppressor mutation. Results from this experiment can further be used to develop improvements in the reproductive and mental health of humans.

Board 39 **Jacqueline Carroll, Anthony Badra, Analisa Cantu, Caitlyn Conway, Ashley Diaz, and Annika Gunderson**

Faculty Mentor: Dr. Myeongwoo Lee

Genetic screen to identify genes interacting with *odr-3* in *C. elegans*
[Biology]

Abstract: The goal of this project is to screen for and identify a mutation that negates or suppresses the effects of an *odr-3* mutation in the soil-dwelling nematode, *Caenorhabditis elegans*. The gene, *odr-3*, codes for a G protein α subunit that plays a vital role in sensory neurons related to olfactory and mechanosensory function. Previous studies have shown that loss or overexpression of *odr-3* results in olfactory defects and changes in cilia morphology, the site where odorants first interact with olfactory receptor proteins. Through the loss or overexpression of *odr-3*, there are severe olfactory defects that impacts *odr-3* function that is essential in the ASH neurons that sense noxious chemicals and mechanical stimuli. In *C. elegans*, ODR-3 interacts with the nociceptive OMS-9, which is a homologue of the mammalian receptor TRPV4. Mutations in TRPV4 are known to show defects in osmoregulation and mechanosensation. In this study, worms with *odr-3* mutations were treated with the mutagen ethylmethanesulfate (EMS) to induce more mutations, and ultimately 30 different strains of *C. elegans* that had the potential of carrying a suppressor gene were selected for further testing. Screening for a suppressor mutation that negates an *odr-3* mutation will include observing the egg-laying behaviors of the worms when a chemical stimulant, serotonin, is introduced, as *odr-3* mutants showed significantly reduced responses

in egg laying when exposed to serotonin. Therefore, we suggest that the behaviors similar to non-mutated, wild-type *C. elegans* will indicate the presence of an effective suppressor mutation. This research is currently ongoing and will continue by conducting egg-laying assays in order to isolate a worm line with a suspected suppressor mutation. This research would further current understanding of the many different effects of serotonin signaling in *C. elegans* as a model organism that utilizes very similar signaling mechanisms to those that function in the mammalian brain.

Board 41 Shiva Ramani, Teja Williams, Haley Odell, Vanessa Smock, Alacia Houston, and Faith Spivey

Faculty Mentor: Dr. Myeongwoo Lee

Effects of Cuticle Mutagenesis on *C. elegans* Osmoregulatory Behavior

[Biology]

Abstract: The cuticle of *Caenorhabditis elegans* plays a vital role in osmoregulation in stressed environments. This regulation pathway is characterized by a buildup of glycerol within the hypodermis, which balances solute concentration with the environment. While wild type *C. elegans* will rapidly deteriorate through protein aggregation when placed in a hypertonic environment, certain mutants, the *osr-1(rm1)*, will maintain normal osmolarity within the hypodermis. Further research has shown that a similar *Osr* phenotype can be emulated with mutations to the cuticle related *dpy-10* and *dpy-2* genes. These genes are associated with *dpy* strains of *C. elegans*. The goal of our experiment is to analyze the role of cuticle genes of the dumpy phenotype in osmoregulation by comparing survivorship and movement data of adult larvae *dpy* and N2(control) strains of *C. elegans* when placed in a hypertonic environment. We will utilize EMS to mutagenize populations of N2 worms, followed by reproducing and isolating *dpy* progeny. Both N2 and *dpy* strains will be placed in separate agar plates exposed to 500mM NaCl and observed. Population surveys will be conducted at an acute exposure period of 2 hours and a chronic exposure period of 1 week. A touch assay will be conducted on surviving N2 and *dpy* strains after the chronic period and results will be compared our control groups. By conducting this experiment, we hope to provide insight on further cuticle genes that may enhance osmoregulatory potential in *C. elegans*.

Board 42 Kaitlyn Havlik**Faculty Mentor: Dr. Robert D. Doyle**

Re-evaluating species boundaries in the freshwater mussel

Fusconaia mitchelli

[Biology]

Abstract: Freshwater mussels (Bivalvia: Unionidae) are one of the most imperiled groups of organisms in North America. Accurately defining species boundaries and distribution is vital for ongoing biological conservation and management efforts. *Fusconaia mitchelli* (Simpson in Dall, 1896) is a freshwater mussel found in the Brazos, Colorado, and Guadalupe drainages. A previous molecular study depicted significant intraspecific genetic variation which may be indicative of speciation occurring between geographically separated populations. We use multi-locus sequence data to re-evaluate systematic relationships between the three populations of *F. mitchelli*. We sequenced both mitochondrial (mtDNA) and nuclear loci: the protein-coding mtDNA genes cytochrome oxidase subunit 1 and NADH dehydrogenase 1, and the nuclear ribosomal internal transcribed spacer 1. Phylogenetic and phylogeographic analyses depict molecular divergence between two groups within *F. mitchelli* coinciding to the Guadalupe drainage, and the Brazos and Colorado drainages. The junior synonym *Fusconaia iheringi* is available for the Brazos and Colorado populations and elevating it from synonymy warrants further investigation using an integrative taxonomic approach.

Board 43 Joseph Spear and Sae Hee Choi**Faculty Mentor: Dr. Tamar E. Carter**

Anopheles species identification in Ethiopia: Comparison of morphology and molecular based techniques

[Biology]

Abstract: Malaria is an ongoing health challenge in Ethiopia. One way to address it is to know the vector species involved in its spread. *Anopheles stephensi*, a common malaria vector in Southeast Asia, the Middle East, and the Arabian Peninsula, was recently discovered in east Ethiopia. Here we compared morphological identification of *An. stephensi* to molecular based approaches to determine best approaches for *An. stephensi* identification in Ethiopia. *An. stephensi* and *Anopheles gambiae* s.l. specimens were collected as wild caught adults using CDC light traps and pyrethrum spray catch. Larvae and pupae were also collected using dipping method at various breeding sites and reared in lab to adult-stage. Mosquitoes were then morphologically identified using morphology keys. *An. stephensi* and *An. gambiae* s.l. (as a control) then underwent molecular

analysis. The ITS2 and CO1 loci were PCR amplified and sequenced for each mosquito for species determination. An endpoint PCR assay was completed based on ITS2 amplicons (presence/ absence of band in gel). The results indicate that out of the 49 mosquitoes that were morphologically identified as *An. stephensi*, 44 have been confirmed to be *An. stephensi* through PCR and gel electrophoresis. There were some mosquitoes that were incorrectly morphologically determined in both *An. stephensi* and *An. gambiae* s.l. specimen which could be due to collection methods or morphology keys. Overall, the molecular analysis of the *An. stephensi* was consistent with the morphologically determined species identification. Further study into whether method of collection correlates with misidentification are needed.

Board 44 Madison Ambrose, Kaitlyn Armijo, Rithvik Baratam, Erick Cornell, Garrett Darden, Michael Davis, Taylor Guynup, Samantha Hodges, Megan Hudson, Andreea Loghin, Noah Mendoza, Will Mullen, Victoria Neises, Sydney Ortenberg, Felicia Osburn, Christopher Sharon, Daphne Simo, Abel Thomas, Hope Willenborg, and Myrnalid Zapata. Faculty Mentor: Dr. Tamarah L. Adair

The effect of polypropylene nanoplastics on *Tetrahymena* reproduction and behavior
[Biology]

Abstract: Nanoplastics, plastic fragments smaller than 10 μm , are prevalent throughout the environment. The effect of nanoplastics on terrestrial ecosystems is largely unknown. *Tetrahymena* is a single cell model organism frequently used for analyzing toxicity which also represents a major group of predators (ciliates) in the soil ecosystem. The goal of this study is to shed light on the impact of polypropylene nanoplastics on eukaryotic cells by examining the effects of polypropylene treatments on *Tetrahymena*. To generate potential breakdown products from the polypropylene, treatment solutions were made through shredding and adding heat to polypropylene baling twine in proteose-peptone-tryptone (PPT) media and filtered with a 5 μm filter. To test the hypothesis that polypropylene nanoplastics negatively impact the growth rate and behavior of *Tetrahymena*, cell counts, swim speed, food vacuole formation, and spin and direction change assays were conducted in both the control and the polypropylene treatment cultures after 48 hours. The reproduction rate indicated that polypropylene increased reproduction rate, decreased spin time, and did not affect direction change, swim speed, or vacuole formation of *Tetrahymena*. These

results indicate that nanoplastics do have an effect on single-cell organisms in culture. Further studies will focus on the effect of nanoplastics on terrestrial ecosystems. The soil ecosystem is the foundation for a healthy biotic environment and investing in research within this scope will help determine the system effects of plastics on the overall ecosystem.

Board 46 Emily Dunn, Grip Gilbert, and Emily Schultz

Faculty Mentor: Dr. Tamarah L. Adair

A Comparative Survey of Tail Fiber Proteins from Phages Isolated on Three *Arthrobacter* Hosts

[Biology]

Abstract: The rise in the number of antibiotic resistant pathogens has increased the need for alternative therapies to treat bacterial infections. One alternative therapy to antibiotics is the use of phages, however, the effectiveness of phage therapy is limited by the high host specificity of bacteriophages. Tail fiber proteins play an important role in attachment and infection of bacteria. This study was conducted to determine whether the tail fiber proteins of *Arthrobacter* phages isolated on different hosts contain similar sequences and protein folding patterns which both play a determining role in specific host wall binding. Using bioinformatic tools such as PhagesDB BLASTp, Clustal Alignment, RaptorX, and DichroCalc, a comparative analysis of tail fiber proteins in *Arthrobacter* phages isolated on different hosts was completed. By utilizing RaptorX's protein structure prediction tool, protein structures were generated for phages ArV1 (host *Arthrobacter* sp. 68b), Colucci (host *Arthrobacter* sp. ATTC 21022), Ingrid (host *Arthrobacter globiformis* B-2979), Loretta (host *Arthrobacter globiformis* B-2979), and Beagle (host *Arthrobacter globiformis* B-2979). These structures were compared qualitatively and quantitatively for regions of similarity or variability. Current data supports that variable regions of tail fiber proteins are unique to each host and are potentially the determining factor of host specificity; however, this can only be determined experimentally. Further bacteriophage genomes should be analyzed to identify more tail fiber regions. Our cross-host comparative analysis of tail fiber proteins within the species *Arthrobacter* provides a broader understanding of phage-host interactions which may lead to more effective therapies through altering host specificity.

Board 47 Kathryn Adkins, Gabriel Andino, Sriram Avirneni, Emily Balint, Henry Burns, Lucy Fisher, Lauren Foley, Emily Gaw, Lily Goodman, Soo-Un Jeong, Cooper Johnson, Melissa Leon Norena, Michael Lum, Rachel Melone, Nathan Newton, Aman Patel, Sabin Patel, Lucy Potts, Brandon Reider, Shepard Saaybe, Sona Subramanian, Joseph Yu, Justin Yu, Lathan Lucas, Leo Rule, and Aadil Sheikh
Faculty Mentor: Dr. Tamarah L. Adair

Discovery and gene function analysis of Arthrobacter Phage NapoleonB
[Biology]

Abstract: Arthrobacter is a type of bacteria commonly found in soil and sewage that can be utilized in bioremediation and in the degradation of pesticides. Arthrobacter sp. ATCC KY3901 was used as a host to isolate Arthrobacter phage. Bacteriophage are a genetically diverse important tool in biotechnology. This study was conducted to explore trends between soil composition and phage presence and to discover and sequence a bacteriophage. The isolation of 8 phage was accomplished by screening over 60 soil lysates using plaque assays and spot tests. Isolated phage were imaged using TEM and the DNA was extracted. PCR was used to determine the potential phage cluster. For one AM cluster phage, NapoleonB, the DNA was sequenced using Illumina sequencing. NapoleonB was discovered from soil near a Chinkapin Oak on the Brazos River on Baylor University. Annotations were manually curated using tools such as DNA Master, NCBI databases, PhagesDB, HHpred, and Phamerator. NapoleonB exhibits siphoviridae morphology and produces two distinct sizes of clear plaques with average diameters of 1.5 mm or 0.1 mm. The genome size of 57,846 base pairs. Annotations indicate 99 potential genes, 73 with no known function and 26 with predicted functions. Among these genes, both structural and regulator genes were predicted. The annotations for this genome will serve to further the understanding of bacteriophage diversity. Further bioinformatic analysis can be done to explore the intergenic regions and the structure and function of the predicted proteins.

**Board 125 Boozaziel Chavez, Rachel Battle, Astrid Escamilla,
Bryce Johnson, and Ashton Smelser
Faculty Mentor: Dr. Myeongwoo Lee**

Isolation of mutant *Caenorhabditis elegans* suppressor to α -Integrin Subunit Deficiency
[Biology]

Abstract: The *ina-1*-encoded integrin alpha subunit is essential to *Caenorhabditis elegans* development, due to its role in complex processes such as morphogenesis, neuron migration, and cell signaling. Studies have shown that when this gene is mutated, they may be larval lethal, and the viable worms display inactivity and morphogenic defects. Specifically, α -integrins function within heterodimeric integral membrane proteins and facilitate cellular and organismal processes via interactions between the cell's cytoskeleton and other cell surfaces and the extracellular matrix. Similar to *C. elegans*' *ina-1* gene, humans possess 13 homologs (ITGA3, ITGA6, and ITGA7), which are integral to normal human development; defects in the human α -integrin genes are linked to congenital muscular dystrophy, epidermolysis bullosa and cancer. *C. elegans* are a model organism to better understand integrin subunits and their important roles in both nematode development and human disorders due to their small number of α -integrin genes, which simplifies their genetic analysis. In this study, we generated and isolated mutants *C. elegans* that suppressed the integrin subunit deficiency by treating them with ethyl methanesulfonate (EMS). Mutants expressing suppressor mutations were characterized by more successful development, viability, and movement. The phenotypes were analyzed, and the mutants displaying these characteristics were isolated and cultured to form a colony of worms that contained the suppressor mutation. In the future, we will genetically analyze the suppressors of *ina-1* mutations to elucidate their genetic basis and their important implications in human orthologs.

Wednesday, April 3, 2019
1:00 p.m. - 2:00 p.m.
Baylor Sciences Building
Second Floor

Board 57 Meg E. McCutcheon, Emily D. Ziperman, Srinivas Pulipakas, and Emvia I. Calixte
Faculty Mentor: Dr. Elyssia S. Gallagher

Comparing Basis Sets and Methods in Density Functional Theory to Optimize the Electronic Structure of Sodium-Adducted Carbohydrates
[Chemistry and Biochemistry]

Abstract: Characterizing glycan structures is necessary because of their functions in cell-cell communication, cancer progression, and genetic diseases. However, analyzing glycan structures is challenging due to the complexity of glycan branching and carbohydrate stereochemistry, thus computational techniques can be employed to model structures. Here, we use Density Functional Theory (DFT), a computational method, to compare electronic structures for carbohydrate model systems. Experimentally, electrospray ionization-mass spectrometry (ESI-MS) analyzes carbohydrates that have adducted to sodium ions, thus we are investigating sodiated-glucose and fucose. Herein, we use the Gaussian09 platform to provide optimized geometries. The methods, B3LYP and BPW91, utilize DFT to treat bonds as “springs”, optimizing their positions to deduce parameters such as zero-point vibrational energy. Variations among molecular parameters are monitored to discriminate amongst methods and basis sets. For example, there was greater variation in the calculated zero-point vibrational energy of β -fucose (standard deviation, SD= 14193, n=11) compared to β -glucose (SD=12283, n=11). These calculated parameters should be consistent, as the sugar-adduct complex does not change; thus, this variance implies that some basis sets and methods are not optimizing the adducts to have the same electronic structures. Such optimizations are necessary to ensure that more complex calculations, like collisional cross sections (CCS), are using experimentally observed structures. Future work will calculate CCS from optimized geometries to be compared to experimentally measured CCS of these sodium-adducts using ion mobility-MS. Through this work, we will define the optimal DFT methods and basis sets to use for modeling carbohydrate and glycan structures.

Board 53 Hanee Kim and O. Tara Liyanage
Faculty Mentor: Dr. Elyssia S. Gallagher

The Effect of pH on In-Electrospray Ionization Hydrogen/
Deuterium Exchange of Metal-Adducted Carbohydrates
[Chemistry and Biochemistry]

Abstract: Hydrogen/deuterium exchange (HDX) is a chemical reaction where labile hydrogens of a molecule are replaced by deuterium in the presence of a deuterating reagent, and the incurring mass difference can be detected by mass spectrometry (MS). HDX is widely used to study the dynamics of biomolecules. For MS detection, analytes need to be converted to gas-phase ions, which can be done using electrospray ionization (ESI). For in-ESI-HDX, the HDX reaction occurs at the same time as the ESI process. Since pH affects the rate of HDX, it is important to investigate how solution pH affects HDX during in-ESI-HDX of carbohydrates. To investigate this, we performed in-ESI HDX on a trisaccharide, melezitose, in water at pH 2.98, 4.68, 7.04, and 9.83. During the ESI process, droplets undergo evaporation, causing the pH to decrease. Therefore, during ESI the pH of the droplet is changing, and we hypothesize that we are sampling the collective effects of this changing pH. We observed that the number of HDX at pH 2.98 was higher than at pH 4.68, 7.04, and 9.83. For the three higher pHs, the number of HDX was within the measurement error. Further, only hydronium ions, which maintain low pH, are attracted to the counter electrode of the source. Thus, we hypothesize that there will not be a significant effect on the number of HDX when increasing the pH above 9.83. Studying the effect of pH on in-ESI-HDX will allow us to analyze the structures of carbohydrates more accurately and effectively. (248 words)

Board 54 Shubhneet Warar, Anna Arvidson, Meredith Ehlmann, Nick Von Waaden, and Ian G. M. Anthony
Faculty Mentor: Dr. Touradj Solouki

Adjusting Sample Concentration within Dynamic Range
for Improved Data Analysis using Vacuum Ultraviolet
Automated Library-Integrated Deconvolution
[Chemistry and Biochemistry]

Abstract: Rapid, confident identification of semi-volatile and volatile organic compounds (VOCs) is crucial in forensic and biomedical applications. Automated data analysis techniques can aid in time-sensitive and accuracy-focused analyte detection. In 2014, a gas chromatography-vacuum ultraviolet (GC-VUV) spectrometer was introduced for identification of VOCs. In this study, we assess the performance of an automated, custom-built GC-VUV data analysis software package—"Vacuum Ultraviolet

Automated Library-Integrated Deconvolution” or VALID—and discuss methods to improve its performance. Samples of frankincense-based essential oil were injected into a GC-VUV instrument and analyzed both manually (via the standard VUV software) and automatically (via VALID). VALID successfully identified analytes that were not detected by manual inspection (viz., “hidden” β -phellandrene and linalool GC-VUV peaks). Moreover, retention index (RI) analysis confirmed the accuracy of VALID-identified analytes and allowed us to correctly identify previously miss-assigned peaks (viz., octyl acetate and p-propyltoluene corrected to pentyl acetate and p-isopropyltoluene, respectively). No single experimental trial was effective to yield correct assignments for all unknowns. However, injection of varied sample concentrations allowed for complete coverage of the VUV spectrometer’s dynamic range. More analytes were successfully assigned via the combination of manual VUV analysis, VALID, and GC RI analysis than any of the three data analysis approaches alone.

Board 61 **Kylie Robinson and Marcelina Gutierrez**
Faculty Mentor: Dr. Yang-Soo Yoon

Consonant Recognition Enhancement Using Innovative Signal Processing in Bimodal Hearing
[Communication Sciences and Disorders]

Abstract: We aimed to determine the effect of novel signal processing tool on consonant enhancement in simulated bimodal listening with normal hearing listeners. The consonant enhancement was tested with four different frequency maps: Large Gap, Slight Gap, Meet, and Overlap between upper boundary of acoustic hearing and lower boundary of electric hearing. Greater consonant enhancement is evident with the signal processing than without. Meet frequency map generated the largest bimodal advantage on consonant perception.

Board 62 Amy Woelfel, Alyssa Van Vossen, and Courtney Hammit

Faculty Mentor: Dr. Yang-Soo Yoon

Comparisons in Temporal Integration between Sequential and Dichotic Listening Conditions

[Communication Sciences and Disorders]

Abstract: This study focused on determining the effect of signal processing on temporal integration for listeners with normal hearing. A novel signal processing tool was used to extract acoustic cues critical for consonant recognition. Temporal integration on consonant recognition was measured under sequential and dichotic listening conditions without and with the processing, and results were compared between two listening conditions. Results demonstrated improved temporal integration with a greater benefit in at sequential than at dichotic listening condition.

Board 63 Sophie Suri

Faculty Mentor: Dr. Yang-Soo Yoon

Binaural Frequency Discrimination: Implication for Bimodal and Electric Acoustic Stimulation Users

[Communication Sciences and Disorders]

Abstract: Ability to resolve different frequency components is critical for speech perception in noise. In this study, we compared the ability of normal-hearing listeners to discriminate tones when the stimuli were presented in dichotic and sequential manner across ears. Results showed that binaural frequency discrimination thresholds became worse as target frequencies increased both in dichotic and sequential listening. However, dichotic listening requires larger frequency differences across ears than the sequential listening.

URSA SCHOLARS WEEK KEYNOTE

“Building Bridges Between Research in the Sciences, Arts, and Humanities”

Thursday April 4, 4:30-5:30 p.m.

Kayser Auditorium in Hankamer School of Business H101

Presented by

Lauren A. Barron, MD

Director, Clinical Professor, Family Practitioner

Baylor University Medical Humanities

“Modern cultural conceptions segregate the sciences, the humanities and the arts, but there are fundamental qualities common to research in all of these arenas. The purpose of this seminar is to show that the drive to discover accompanied by determination, creativity, and curiosity are central to the pursuit of truth whether you identify as a scientist, a humanist or an artist. From the perspective of a medical educator and physician, I will argue for the importance of cross-disciplinary collaboration. Despite the long-standing history of increasing specialization and separation between the disciplines, there is increasingly compelling evidence that building bridges between islands of knowledge is the most efficient and effective way forward.”

UPCOMING UNDERGRADUATE RESEARCH EVENTS IN THE FINE ARTS

Early Music Ensembles

Presented by Baylor’s School of Music

Thursday, April 4, 2019, 5:30 p.m.

Armstrong Browning Library

Black Glasses Film Festival

Presented by Baylor’s Department of Film & Digital Media

Saturday, April 27, 2019, 7:00 p.m.

Waco Hippodrome Theatre, 724 Austin Ave., Waco, TX

Art Student Exhibition

March 28 – April 18

The Martin Museum of Art at Baylor University is proud to announce the annual Baylor Art Student Exhibition, Thursday, March 28 – Thursday, April 18, 2019, featuring Tish Brewer, owner of The Art Center for Conservation, Dallas, TX, as guest juror. Opening reception begins at 5:30 pm, Thursday, March 28, with light refreshments, remarks by Brewer, and the student award ceremony.

Tish Brewer holds a B.A. in Studio Art and Chemistry from Hendrix College, Conway, AR, and a M.S. in Book and Paper Conservation from The Kilgarlin Center for Preservation of the Cultural Record, University of Texas at Austin. She received additional Paper Conservation training through various courses from The American Institute for Conservation, headquartered in Washington DC, and through internships and professional experience while at the National Preserve of Tauric Chersonesos, Sevastopol, Ukraine; Biblioteca Ludwig von Mises, Universidad Francisco Marroquín, Guatemala City, Guatemala; and the National Park Service, Harpers Ferry Center, Harpers Ferry, WV. Brewer has published articles on numerous topics including surface coatings for leather, iron gall ink, and paper aging in relation to forged historical documents. She has also been a regular contributor of conservation-related articles to the Newsletter for the Guild of Book Workers. She is the current Lone Star Chapter Chair for the Guild of Book Workers, and serves as a Member-at-Large on the Board of the Western Association for Art Conservation. The Center for Art Conservation was established in 2007 and is located in the Expo Park neighborhood of Dallas, TX.

The Martin Museum of Art is located in the Hooper-Schaefer Fine Arts Center, 60 Baylor Avenue, on Waco's Baylor University campus. Admission to all special events and exhibitions is free and open to the public.

**Museum exhibition hours: Tuesday - Friday 10 am – 6 pm;
Saturday 10 am – 4 pm; and Sunday 1 – 4 pm.**

For more information, call 254-710-6371 or visit
www.baylor.edu/martinmuseum.