April 28th Events

- Awards Convocation: 9:00 a.m., McNeill Concert Hall in Evergreen
- Poster Session I & Lunch Reception, 11:30 a.m.-1:30 p.m., Multi-Sports Forum of the Bryan Campus Life Center
- Oral Presentation Sessions: 12:30-5:00 p.m., various locations
- Poster Session II & Closing Reception: 4:30-6:00 p.m., Multi-Sports Forum of the Bryan Campus Life Center

Acknowledgements and Special Thanks

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- Etta Danielson, Rhodes Student Associate in Academic Affairs, App curator

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- Gregory Vieira, Assistant Professor, Department of Physics

Table of Contents

◙ Rhodes Fellowship

Schedule by Division

Date	Time	Room	Session Title	Departments/Programs
	Urban Studies			
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Thursday, April 27	2:00-3:15 p.m.	Evergreen 204	Urban Studies & Urban and Community Health II	Urban Studies
Thursday, April 27	5:00-7:00 p.m.	Evergreen 204	Urban Studies & Urban and Community Health III	Urban Studies
	Social Science			
Friday, April 28	12:30-1:15 p.m.	Clough 204	Ethnography at Home I	Anthropology & Sociology
Friday, April 28	1:30-3:00 p.m.	Clough 204	Ethnography at Home II	Anthropology & Sociology
Friday, April 28	1:30-3:00 p.m.	Buckman 108	Economics and Political Economy	Economics & Political Economy
Friday, April 28	3:30-4:15 p.m.	Buckman 108	Political Science and International Studies	Political Science & International Studies
Friday, April 28	3:30-4:30 p.m.	Kennedy 205	Humanities and Social Sciences	History, Modern Languages & Literatures, and Urban Studies
Friday, April 28	3:30-4:45 p.m.	Clough 204	Ethnography at Home III	Anthropology & Sociology
	Humanities			
Friday, April 28	12:00-1:45 p.m.	Buckman 200	Rhodes Historical Review Launching Session	History
Friday, April 28	1:00-1:30 p.m.	Language Center	Language and Education in the U.S.	Modern Languages & Literatures
Friday, April 28	1:00-2:15 p.m.	Palmer 207	Explorations in Greek and Roman Studies	Greek & Roman Studies
Friday, April 28	1:30-2:10 p.m.	Language Center	Spanish Senior Seminar I	Modern Languages & Literatures
Friday, April 28	2:00-3:00 p.m.	Buckman 200	*It Happened Here: The Memphis Massacre of 1866* Documentary Film	History
Friday, April 28	2:15-3:30 p.m.	Palmer 210	Ethnography, Ideology, and Race	History and Art History
Friday, April 28	2:20-3:00 p.m.	Language Center	Spanish Senior Seminar II	Modern Languages & Literatures
Friday, April 28	3:10-3:50 p.m.	Language Center	Spanish Senior Seminar III	Modern Languages & Literatures
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	Sciences			
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Friday, April 28	1:30-2:15 p.m.	FJ-C	Chemistry	Chemistry
Friday, April 28	1:30-2:15 p.m.	FJ-A	Math I	Mathematics
Friday, April 28	2:30-3:15 p.m.	FJ-D	Biochemistry and Molecular Biology I	Biochemistry & Molecular Biology
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Friday, April 28	3:30-4:15 p.m.	FJ-D	Biochemistry and Molecular Biology II	Biochemistry & Molecular Biology
Friday, April 28	3:30-4:15 p.m.	FJ-C	Physics	Physics
Friday, April 28	3:30-4:15 p.m.	FJ-A	Computer Science II	Computer Science
	Fine Arts			
Friday, April 28	1:00-2:00 p.m.	Tuthill Performance Hall	Cauthen Competition	Music & Theatre
Friday, April 28	2:00-2:45 p.m.	Clough 417	Studies of the Past and the Present	Theatre and Art & Art History
Friday, April 28	3:00-5:00 p.m.	Clough-Hanson Gallery	Studio Art Senior Thesis Exhibition	Art & Art History

◙ Rhodes Fellowship

Schedule by Building

Date	Time	Room	Session Title
Buckman Hall			
Friday, April 28	12:00-1:45 pm	Buckman 200	Rhodes Historical Review Launching Session
Friday, April 28	1:30-3:00 pm	Buckman 108	Economics and Political Economy
Friday, April 28	2:00-3:00 p.m.	Buckman 200	*It Happened Here: The Memphis Massacre of 1866* Documentary Film
Friday, April 28	3:30-4:15 pm	Buckman 108	Political Science and International Studies
Clough Hall			
Friday, April 28	12:30-1:15 pm	Clough 204	Ethnography at Home I
Friday, April 28	1:30-3:00 pm	Clough 204	Ethnography at Home II
Friday, April 28	2:00-2:45 pm	Clough 417	Studies of the Past and the Present
Friday, April 28	3:30-4:45 pm	Clough 204	Ethnography at Home III
Friday, April 28	3:00-5:00 pm	Clough-Hanson Gallery	Studio Art Senior Thesis Exhibition
Frazier-Jelke			
Friday, April 28	1:30-2:15 pm	FJ-A	Math I
Friday, April 28	2:30-3:15 pm	FJ-A	Math II
Friday, April 28	3:30-4:15 pm	FJ-A	Computer Science II
Friday, April 28	1:30-2:15 pm	FJ-C	Chemistry
Friday, April 28	2:30-3:15 pm	FJ-C	Computer Science I
Friday, April 28	3:30-4:15 pm	FJ-C	Physics
Friday, April 28	1:30-2:15 pm	FJ-D	Biology
Friday, April 28	2:30-3:15 pm	FJ-D	Biochemistry and Molecular Biology I
Friday, April 28	3:30-4:15 pm	FJ-D	Biochemistry and Molecular Biology II
Hassell Hall			
Friday, April 28	1:00-2:00 pm	Tuthill Performance Hall	Cauthen Competition
Kennedy Hall			
Friday, April 28	3:30-4:30 pm	Kennedy 205	Humanities and Social Sciences
Palmer Hall			
Friday, April 28	1:00-1:30 pm	Language Center	Language and Education in the U.S.
Friday, April 28	1:00-2:15 pm	Palmer 207	Explorations in Greek and Roman Studies
Friday, April 28	1:30-2:10 pm	Language Center	Spanish Senior Seminar I
Friday, April 28	2:15-3:30 pm	Palmer 210	Ethnography, Ideology, and Race
Friday, April 28	2:20-3:00 pm	Language Center	Spanish Senior Seminar II
Friday, April 28	3:10-3:50 pm	Language Center	Spanish Senior Seminar III
Friday, April 28	4:00-4:50 pm	Language Center	Spanish Senior Seminar IV
Evergreen			
Wednesday, April 26	5:00-7:30 pm	Evergreen 202	Urban Studies & Urban and Community Health I
Thursday, April 27	2:00-3:15 pm	Evergreen 204	Urban Studies & Urban and Community Health II
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Wednesday, April 26

URBAN STUDIES ORAL SESSIONS

Urban Studies & Urban and Community Health I
5:00-7:30 p.m.
Evergreen 202

5:00-5:15 p.m. *Reading Willis into a Post-Industrial Economy: Feminized Labor, Taylorist Curriculum, and the Contradictions in College Readiness*
Michael McCanless
Faculty Sponsor: Elizabeth Thomas, Urban Studies Program
This study attempted to re-theorize the relationship between the school and service industry labor. Purposive samples of policy were drawn from 1.) School Handbooks 2.) National Charter Policy Platforms and 3.) Fast Food Employee Conduct Manuals. These documents were blended with a theorization of literatures mobilized for conceptualizing the school as an institution inextricably linked to labor. Building off the work of Paul Willis in Learning to Labor (1977), additional literatures were directed towards a re-theorization of his work in post-industrial contexts of service, and to account for the effects of scientific management and Taylorism on modern forms of schooling and labor. As scholars of labor and education move towards alternative theorizations of a post-industrial, neoliberal economy, incorporating the conditions of low-wage service work is fundamental to the larger pursuit of social and economic justice. While a variety of scholars have studied some combination of management theory, curriculum, and the neoliberal economy, few have blended these approaches to account for the school and service industry labor education. Investigating the characteristics conditioned by the school, and subsequently required by the service economy, is helpful in understanding the school as an ideological space for the construction and maintenance of labor markets. This presentation engages at the intersections of labor and education, hoping to foster critical interpretations of the tension between the school and economy, and unveiling the ends to which the national co-optation of curriculum aims.

5:15-5:30 p.m. *Proximity and Its Relation to Academic Success in Urban Charter Schools*
Amanda Rubin
Faculty Sponsor: Peter Hossler, Urban Studies Program
As public education systems struggle to meet the needs and demands of a diverse student population, charter schools have become a popular solution. Charter schools can tailor curriculum to meet the unique needs for their community (National Alliance for Public Charter Schools, 2017). With high concentrations of poverty, racial and ethnic diversity, and high rates of student mobility, urban communities are often ideal neighborhoods for charter schools (Kincheloe, 2004). Charter schools often tailor their programs around a community's needs, assets, and the relationship between community factors and school outcomes (National Alliance for Public Charter Schools, 2017). However, proximity is an understudied and underappreciated aspect of the relationship between the school and community. During travel time to and from school, students absorb an experience that can either enhance or hinder their educational experiences. My research will examine the relationship between a student's residential proximity to school, the resulting mode of transportation and its ultimate effect on a child's academic achievement, his perception of school/education, and his perception of belonging within the school community. I will examine this relationship through the students' GPAs, survey, and interview answers. Using these three components, I will provide a well-rounded and well-informed understanding of the connections between a student's proximity to school, travel time, and experience in academics.

5:30-5:45 p.m. *After-School Participation Benefits for Low-Income Elementary Aged Students*
Conor Monks and Peter Hossler, Urban Studies Program
Faculty Sponsor: Peter Hossler, Urban Studies Program
The impacts of after school care were looked at for low-income elementary aged students. Children who participated were in 2nd through 5th grade. Academic performance and school conduct were examined. Students from a charter school who went to an after school program once school ended were compared to students who did not not. The students that did not attend the after school program were surveyed to discover what they did after school. Students who participated in the after school program were expected to perform greater academically and behaviorally at school.

5:45-6:00 p.m. *Charting the Way: A Comparison of College Preparation Among Two Memphis Charter High Schools*
Katiebeth Chapman
Faculty Sponsor: Elizabeth Thomas, Urban Studies Program
Cities are at the center of the charter school debate. Charter schools have become a popular alternative to traditional public schools nationally, especially in urban settings (Booker, Sass, Gill, & Zimmer 2011). Although the number of charter schools has been growing, there is disagreement on whether or not they are effective (Angrist, Pathak, and Walters 2013). Many charter high schools in Memphis, TN send 100% of their students to college but each charter school has a different type of college preparation. Some schools prepare students for college with strict discipline and zero-tolerance polices while other charter schools prepare their students by giving them more autonomy, similar to college life. This study will examine if charter schools in Memphis prepare their students not only go to college but to graduate from college. It will analyze interviews from charter school principals and college administrators that work with charter high school graduates. This presentation will explore how types of college preparation, like discipline, curriculum, and after school programs, affect college graduation rates.

6:00-6:15 p.m. *Student Perspectives on the City; How Young People Engage in Reflection on Memphis* ◙
Sarah Sabin
Faculty Sponsor: Elizabeth Thomas, Urban Studies Program
While some cities elicit feelings of pride from their citizens, other cities provoke a more ambivalent response. Nashville and Memphis, for example, are viewed and spoken of very differently; one being a popular city to move to while the other quickly dwindling in population. Between 2010-2015 the average annual growth percentage in population was 1.8% in Nashville compared to the 0.3% in Memphis (Ward, 2016). Urban planners work to change and improve cities for the benefit of the city's citizens; however, youth are often not included in, not only the planning process, but consideration as well. It is normal, in urban planning, for the focus to land on adult community members regardless if the children and youth are the community members that will be directly affected by the results (Ho et al., 2011). In order to better accommodate the city, it is important for urban planners to gain a better understanding of how youth come to their understanding of the city in which they live, and how their feelings toward it are shaped. This research is a first step in beginning to understand the circumstances in which students formulate their opinions on their home cities. The presentation will focus on my experiences in presenting students with thought-provoking articles regarding cities and reflections of student reactions to the material. The research will be grounded in work done by 9th grade students in Memphis, TN. These students are assigned a project that helps the students focus on their perspectives on the city. Children and adolescent voices are critical to urban planners as they work to retain citizens, strengthen benefits, revitalize, or sustain prosperity of the cities in which they work.

◙ Rhodes Fellowship

6:15-6:30 p.m. *"You Grow Girl": Crafting Purposeful Youth Development in Memphis*
Becky Kempf
Faculty Sponsor: Elizabeth Thomas, Urban Studies Program
Many organizations and communities struggle with ways to foster positive youth development, due to the difficulty in creating programming that is purposeful in design, captures the youth's interests, and empowers the participants to become active members of their community. One such organization that works to foster such programming is Girls Incorporated. Throughout the United States and Canada, Girls Inc. affiliates encourage girls to be smart, strong, and bold. By using these values, the Girls Inc. of Memphis Youth Farm works with local high school students to become healthier, educated, and independent by teaching them farming, entrepreneurial, and civic engagement skills. The purpose of this study is to gain clarity on the impacts of the programming of the Girls Inc. of Memphis Youth Farm. This study compares the participants' personal and professional growth and the staff's ability to guide and develop these by utilizing focus groups composed of the staff and the participants of this program. The results of this study will help to define the program's successes and shortcomings, and will provide insight to ways the program can move forward and contribute to create a successful community around youth development in the Frayser neighborhood of Memphis.

6:30-6:45 p.m. *Perspectives from Low-Income Consumers in the Health Insurance Marketplace in a Medicaid Non-Expansion State*
Tyler Harvey
Faculty Sponsor: Peter Hossler, Urban Studies Program
In 2010, under the Patient Protection and Affordable Care Act, the Health Insurance Marketplace was created to ensure each and every American had a means to shop and buy health insurance plans in order to maintain minimum essential coverage and satisfy the individual mandate of the Act. Most Americans who purchase their insurance on their own obtain it during this period of the year called Open Enrollment. Throughout the United States, given the complexity of health insurance, both non-profit and for-profit organizations assist Americans with buying the plan(s) that best fit their needs. In Memphis, Tennessee, Church Health, a healthcare organization for particularly low-income individuals, provides free assistance with the Health Insurance Marketplace during Open Enrollment. Utilizing Church Health's population sample, this research looks at what factors influenced consumers when they are deciding whether and how to engage with health insurance plans during Open Enrollment in 2017.

6:45-7:00 p.m. *Locations of Hospitals and Clinics. Potential Network Between the Two?*
Austin Henyon
Faculty Sponsor: Peter Hossler, Urban Studies Program
Healthcare has always been a very important part of everyone's lives. Whether you are a newborn child or an elderly adult you experience times of sickness that requires the help of healthcare members. Without hospitals and clinics we would not able to properly assist people in times of sickness and need. Growing up in Fort Worth, Texas our school was located near a large hospital (Harris Southwest). Driving by it and seeing it everyday was normal to me, but once I began to think about a possible research project for this class this came to mind. This thought process made me question sites and locations whenever I was driving around town. Due to healthcare being my passion, my choice of major in college, and my future career path I began to look at this thought process through a healthcare lens. The biggest question that arose from this thought was how exactly do hospitals and clinics end up in the locations they are in and how are those locations chosen. Since these two entities (hospitals and clinics) usually work together, I became curious about whether or not there was a network between them.

7:00-7:15 p.m. *Gentrification in Memphis; A Case Study of the Overton Square and Binghampton Communities*
Colleen Mullaney
Faculty Sponsor: Elizabeth Thomas, Urban Studies Program
In an attempt to diminish blight, crime and declining tax bases, the trend of gentrification has gained some popularity in cities across the United States (Shaw & Hagemans, 2015). Gentrification is an ambiguous term that is

generally understood as a reinvestment process that usually leads to an economic, social and/or racial shift of a neighborhood (Glick, 2008). Memphis has also been reinvesting and redeveloping in neighborhoods to combat these problems. While research has been conducted in many major cities across the country, very little research has been conducted in Memphis to see how it is handling gentrification. While there are many common trends that signal a neighborhood is in the process of gentrifying or has gentrified, each city has some unique characteristics that can modify how gentrification is operating. This study will primarily examine the economic and racial shifts in the neighborhoods of Overton Square and Binghampton Communities to help understand why Memphis is gentrifying and how stakeholders of The City of Memphis are conducting the work that goes into it. Specifically, data will examine demographic changes of the neighborhood, which indicate gentrification and revitalization efforts as well as explaining why Memphis has chosen to revitalize many of its neighborhoods.

7:15-7:30 p.m. *St. Jude Children's Research Hospital as an Anchor Institution for the Redevelopment of the Pinch District*
Lizzie Choy
Faculty Sponsor: Elizabeth Thomas, Urban Studies Program
Anchor Institutions are key community organizations and property holders—most often hospitals and universities—that act as driving forces of urban redevelopment. The purpose of this study is to examine the role of one of Memphis's most recognized anchor institutions, St. Jude Children's Research Hospital, on the redevelopment of the Pinch District in downtown Memphis. Through interviews with relevant persons within ALSAC/St. Jude, representatives of Memphis and Tennessee and former or current property owners within the Pinch District, I explored the goals of this project from the perspective of each different entity in an effort to better understand what it means for a nonprofit to drive an urban neighborhood's development. Strategic plans and other public records were utilized for data analysis. While this development project has not yet been completed, my research is intended to add to and strengthen the current body of knowledge regarding anchor institutions and surrounding areas.

Thursday, April 27

Urban Studies & Urban and Community Health II
2:00-3:15 p.m.
Evergreen 204

2:00-2:15 p.m. *Potential Limitations of HIV Prevention Programs in Memphis, Tennessee*
Alisha Patel and Peter Hossler, Urban Studies Program
Faculty Sponsor: Peter Hossler, Urban Studies Program
This undergraduate research proposal provides insight on the potential limitations of HIV treatment programs that may exist in Memphis, Tennessee. HIV treatment programs can be either federally or privately funded to provide counseling services, HIV testing, and resources to those who are engaging in high-risk sexual behavior, but are currently HIV negative or already diagnosed with HIV and seeking resources. Memphis, Tennessee, particularly Shelby County, has one of the highest HIV incidence rates in the state accompanied by a large high-risk population, which predominantly impacts African-American men who have sex with men. Though treatment programs exist, evidence of high incidence rates of HIV suggest that there are certain limitations within current HIV treatment programs that must be assessed to lessen HIV transmission rates. Data will be obtained by a purposive, snowball sample of semi-structured interviews of HIV prevention program directors, program staff, and Shelby County public health officials from the Ryan White Council. The interviews will be coded for analyses to detect responses from organizations and government program representatives. HIV prevention programs are a vital component to providing preventive health care services that educate and deliver resources to individuals who are at most need and to ultimately improve community health.

2:15-2:30 p.m. *Impact of Restrictive Abortion Policy on Women's Access to Other Reproductive Health Services*
Jessica Ealy
Faculty Sponsor: Peter Hossler, Urban Studies Program
The aim of this study is to examine how restrictive abortion policy, in the context of the southern United States, impacts women's access of other important reproductive health services. Through a review of the literature, key barriers related to both reproductive healthcare and abortion access were identified, discussed and later utilized to properly analyze a correlation between restrictive abortion law and women's use of reproductive health services. Additionally, several specific restrictive abortion policies, and their after effects, were used in the final analysis. This was a survey study in which a sample of women who underwent an abortion at a southern abortion provider affected by restrictive law were asked questions regarding their use of other reproductive health services (ie. family planning services, cancer and std screening, contraception services, etc.) post abortion procedure.

2:30-2:45 p.m. *Women & HIV in Memphis: Closing the Gap by Increasing PrEP Usage*
Nicole Quinones and Peter Hossler, Urban Studies Program
Faculty Sponsor: Peter Hossler, Urban Studies Program
With recent innovations in HIV prevention care, we are one step closer to preventing an increase in transmission rates. Given the disparity of HIV among populations, the once, daily pill Truvada, or pre-exposure prophylaxis (PrEP) can be a helpful tool in further preventing new HIV diagnoses. Most literature surrounding PrEP discusses its focus population group as men who have sex with men (MSM), transgender groups, and communities abroad in Africa. In the US, after MSMs, women are most at risk for contracting HIV via heterosexual contact. This affects African American women at a much higher rate than any other race. Action must be taken to educate women and provide them with the tools to protect themselves. The purpose of this research is to find the best points of intervention in a women's reproductive health clinic in Memphis that can yield the highest increase in PrEP uptake.

2:45-3:00 p.m. *Artists as Activists: An Exploration of Urban Activism Theatre in Memphis, Tennessee*
Brynna Newkirk
Faculty Sponsor: Elizabeth Thomas, Urban Studies Program
Primarily known as the home of the Blues, Memphis is home to an array of playwrights, poets, and image-makers who are fighting against racial or social injustices. Throughout history, theatre has been used to address racial and social justice issues facing society. Today in Memphis, topics range from police brutality, human trafficking, poverty, homelessness, sexual assault, educational inequalities, etc. Research is lacking around the intersection of theatre and social justice in Memphis and this study will seek to fill the gap. This study uses semi-structured interviews, content analysis, and mapping to understand how Memphis artists and activists participate in activism theatre. Local community artists, professors, and activists are interviewed about their work to get an in-depth understanding of their goals. Additionally, an interactive map showcases where this work is being done around Memphis. Ideally, the findings of this research will allow Rhodes and the surrounding Memphis community to interact fully with the artist-activists. Through understanding why and how artist-activists are using this avenue for social change and looking at the challenges they face, we can learn a lot about dismantling the systems of oppression.

3:00-3:15 p.m. *Memphis and Nashville: Music, Race, and Urban Revitalization from 1976-1991*
Ashley Dill
Faculty Sponsor: Elizabeth Thomas, Urban Studies Program
Only 200 miles apart, Memphis and Nashville serve as the largest metropolitan areas in Tennessee; Nashville as the thriving, modern capital city and Memphis as one of decaying history. Historical in their own right, both of these cities have been central in shaping the identity of Tennessee and the South with their rich histories in civil rights and music. Their geographical closeness and similar histories call into question how and why they have diverged on different paths. After the closing of Stax Records and the death of Elvis Presley in the late 1970s, Memphis was on a

downward trend while its neighboring Nashville was on the up and up with a resurgence of country music and a growing tourist economy in the 1980s. Nashville, accompanied by deep infrastructure, continued to thrive as Memphis struggled to stay afloat. Between 1976-1991, these cities saw immense change in their music industries, race relations, and urban revitalization. This presentation will explore the intersections between these major changes through the analysis of newspapers, magazines, and primary source documents in an attempt to understand the barriers Memphis continues to face as a burgeoning modern city.

Urban Studies & Urban and Community Health III

5:00-7:00 p.m.
Evergreen 204

5:00-5:15 p.m. *Educational Interventions: Solutions or Distractions?*
Eilidh Jenness
Faculty Sponsor: Peter Hossler, Urban Studies Program
What are the benefits and limitations of promoting "educational interventions" (i.e. financial literacy, sex ed, nutrition classes) as the primary solution to issues that disproportionately affect disadvantaged populations? The study of this question is an important, critical analysis of many philanthropic and nonprofit models of educational intervention that are promoted with government and private time and funding. If educational intervention isn't the most effective solution to structural issues, why do we support it in so many instances? Results of this study could give people who are invested in the improvement of society deeper perspective on what causes societal inequality and how (or how not) to solve it. The study may also help people who are very attached to models of educational intervention reconsider why they care so strongly about promoting them regardless of the models' outcomes, leading to individuals' deeper understanding of their personal beliefs and values and, more broadly, how educational interventions graph onto an American two-party political system.

5:15-5:30 p.m. *What is the role of the Mid-South Food Bank in the food safety network in Memphis, Tennessee?*
Rachel Glazer
Faculty Sponsor: Peter Hossler, Urban Studies Program
The purpose of this study is to assess both the availability and nutritional quality of foods provided by the Mid-South Food Bank and its Partner Agency programs for food insecure populations in Memphis. While the federally funded Supplemental Nutrition Assistance Program has been implemented to aid in the fight against food insecurity, the program alone does not improve the quality of diet of food stamp users. Research indicated that food insecure individuals who rely on SNAP alone are nearly 2.5 times more likely to be obese than food secure counterparts. While food stamps are an important national policy in reducing food insecurity, there is a need for non-government organizations, such as a local food safety net, to supply more nutritious and substantial meals to low-income individuals and families; thus, this study will focus on the nutritional aspects of the food available to food-insecure households through local food banks in Memphis.

5:30-5:45 p.m. *History for All to See: GIS Mapping of Historical Markers in Memphis, Tennessee*
Madalyn Bryant
Faculty Sponsor: Elizabeth Thomas, Urban Studies Program
Historical Sites of Memory are physical spaces, such as the National Civil Rights Museum or Nathan Bedford Forrest's Burial Ground, that come to embody conflicting narratives of history (Foote, 2003; Nora, 1989). Yet, these sites are rarely studied in conjunction with each other (Winberry, 2015). Recognizing history as a constantly created and contested realm, this study looks to spatially analyze the location of historical markers in Memphis, Tennessee. GIS mapping facilitates this comparison as historical markers are coded by themes, stakeholders, and timeframe to clarify the ways that history is recognized in connection with certain places and not others. In this study, mapping interrogates the role these markers have in shaping the city as well as the city in shaping historical narratives. There

needs to be more attention paid to how a city comes to emphasize certain memories and to ignore others. Future studies should continue to look at cities of different sizes and relationships to memory.

5:45-6:00 p.m. *Black Greek Letter Organization as a Vehicle of Black Student Activism*
MaKenzie Mosby
Faculty Sponsor: Elizabeth Thomas, Urban Studies Program
Rhodes' socially tense campus climate in 1989 and throughout the 1990s increased levels of student activism. Additionally during this time period, two of the four Black Greek letter organizations currently chartered at Rhodes College in Memphis, TN were chartered in 1989 and 1999. This project examines if there is a correlation between the chartering of Black Greek letter organizations and Rhodes' campus climate from 1989 to 1999. This project also takes a historical look at black student activism on college campuses from 1966-1973 and the founding of the Black Greek letter organizations that were chartered at Rhodes using archival research and interviews. Ultimately, this project will determine if Black Greek letter organizations were used as vehicle of black student activism at Rhodes College.

6:00-6:15 p.m. *"Fair" Housing: A Study of Discrimination Faced by Latinx Immigrants Within the Housing Sector in Memphis*
Mira Patel
Faculty Sponsor: Elizabeth Thomas, Urban Studies Program
This research explores the discrimination and inequity that Latinx immigrants face in the fair housing sector in Memphis. The Latinx immigrant population in the Midsouth region has greatly expanded over the past few decades. Literature shows that Latinx people face unduly discrimination in the housing sector even though fair housing laws have been implemented to prohibit discrimination based upon race, religion, and national origin in housing. However, there is a significant gap in literature that sheds light on the experiences of discrimination faced by Latinx immigrants, especially those that live in the Midsouth region. Many community legal services provide free legal advice and services to members of the Latinx community that cannot afford to appoint lawyers to address discrimination that they may face in housing. This study aims to investigate the nature of the discrimination that Latinx immigrants face in securing housing in Memphis by asking local community legal experts and local Latinx activists which factors they perceive as having the greatest influence upon housing discrimination against the Latinx immigrant community.

6:15-6:30 p.m. *Finding a Way Back Home: For Those Who Are Experiencing Homelessness and Who Have Mental Illness*
Annie Leonardi
Faculty Sponsor: Peter Hossler, Urban Studies Program
I began my research by seeking to explore the following questions: How can those experiencing homelessness in addition to mental illness be better served in terms of housing? What is being done to alleviate their symptoms? What appears to be the most effective strategy? What barriers exist for stronger services? Over the past few months, I have researched several non-traditional housing programs, such as Housing First, Assertive Community Treatment (ACT), Prevention Assistance and Temporary Housing (PATH), and Supportive Housing. ACT and PATH are supportive housing programs that operate 7 days a week, 24 hours a day, for 365 days a year, and are staffed by an integrated team of case managers, psychiatrists, nurses, and psychologists. The service team provides either in-house or community treatment. Social inclusion and social capital-human networks-are of great importance to these programs. Some programs have no prerequisites—like sobriety and mental health stability. Each has been proven to be surprisingly effective in increasing housing tenure and some quality of life. I have evaluated the strengths and challenges of each program in terms of success in reintegration back into society for those experiencing homelessness and who have co-occurring mental illnesses.

6:30-6:45 p.m. *Helping Homeowners, Neglecting Renters: Rethinking the Effects of Federal Housing Policies on Homelessness*

Grant Ebbesmeyer

Faculty Sponsor: Elizabeth Thomas, Urban Studies Program

Current United States federal housing policies encourage and favor homeownership over renting; this is most clearly evidenced by the much larger proportion of subsidies and expenditures, such as the mortgage interest tax deduction, that support homeowners at the expense of renters (Landis & McClure, 2010). While the disparate distribution of housing subsidies and expenditures and the impact that this has on low-income renters overall has been studied, fewer studies have attempted to show the direct impact that these disparities and broader policies may have on homelessness. Homelessness, although caused by a combination of personal risks and structural factors, has its basis in housing market dynamics, especially the lack of affordable rental housing (Elliott & Krivo, 1991; Lee, Price-Spratlen, & Kanan, 2003). Most federal programs and policies attempting to end homelessness are focused on assisting those who are already homeless. However, to truly attempt to end homelessness, we must look at the bigger picture and address the current disparity of federal housing policies. This study examines and analyzes current policies, programs, subsidies, and expenditures for homeowners, renters, and people who are homeless; it also examines potential policy changes to attempt to show how transforming these policies could potentially impact homelessness.

6:45-7:00 p.m. *Options and Obstacles for Alternative Birth Methods for Low-Risk Women in Memphis, Tennessee*

Elizabeth Vecseri

Faculty Sponsor: Peter Hossler, Urban Studies Program

Until Choices decided to open a birth center last fall, Memphis hadn't really given much thought about alternatives to giving birth in a hospital setting. My study is to explores the birth scene in Memphis and hopes to discover why more alternative options to hospital births have not been previously realized. I will outline how the process of giving birth has developed over time and shaped it into the process it is today, and then give the alternative methods for giving birth. I will to demonstrate the social, political, racial, and financial reasons for this limitation through the testimonies of local midwives. In the end, I hope to show that increasing access and positive approaches towards these options within Memphis would greatly benefit the women of Memphis and ultimately the community.

Friday, April 28

SOCIAL SCIENCE ORAL SESSIONS

Economics and Political Economy
1:30-3:00 p.m.
Buckman 108
Moderator: Ried Roshong

1:30-1:45 p.m. *Framing a Theory of Urban Federalism*
Jay Hedges and Renee Johnson, Department of Political Science
Faculty Sponsor: Renee Johnson, Department of Political Science
Though many methods of public spending are deployed in an effort to alleviate the conditions of under resourced communities in the inner-city, often these projects are development-focused and have little positive impact on the residents themselves. This project endeavors to apply a theory of urban federalism to increase under resourced neighborhoods' political voice, leading to democratically arrived policy decisions. The paper will utilize a comparative case study from two cities to explore the benefits of neighborhood governance within an urban federal structure.

1:45-2:00 p.m. *Political Economy of Mardi Gras in New Orleans*
Meredith Graf and Renee Johnson, Department of Political Science
Faculty Sponsor: Renee Johnson, Department of Political Science
My project measures the political and economic impact of Mardi Gras both locally and federally. The parades of Mardi Gras are run by mostly local elite organizations and middle class organizations that bring millions of dollars into the New Orleans economy. While the parades bring in money, the floats that roll have political messages written on all sides of the float. Through out the past history of Mardi Gras, the carnival has been subjected to political scrutiny that has gone to local and federal courts.

2:00-2:15 p.m. *Academic Returns to Attending Better High Schools in China*
Ziwei Li
Faculty Sponsor: Erin Kaplan, Department of Economics
Using three years of administrative data, I examine the effects of attending an elite high school on students' academic outcomes in a Chinese city. To overcome selection bias, the fuzzy regression discontinuity design compares students just above and below the high school admission cutoff. Results indicate that attending an elite high school improves the college entrance exam scores by 0.38 standard deviation and increases the probability of qualifying for college admission by 27.8 percentage points for marginal students. There is no evidence that attending an elite school impacts their choice of study track, but students in the natural sciences track are 33 percent less likely to be qualified for college than those in the social studies track.

2:15-2:30 p.m. *Finding the Rudy Effect: An Economic Investigation into the Fraudulent Wine Scandal of 2012*
Emily Fougere and Erin Kaplan, Department of Economics
Faculty Sponsor: Erin Kaplan, Department of Economics
In March 2012 Rudy Kurniawan was arrested for wine fraud and accused of creating thousands of bottles of fake wine. He entered the auction market in 2001 and over 10 years he sold millions of dollars worth of counterfeit wine and it is estimated that over 10,000 of his fake bottles are still in private collections. My research is centered on searching for the effect of his arrest on the wine market. I created two data sets using information on Wine Spectator. The first set is comprised of information from Wine Spectator's auction highlights guide, where I

collected information from 2001 to 2016 on total sales, number of lots, auction houses, auction locations, auction dates, and buyer's premiums. The second data set was gathered using the wine tasting guides. For this data I focused on wines tasted from Burgundy between 2010 and 2013 and have information on the wine vintage, score, vineyard, price, issue date, and number of cases made. My preliminary regressions have shown significant results in auction markets, with an average decrease of $1,341 for sales made after Rudy's arrest date. When I run a similar regression on individual wine prices wines sold after the arrest they decrease by an average of $3, but with no statistical significance.

2:30-2:45 p.m. *Plastic Production and Cancer Rates: A County-Level Examination of the Effect of Nearby Plastic Production on Cancer Rates*

Emily Hanson and Erin Kaplan, Department of Economics

Faculty Sponsor: Erin Kaplan, Department of Economics

Many case studies show that working in or living near a plastic production facility increases the likelihood of some cancers. However, the results of these case studies are often limited by small sample sizes and large confidence intervals. In order to provide another prospective with a large sample size, this study uses county-level data to examine the relationship between plastic production facilities and increased cancer rates for the population of each county. Data from County Health Rankings, the Environmental Protection Agency, and the National Cancer Institute is use to analysis both death and incidence rates from eight types of cancers in over 90% of the counties in America. Preliminary results show that the presences of a plastic production facility does have a positive, significant effect on both the age adjusted death rate for all cancers and the age adjusted incident rate for all cancer.

Political Science and International Studies

3:30-4:15 p.m.

Buckman 108

Moderator: Jay Hedges

3:30-3:45 p.m. *Dealing with Migratory Trauma: Mental Health Stressors and Coping Mechanisms among Sub-Saharan Migrants in Rabat, Morocco*

Dominique DeFreece

Faculty Sponsor: Amy Risley, Department of International Studies

Interviews, surveys, and participant observation were used to study the mental health of Sub-Saharan migrants residing in Rabat, Morocco. I employed these data collection methods while studying abroad in Morocco to explore migrants' experiences pre-migration, during their migration journey, and post-migration. The subjects of this research shared many negative, traumatic, and painful experiences. These experiences have caused a significant amount of pressure on the mental psyche of the migrants, manifesting itself in many physical and psychological problems. Common problems included a sense of disillusionment and a lack of control over their bodies and situations. However, many lack access to mental health professionals. Instead, they rely on widely practiced coping tools such as focusing on family bonds, turning to religion, and finding distraction through the Internet and music, to re-gain agency in their lives. This research is important because it combines research on traumas that migrants face before, during, and after the migration with research on what I discovered to be key coping mechanisms for Sub-Saharan migrants in Rabat, Morocco. Furthermore, the study sheds light on the blatant lack of mental health resources available to the Sub-Saharan migrant community in Rabat and urgently calls for increased investment in addressing this community's needs.

3:45-4:00 p.m. *"You'll Only Be Allowed in If You Aren't Voting for Hillary Clinton": An Exploration of Conservative Ideology in the Country Music Industry*
Jolie Grace Wareham
Faculty Sponsor: Renee Johnson, Department of Political Science
This inquiry seeks to explore the notion that country music is conservative, as well as the actions by the country music industry to either maintain or dispel this notion that country music is conservative. This study focuses the winning songs of two different country music award shows over several years and employs both inductive and deductive content analysis methodologies to study the political ideologies present in various song lyrics.

4:00-4:15 p.m. *The Modern Crusade: Understanding Christian Views of Homosexuality*
Ried Roshong
Faculty Sponsor: Renee Johnson, Department of Political Science
In this research project, I set out to investigate the foundation of Christian views concerning homosexual marriage. Being a religious man myself, I utilized survey data from the 2012 election cycle to further my understanding of how Christians across America respond to the notion of homosexual marriage. My theory is that the Christian anti-gay movement in America is not founded on actual Biblical scripture, but is rather founded on the morally-traditional views of those few people with the power to interpret Biblical scripture for loyal masses. During my research, I found that Christians in America actually do not have negative views of homosexuality at-large. Rather, I found that only Pentecostal Christian groups – including such denominations as Evangelicals and Baptists – were correlated with a disapproval of homosexuality to a statistically-significant degree. Furthermore, when analyzing survey data, I found statistically-significant positive correlations between three independent variables and disapproval of homosexuality, regardless of Christian identification: Education (specifically in regards to completion of a college education), Church Attendance (ranging from no attendance to attending every week), and Moral Traditionalism (concerning a given person's overall conservative values).

Humanities and Social Sciences

3:30-4:30 p.m.
Kennedy 205
Moderator: Faith Blanchard

3:30-3:45 p.m. *The Mediums of Soccer and the Sport's Influence in Latin America*
Tucker Nichols
Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages & Literatures
Since its introduction to the American continent in the end of the 19th century by English immigration, soccer has been an unstoppable force in the region. Its influence can be seen in nearly all aspects of the modern Latin American society and represents one of the few truly universal passions. As a result of its undeniable power, it is evident that soccer is much more than just a game and demands deeper analysis. To understand better the way in which soccer shapes the modern American society, this project aims to analyze the different ways in which soccer is portrayed through a myriad of oral, literary and visual mediums. In doing so, one will gain a more in depth understanding of the meaning of soccer and the individual discourses that aim to encapsulate the essence of the sport. These mediums include the hymn, essay, short story, movie, radio and the press. The tensions between mediums that arise through this analysis will serve as critical points of comparison that will help uncover the purpose of these discourses and how their individual treatments of the sport illustrate soccer's critical role in Latin America.

3:45-4:00 p.m. *"A Martyr of '78": White Southern Masculinity and the Life of Reverend Charles C. Parsons*
Maxwell Farley
Faculty Sponsor: Dee Garceau, Department of History
Charles Carroll Parsons, a West Point graduate, Union war hero, and devoted Memphis reverend, was an extraordinary and unexpected model upon which emerging themes of Southern masculine identity were molded in the years following the Civil War. The Ohio-born artillery commander, who become a man of peace and reconciliation in his post-war years, embodied many disparate national narratives of nineteenth century manhood during the course of his life. Upon his death in Memphis during the 1878 Yellow Fever Epidemic, Parsons was mythologized as a reverend and as a martyr who transcended North/South divisions by embodying simultaneously the "Christian Gentleman" and the "Man of War" themes of manhood prevalent in the New South prior to the turn of the 20th century. Through newspaper accounts and published recollections, an 1878 sermon by the reverend, letters between Parsons and his wife, and the eulogy delivered by Parson's mentor, as well as a dive into existing scholarship on manhood of the nineteenth century, this paper explores the identities that Parson's embodied for a troubled, southern masculine culture that was seeking answers. From his rugged bravery during the Civil War, to his transition to morally dutiful man of peace, and through his years spent cultivating spiritual soundness within dominant, martial masculinity, the life of Reverend Charles C. Parsons provided a new template upon which Southern masculinity was shaped, stretched, and molded in the post-Reconstruction years of the New South.

4:00-4:15 p.m. *"Is There a Bubble to Burst?": College Students' Spatial Perception of Campus and the City, A Case Study of Rhodes College in Memphis, TN*
Madalyn Bryant, Emily Messmer, Sophie Tsagronis, and Sarah Link
Faculty Sponsor: Shaolu Yu, Urban Studies Program
This paper aims to build on the study of student geography by critically examining the perceived space of campus and the surrounding urban space among college students. Rhodes College is a liberal arts college situated in the city of Memphis. Being a campus with a majority white population located in a predominately black city, Rhodes College has acquired a reputation of being a "bubble." It serves as a perfect case study to investigate how college students build relationships with the environment within and beyond the campus. By using mental mapping and focus groups, this research unpacks four spatialities that shape the spatial cognition of the city image among college students: activity space, mobility, boundaries, and center. This research also demonstrates that the perceived space is not only a reflection of the lived and material space, but it is also a result of social construction. Finally, this paper concludes with implications to facilitate deeper connections among students, the campus, and the city.

4:15-4:30 p.m. *Mellon Innovation Fellowship: Cultivating a Community of Practice* ◙
Mellon Innovation Fellows: Aylen Mercado, Erin Deery, Dani Garcia, Anna Baker-Olson, Roz KennyBirch, Kirkwood Vangeli, Wendy Trenthem, and Matt Jabaily
Faculty Sponsor: Elizabeth Thomas, Urban Studies Program
For the past three years, the Mellon Innovation Fellowship has brought professors, students, and staff together in a community of practice which explores digital scholarship and innovative pedagogical tools. The Mellon cohort has developed classes on a range of topics including social movements, media and politics, and the intersection of societal change and digital media. Furthermore, professors, students, and staff have executed a variety of projects through the fellowship, including making cartoneras, photographing and documenting Memphis architecture, digitizing the Shelby Foote archival collection, and creating a historical documentary film on the Memphis Massacre of 1866. Carrying out these plans would not have been possible, or nearly as successful, without collaborating with community partners. From the Memphis Zoo to Shelby County High Schools, the Mellon cohort has worked with a plethora of locales in order to strengthen bonds between the school and the city. The community of practice that the Mellon cohort has created, which extends throughout Memphis, has allowed individuals from various academic disciplines and skill sets across campus to meet with one another, share ideas, and test new innovations.

◙ Rhodes Fellowship

Ethnography at Home I
12:30-1:15 p.m.
Clough 204
Moderator: Susan Kus, Department of Anthropology & Sociology

12:30-12:45 p.m. *Inside Alex's Tavern*
Lisle Bruns
Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology
Proper ethnography allows its users to gain an authentic impression of a particular targeted space. This method not only holds value in unknown, foreign cultures, but also in more familiar, generally overlooked or unappreciated settings. Knowing this, I turned my anthropological focus to a dive bar called Alex's Tavern in Memphis, Tennessee.There is an aesthetic appeal of Alex's Tavern that grows when careful attention is paid to the individual elements that make up the scene. While at first the unsystematic collection of material items seems overwhelming and disorganized, time transforms those initial sentiments into an appreciation for this madness. After observing and talking to the employees and customers, I was struck by one aspect of the site that allowed it to stand out from other dive bars. It aims for comfort and a pleasant sense of familiarity rather than to impress. It is a refreshing, pressure-free environment for all who are lucky to experience it.

12:45-1:00 p.m. *One Smoothie at a Time: An Ethnographic Study of I Love Juice Bar Café*
Reem Rassoul and Susan Kus, Department of Anthropology & Sociology
Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology
Memphis's cultural scene incorporates many aspects of individual life making it vibrant, diverse, and inclusive of multiple traditions and practices. In order to better understand the culture surrounding Memphis, I engaged in an ethnographic study of Juice Bar's cultural scene. In doing such research, I immersed myself in an environment through participant observation. This has resulted in many conversations with not just the employees of Juice Bar, but their consumers as well. Through such interactions, my familiarity with Juice Bar's cultural scene has flourished over the course of the semester. A healthy mental and physical stigma is encouraged by such an organization, where the owners have centered their community around honest and open practices that ensure the health of their consumers. Their dedication to promoting a healthy lifestyle is not only demonstrated in their use of fresh local ingredients, but is also displayed through their commitment to offering an environment that reflects the vibrancy and energy found in most of their products. I will thus use my knowledge to shed light the detailed understandings of Juice Bar's commitment to health not only through their ingredients, but to their devotion to providing an environment that corresponds well to their cause.

1:00-1:15 p.m. *Respectful Warfare: An Ethnographic Study of the Art of Taekwondo*
Faith Blanchard
Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology
Created as a way of life for warriors in Korea over 2,000 years ago, taekwondo presents a different form of warfare today in the United States; a "warfare" that many parents enroll their children in. As a student at Midtown Taekwondo, I am using he ethnographic method to gain a deeper understanding of this cultural scene. This methodology is the focus of my study as I learn to navigate difficult situations and questions that arise in the field. While being engaged in participant-observation, I have found seemingly contradictory ideas expertly crafted into this art form that shapes both body and mind: violence is melded with respect, and humility resides in individuals considered deadly weapons. Discipline and self-control are emphasized as students are taught to respect themselves as well as their opponents. Simple actions-such as bowing to one another before sparring-acknowledge the opponent as more than a target. As individuals who may never see war engage in this training, these lessons, which were first taught to Korean warriors, are translated to fit into a new context. My ethnographic study has allowed me to pose a new question for further investigation: What could we gain by valuing restraint more than action?

Ethnography at Home II
1:30-3:00 p.m.
Clough 204
Moderator: Susan Kus, Department of Anthropology & Sociology

1:30-1:45 p.m. *Stretching My Comfort Zone*
Emily Adams and Susan Kus, Department of Anthropology & Sociology
Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology
Throughout this semester, I have been engaged in an ethnographic study of the workout studio CardioBarre Memphis. The studio is located in Overton Square above Babalu and it is very involved in that community. My project is about studying the culture in this area. I will be studying the classes, movements, and the people involved in this program all while participating in them myself and engaging with the other participants. CardioBarre is a string of studios that exists all throughout the nation. It combines ballet and yoga with various cardio exercises in an attempt to give the student the best workout possible all while having fun. Instructors, attendees, and the owners are all Memphians who want to get in shape and learn to love their bodies all while having fun and engaging in the community.

1:45-2:00 p.m. *Top Shelf Antiques: An Ethnographic Study of an Antique Mall*
Lucy Robinson
Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology
This semester I have participated in the Ethnographic method, which is central to anthropological study at an antique mall on Poplar ave. This method involves participant observation of a cultural scene. I will follow the ethnographic method by immersing myself in the cultural scene of this antique mall in an attempt to understand and record patterns that I observe. Through participant observation I have gained a thorough understanding of behind the scene ongoing as well as insight into customers. I have gained an understanding of those who participate in antique shopping to either dispel or prove the stereotype that all of this population is older and white. Interactions are driven by the acquisition of new pieces through atypical customer interactions and appreciation for finding great pieces of furniture at bargains.

2:00-2:15 p.m. *(Gluten) Free Food: An Ethnographic Study of a Gluten-Free Dedicated Business in Memphis*
Lizzy Epps and Susan Kus, Department of Anthropology & Sociology
Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology
I am doing my ethnography at The Bedrock Market and Café, which is one of many restaurants in Memphis. It is located downtown on South Main Street. It is unique for being a dedicated gluten-free business. At the restaurant, all types of people come enjoy themselves or do work. It is a space that provides a comforting atmosphere where families come to eat a meal, anyone can go to do work, or, just relax while listening to the music that is always playing. The business, which I have had the privilege of observing, creates a strengthened feeling of community through food and art and human interaction. The environment is a pleasant one; intimate and friendly. I have spent time at the location as a member of the gluten-free community and as a student doing my ethnography. I have had the privilege of researching the space using the ethnographic method of participant observation and interviews. My ethnographic study has allowed me to come to understand how my positioning, my observation and my interpretation of the Bedrock Market and Café differ from the sensual perceptions of others within the space.

2:15-2:30 p.m. *A Semester of Downward Dogs, Chaturangas, and Warriors: An Ethnographic Study of Midtown Yoga*

Catherine Sullivan

Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology

As anthropologist Edith Turner said, "The purpose of anthropology is to supply humankind with information about itself." Anthropologists employing the ethnographic method, that is, participant observation, learn about a particular culture or cultural scene. In my ethnographic research of Midtown Yoga this semester, I am doing just that, both observing and participating. Midtown Yoga is a locally owned yoga studio in Midtown Memphis, TN. The studio teaches a variety of yoga styles and offers classes at many times to accommodate different schedules. As a student researcher, I participated in yoga classes as a normal patron of the studio. However, I also arrived early and stayed late to observe the pre- and post- class chatter. By employing the ethnographic method, I have gained an in-depth perspective of the studio, its students, and its place in the Memphis community. Through observing, asking, and listening, I have arrived at a richer understanding of the cultural scene. As a student ethnographer at the studio, I have learned that yoga is not only a physical practice, but a mental practice and community experience as well.

2:30-2:45 p.m. *Caffeine Fiends Welcome: An Ethnography of Café Keough*

Olivia Glenn

Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology

Through the ethnographic method, we observe the lives of others and discover that even the smallest activities can significantly shape the ways we view the world. While popular depictions of anthropology and ethnography take place in far-away lands, my research aims to make cultural discovery into a local venture. My research focuses on downtown Memphis's Café Keough. Located on South Main, the café invites Memphians and coffee fiends to enjoy their vibrant food and drink menu. I have taken on a dual role of a café patron and researcher and am quickly learning that there is no singular story about any space. Traditional coffeehouse "vibes," European influences, and a subtle appreciation for Memphis Grizzlies are combined to create the best spot for enjoying a green tea latte. While the café may initially present one story about itself, the ethnographic method reveals how smaller details work to create spaces that fulfill the needs of many. One building can become a place for conversation, solace, or a quick stop for a hot coffee.

2:45-3:00 p.m. *"Kindergarten for Grown Folk": An Ethnographic Study of 5 in 1 Social Club*

Caryn Hawkins

Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology

Memphis is an incredibly artistic city – in it, we find not only the kind of art that hangs on walls, but also the kind of art that engages our bodies and minds. This kind of creativity that flows from the city can also be found at 5 in 1 Social Club on Broad Avenue, a space that doubles as both a store and a craft workshop. Its environment is colorful, interpersonal, and old-fashioned, meaning it discourages the use of modern technology in favor of human interaction. Using an ethnographic approach, I hope to better understand the scene's unique culture. The ethnographic method is the "bedrock" of anthropology in that it focuses on what exists here and now. At the club, people of all artistic skill levels gather and create something new each week: screen printing, silk marbling, and stained-glass making are just a few options. As an aspiring jack of all trades, I am participating in the workshops and learning some of these crafts as well, but my main purpose at the club is to illuminate the underlying reason for its existence. Is it the innate need for humans to create that Marx talks about? Is it a way to escape the dullness of a day job? Is it simply for fun? These are just a few of the questions that I seek to answer during my time at 5 in 1 Social Club.

Ethnography at Home III
3:30-4:45 p.m.
Clough 204
Moderator: Susan Kus, Department of Anthropology & Sociology

3:30-3:45 p.m. *Loads of Fun: An Ethnographic Study of Super Suds Coin-Op Laundry*
Diana Azcarate Barreto
Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology
Ethnography is a research method used by anthropologists and sociologists to study a group of people within their cultural environment. The ethnographic research method is usually executed through participant-observation, where the ethnographer becomes immersed in the field site they are studying. My ethnographic study was at a coin operated laundromat in a predominantly immigrant neighborhood of Memphis. On days when I did not have any laundry to do, I mostly observed how the customers interacted with each other and the environment. When I did have laundry to do, I was able to engage customers in casual conversation to learn more about their experience both at the laundromat and beyond. Since the laundromat is in a predominantly Spanish-speaking community, I engaged in conversations in both English and Spanish. This site is a microcosm of the growing Spanish-speaking population in the United States. Not only did I figure out the proper laundry day etiquette but also listened to the stories of people that are too often presented as two-dimensional stereotypes in current national discussions.

3:45-4:00 p.m. *Alice in ~~Wonderland~~ Otherlands*
Caroline Reilly
Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology
Otherlands is a place where the normal social hierarchies do not apply, where all walks of life converge. This coffee shop transports an individual to another reality in our very backyard. Otherlands is a local hangout in Memphis saturated in color and filled with delicious coffee, delectable food, and vibrant people from various backgrounds. Here, the space overcomes people's individual aesthetics, with men in suits sitting alongside and converse with women in ripped jeans and baggy shirts. Because of this and Otherlands use of material culture is why I chose it to be the focus of my study. My research utilizes the ethnographic method, which is where one observes and sometimes participates in a cultural scene, through which I have noticed the connection between space, material objects, and people by situating myself as a regular coffee and Otherlands enthusiast. I am able to observe how others interact with the space while also forming a reciprocal relationship with its presence. The ethnographic method allowed me to study how decoration and arrangement of space affects people and their relationship with one another and physical space, creating a world where people connect through a shared response to their environment.

4:00-4:15 p.m. *Don't Judge a Book by Its Cover: An Ethnographic Study of Burke's Book Store*
Caroline Ilnicky
Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology
The purpose of my study is to use the ethnographic method, which employs observation, interviews with key informants, and casual conversations with other customers, to understand and appreciate the culture of Burke's Book Store in Memphis, TN. Burke's is located in Cooper Young, a neighborhood in Midtown with a varitety of restaurants, bars, and coffee shops, that describes itself as both traditional and trendy, cosmopolitan and casual. Most of my time at the store will be spent observing rhythms and behavior, and also wandering around the store like any other customer would. My hope is that at the end of this study I will have a better understanding of the demand of a local bookstore and the social culture that surrounds it in the digital age. I'm interested to see if people still use bookstores, specifically locally owned ones, as a source for buying books. And if so, who are these people? What kinds of books are they buying? Why do they choose this source over online sources or chain bookstores? Is it convenience, a desire to support local businesses, or some other reason? Hopefully somewhere in the pages of Burke's Books I will find these answers.

4:15-4:30 p.m. *For Sport or Spare Time? An Ethnographic Study of a Bowling Alley*
Colby Denesuk
Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology
Bowling can be both competitive and casual, providing an entertaining experience for everybody. From cutthroat tournaments, to kids' birthday parties, bowling is the "Swiss Army Knife" of American pastimes. Ethnography is an anthropological method of observation with the main focus achieving cultural immersion. The benefit of an ethnographic study is a relatively non-biased, yet in-depth perspective on a certain culture. My site is Billy Hardwick's All Star Lanes located in East Memphis. During my time at this bowling alley, I have observed not only the incredibly intricate setting, but also the staff who must cater to whomever walks through the front door. Through my participant-observation style of ethnographic research, I have learned about why so many people choose bowling as their favorite pastime. From the 80's furniture, color schemes, and disco balls to the numerous flat-screen TV's, state of the art bowling interface systems/machinery, and high-tech speakers and lighting fixtures, this location is able to accommodate and provide a fun experience for literally anybody. A family owned business for over thirty years, Billy Hardwick's All Star Lanes appeals to all generations.

4:30-4:45 p.m. *Skaters vs. Sk8яz: Understanding Memphis Skateboarding Culture and Breaking Down Myths and Stereotypes*
Reggie Eskridge
Faculty Sponsor: Susan Kus, Department of Anthropology & Sociology
In order to develop a better understanding of people belonging to different backgrounds and cultures, there has to be an effort made to interact with and experience that culture. One of the ways this effort is accomplished is through ethnography, where a researcher experiences the culture in order to bridge the gap between the familiar and the unfamiliar. For this ethnographic study I visited Tobey Skatepark, located in the Midtown Memphis, in order to understand skateboarding culture. I interacted with the people who ride at the park and learned how to ride a skateboard, the physicality involved, the material culture such as different types of boards and gear, and the relationships that are developed through skateboarding that extend beyond the park itself. What I have come to learn is that skating is for anyone who is interested. At the park there are always people who are eager to give advice and help people push themselves. The skateboarders are often more supportive of others rather than judgmental. So if new comers to the sport are a little uneasy, just know that there is no shame in falling as long as you get back up again.

HUMANITIES ORAL SESSIONS

Rhodes Historical Review Launching Session
12:00-1:45 p.m.
Buckman 200
Session Chair: Seok-Won Lee, Department of History

12:00-12:15 p.m. *Founders & Fascists in a Fuller Framework*
Nathaniel Plemmons
Faculty Sponsor: Seok-Won Lee, Department of History
The historical study of Nazi eugenic practices and the ways in which they were viewed (and in some cases supported) by American eugenicists is well known and studied. Less researched, however, are the views held by British eugenicists regarding the Nazi study and implementation of eugenic practices. This is a peculiar place to see a relative lack of research considering the field's British origins. Even less examined is the fact that British eugenicists, particularly the British Eugenics Society, were not uniform in their opposition to Nazi eugenics. While the Society's majority stood against Nazi racial hygiene, a significant minority grew tentatively supportive of the

regime's ability to implement eugenic legislature. Additionally, the fanaticism embodied by Captain George Pitt-Rivers serves as a window into the minds of the most extreme British supporters of Nazism at the time. By analyzing these three facets of British eugenic opinion regarding Nazi policies in light of eugenics' British origins, the socio-economic and political contexts that surrounded its development, and the hypocritical nature of British colonial eugenics practices one can envision a more authentic (if fragmentary) conception of the British Eugenics Society.

12:15-12:30 p.m. *Entrance to the Academia, and Then to America: The Life of Mary Solari, 1849-1929*
Roz KennyBirch and Maddie McGrady; Jeffrey Jackson, Dee Garceau, and Seok-Won Lee, Department of History
Faculty Sponsor: Seok-Won Lee, Department of History
Mary Solari, a prominent Memphis artist, immigrated from Italy to Memphis in the mid-1800s, a time in which immigrants from all corners of the globe began to flock to the "land of opportunity." However, these groups were not always welcomed by Americans who had lived in the country for generations, particularly working class whites, who felt economically and socially threatened by newcomers. Italian immigrants, labeled as "wops" and "descendants of bandits and assassins," were met with intense hostility by white Americans, and became victims of malevolence, violence, and even lynchings. Yet, Solari, by presenting nostalgic images of Italy in her artwork, as well as by exercising her agency as a female, escaped the prejudice that many Italians experienced during the late nineteenth and early twentieth century. In this presentation, I will explain how Solari not only used her gender to her advantage in a time in which females were not afforded many opportunities, but also used her prominence to recreate the depiction of Italians in a society which persecuted them. Indeed, an examination of Solari's life adds a crucial component to our understanding of the past because it demonstrates how marginalized peoples broke down socioeconomic barriers and began to assert themselves in a culture dominated by white American males.

12:30-12:45 p.m. *Cedo la parola al piccone: Fascist Violence on the Urban Landscape*
Dominik Booth
Faculty Sponsor: Seok-Won Lee and Jeffrey Jackson, Department of History; Ariel Lopez, Department of Greek & Roman Studies
Mussolini's Fascist government in Italy embarked on an ambitious campaign of urban redevelopment across the Italian state. While these urban planning projects ostensibly sought to modernize Italy's urban spaces and solve systemic issues regarding health and traffic, they were also one of the most overtly Fascist expressions of ideology and purpose during the government's twenty-three years in power. By redeveloping major urban spaces, appropriating certain urban forms like the piazza, and engaging in a policy of 'sventramenti' - literally, disembowelment - urban planning became an expression of Fascist ideals of action and violence that left visible scars on the urban landscape. This paper seeks to explore the process of urban redevelopment in Rome by focusing on specific sites and analyzing the ways these sites reflected Fascist doctrine as well as the state's narrative aims.

12:45-1:00 p.m. *The Battle for Chinatown: Adaptive Resilience of San Francisco's Chinese Community in the Aftermath of the 1906 Earthquake*
Claire Carr
Faculty Sponsor: Seok-Won Lee, Department of History
In April 1906, San Francisco's most devastating earthquake and fire destroyed most of the city in northern California. The centrally located neighborhood of Chinatown, home to some 14,000 residents of Chinese heritage, was particularly devastated. The Chinese, for decades despised, disenfranchised, and relegated to the small area of Chinatown, appeared by all means condemned to suffer inordinately in the aftermath of the disaster without the aid provided to white citizens, especially as city officials launched an initiative to relocate Chinatown and its residents outside of the city to rid San Francisco of what white residents considered a public nuisance. San Francisco's Chinese community proved tenacious, however, and the neighborhood recovered almost entirely within its original

parameters in just two years. In examining the case of Chinatown's rapid recovery, it is necessary to ask what entities contributed to the community's adaptive resilience in the wake of the 1906 San Francisco earthquake. I argue that Chinese Americans' history of social isolation from other ethnic groups in fact generated Chinatown's resilience; individuals' community ties, the Chinese language newspaper Chung Sai Yat Po, and the merchant organization called the Chinese Six Companies were the products of Chinatown's isolation and the agents of its recovery.

Language and Education in the U.S.

1:00-1:30 p.m.
Language Center
Moderator: Abby Ritter

1:00-1:15 p.m. *Left Behind in the Race for Success: How U.S. Education Policies of the 21st Century Have Disadvantaged Hispanic Students*

Anna Rodell

Faculty Sponsor: Elizabeth Pettinaroli, Department of Modern Languages & Literatures

The U.S. school system generated the achievement gap by privileging certain kinds of knowledge and ways of learning over others, thus standardizing intelligence. As standards of intelligence were reduced to a limited range of accepted aptitudes, testing was upheld as the unquestioned scientific measure to determine an individual's level of intelligence. However, factors such as cultural and linguistic difference and variation in quality of facilities and instructors take effect on the learning experiences of Hispanic students. Moreover, these factors complicate their potential to achieve appropriate levels of learning according to the standards that U.S. education policies have instituted. My research examines how national education policies of the last sixteen years have affected Hispanic students. Based on my findings, this project explores the way in which educational policies under the No Child Left Behind Act and the Every Student Succeeds Act have disadvantaged Hispanic students through the following factors: evaluation of student and school performance through high-stakes testing, and misidentification of Hispanic students as special needs learners through assessments provided in English. Both of these problems stem from failed attempts at closing the achievement gap between white and minority students.

It Happened Here: The Memphis Massacre of 1866 Documentary Film

Buckman 200
Moderator: Dee Garceau, Department of History

2:00-3:00 p.m. "*It Happened Here" Documentary Film*

Weston Breay, Katherine Hawkins, Sarah Link, Sumner Richter, Alessandro Secino, Smith Stickney, Cole Thornton, Chassidy Wallace, Charlie Welsh, Bonnie Whitehouse, and Ethan Williford

Faculty Sponsor: Dee Garceau, Department of History

There is a movement afoot in Shelby County to uncover the history of lynching in the region. Public memory in the mid-South has been largely silent on the subject; monuments, parks, and street names honor Confederate generals, African-American musicians, and African-American activists, but there is little recognition of lives lost to racialized violence. Today a Memphis group called "Responding to Racism" seeks to memorialize 21 lynchings that took place in Shelby County. Inspired by the Alabama-based Equal Justice Initiative, they do this not to be macabre, but to affirm human rights by ending the silence. This film investigates the Memphis Massacre of 1866, a three-day white rampage through black neighborhoods in which 46 African-American citizens were murdered and over 75 injured, as well as 4 churches, 12 schools and 90 homes destroyed. Our film addresses the larger questions provoked by this massacre: What are the historical roots of racialized violence? How has silence about racial atrocities affected Memphians? How might we reshape public memory regarding this part of our history?

Spanish Senior Seminar Session 1: Language, Community and its Discontents: from las jarchas to Junot Díaz's works

1:30-2:10 p.m.
Language Center

1:30-1:45 p.m. *Of Love and Power: Questioning the Construction of the Feminine in the muwashshaḥāt and the kharajāt.*
Meaghan Waff
Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages & Literatures
During the Middle Ages, the Muslim-ruled territory of al-Andalus in Spain was home to a remarkable mix of peoples and religions. Out of their interactions emerged the earliest recorded lyric poetry in an Iberian romance language: the kharja (exit), which is the final stanza of the longer poetic form known as the muwashshaḥāt (ring song). Kharajāt introduce a female voice speaking in vernacular Arabic or in Mozarabic romance (the language typically spoken by Jews and Christians) at the end of the muwashshaḥāt, in which a masculine voice uses classical Arabic or Hebrew. This project analyzes six romance muwashshaḥāt in relation to their kharajāt, considering them within the frame of medieval Andalusian power relations. The kharja is commonly studied alongside other forms of medieval "women's songs," as a stunning gem encapsulating the essence of love through the female voice. By evaluating the framing of that voice within the masculine narrative of the larger muwashshaḥ, this project calls into question such a reading, investigating the kharja's ventriloquism of a popular, female, and "othered" voice.

1:45-2:00 p.m. *Cultural Hybridity in Tales of Modern Immigration: The Texts of Junot Díaz*
Emily Teague
Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages & Literatures
Dominican American author Junot Díaz has emerged as an influential contemporary literary voice, sharing complex stories of the immigrant experience and challenging expectations of fiction with an autobiographical twist. Adopting the perspective of a common narrator throughout his celebrated novel and short stories, Díaz constructs the life and community of the Dominican immigrant and uniquely explores the relevant issues that accompany this hybrid identity. Seamlessly blending languages, cultures, and histories, Díaz's texts create a profound otherness illuminating the harsh realities of the immigrant experience in the United States. This investigation seeks to examine the representation of cultural hybridity in the literary works of Junot Díaz and the phenomena of interlingualism, gender constructs, and community identity that are abundant in his fiction. I will also explore the public role Díaz plays in the contemporary literary landscape as a minority author who aims to represent marginalized voices and mediate complicated intersections of multiculturalism in the United States.

Spanish Senior Seminar Session 2: Mexico and the US: Anzaldúa's Borderlands and the Mexican rereading of Octavio Paz's El laberinto de la soledad

2:20-3:00 p.m.
Language Center

2:20-2:35 p.m. *The Struggle for Power in the Borderlands*
Mason Brown
Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages & Literatures
The border separating Mexico and the United States has historically (and more recently) been a source of tension. However, this area referred to as "The Borderlands" is also home to a type of hybrid culture—a fusion of Mexican and American food, ideology, and language—known as "Chicano" culture. Throughout my research, I have utilized a wide variety of literature to investigate social conflict in the Borderlands. More specifically, my research focuses on how gender and language are used in the Borderlands as social tools in order to assert power. My primary

resource is Gloria Anzaldúa's Borderlands/La Frontera: The New Mestiza, which gives personal insight into her experiences as a marginalized member of society living on the border between Mexico and the U.S. At the forefront of Chicana studies, Anzaldúa tackles social issues like homosexuality, violence against women, dual-identity, and immigration as well as Aztec history and mythology. This research primarily focuses on how gender and language function as sources of power in the Borderlands and the ways in which they lend themselves to other social issues affecting the lives of the Chicanos living there.

2:35-2:50 p.m. *Modern Interpretations of Paz and Contemporary Mexican Culture*
Jacob Helt
Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages & Literatures
Over half a century ago, El Laberinto de la Soledad painted a troubling picture of Mexican identity characterized by a traumatic past and a pessimistic, even apocalyptic outlook towards the future. Since then, contemporary authors of the 90's, 2000's and 2010's (Mario Bellatín, Yuri Herrera and Carlos Monsiváis) have reinterpreted elements of Paz that are fundamental to his vision of Mexican Culture. This project explores the methods by which these authors challenge many of Paz's ideas such as "la chingada/el chingón", the concept of "solitude" or apocalyptic temporality with consideration given to the novel's effect on how these issues are framed. Differences inherent in the essay/chronicle (Paz, Monsiváis) and novel (Bellatín, Herrera) and their respective limitations/advantages as it relates to the discussion of Mexican identity will also be a focal point of my research. I will additionally use secondary resources as conceptual aides for all four of my primary texts to shed light on fundamental themes in each individual text (ie. border culture, or sexual violence, in Señales que Precederán al Fin del Mundo).

Spanish Senior Seminar Session 3: Journalism in the Development of Latin American Literature: from José Martí's chronicles of the US South to Argentinean non-fiction novels

3:10-3:50 p.m.
Language Center

3:10-3:25 p.m. *"Country of Little Science and Ardent Imagination": Jose Martí's Characterizations of the Southern United States*
Maddie McGrady
Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages & Literatures
From 1880 to 1895, the legendary Cuban revolutionary and prolific writer José Martí lived in New York City, from where he examined U.S. cultural and political life and published his abundant observations in periodicals throughout Latin America. Martí's peripheral position as a Cuban exile and Latin American witness, moreover, colored these crónicas and allowed him to more critically evaluate the condition of U.S. democracy and national unity than his Latin American compatriots or his North American contemporaries. Specifically, Martí recognized the diversity of U.S. cultures and the regional hostilities that persisted decades after the U.S. Civil War. In his characterizations of the U.S. South, Martí at once challenged Latin American conceptions of a homogenous yanquismo attributed to their northern neighbors and disrupted a U.S. national narrative of progress and expansion as it developed in the late-nineteenth century. This presentation will closely examine several of Martí's crónicas on the U.S. South, taking into consideration the influences of a nascent modernismo, and ultimately arguing that Martí's poetic representations of the region emphasized its spiritual similarities to Latin America.

3:25-3:40 p.m. *The Construction of a Social Memory Through Non-Fiction Novels in Argentina*
Ellie Valega
Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages & Literatures
This research entails examining the development of a genre in Latin America known as "non-fiction novel" and its relation to journalistic/testimonial narratives. This study focuses on three novels written by Argentine authors:

Operación Masacre by Rodolfo Walsh, Los Pichiciegos by Rodolfo Fogwill, and Santa Evita by Tomás Eloy Martínez, and the treatment of common themes and techniques among them. These three novels discuss the history or Argentina between 1952 and 1995. Why, over the course of forty years, do Walsh, Fogwill, and Martínez combine fiction and non-fiction, journalism and narration, to tell the history of Argentina? After reading the three novels and subsequent articles, it is clear that the necessity of combining techniques comes from the desire to best describe the often-unimaginable horrors of the history of Argentina, like many Latin American countries, and create a social memory. Although these three novels demonstrate conflicting views on themes and techniques such as class and the use of animalization, the genre employed allows the authors to create an emotional yet accurate account of Argentine history that is accessible to the reader.

Spanish Senior Seminar Session 4: Spectacles of the Southern Cone dictatorships: theater, rock and soccer

4:00-4:50 p.m.

Language Center

4:00-4:15 p.m. *Triangulations of Trauma in Post-Dictatorial Theatre: A Melancholic Reading of The Death and the Maiden by Ariel Dorfman*

Miriam Maloney

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

Does a person remain human after having descended into the depths of the inhumane? At what point should the interests of the State outweigh the rights of the individual? Can a lover of Schubert be at the same time a torturer? Can we forget without forgiving? Can we forgive without betraying ourselves and others? These are the questions posed by Elie Wiesel in his commentary on The Death and the Maiden by Ariel Dorfman, a Chilean author that wrote this work, his first play, following his return from exile after the military dictatorship of Augusto Pinochet. With a scant three characters representing myriad triangulations of allegorical meaning, Dorfman explores the intersections between trauma, justice, and reconstruction following military dictatorship in Latin America. The work takes place in "the present" in "a country that is probably Chile, although it could be any country that has just emerged from a dictatorship," and this preface, though brief, alludes to some of the main themes of the work: justice after dictatorship, individuality versus universality of traumatic experience, being tortured by the past versus moving forward. When read in conjunction with psychological and literary trauma theory, one main question emerges; does this warrant a mournful or melancholic reading? Mourning supposes an end to this process of dealing with trauma, whereas melancholia acknowledges the irreparable damage caused by such atrocities. In one of these allegories, the audience becomes judge and jury in a case rife with subjectivity and ambiguity, and thus cannot remain complicit in the theatre of denying the devastation caused by dictatorship.

4:15-4:30 p.m. *The Sounds of the Resistance: Southern Cone Rock and the Disruption of National Identity Formation*

Harris Short

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

In the 1950s, rock and roll from the United States and the United Kingdom came crashing onto the music scenes of Latin American countries like Argentina and Chile in a movement known as Nueva Ola. Ever since, there has been a series of widespread acceptance and rejection of rock music, morphing and evolving the genre from rock music in Latin America into Latin American rock. Birthed from the deeply political Nueva Cancionero and Nueva Canción movements in Argentina and Chile, respectively, rock musicians and fans alike suffered severe censorship, social ostracism, and targeted violence under the dictatorial governments of those nations in the late 1970s and 1980s. Two bands that are particularly representative of their country's styles of rock music are Argentina's Serú Girán and Chile's Los Prisioneros. With Serú Girán's 1979 album La Grasa de las Capitales (The Fat of the Capitals) and Los Prisionero's 1984 album La Voz de los '80s (The Voice of the '80s), a voice of resistance was given to the masses.

In this research project I will explore how themes of counterculture, rebellion, and social and political dissonance helped interrupt the formation of national identity in Argentina and Chile.

4:30-4:45 p.m. *The Mediums of Soccer and the Sport's Influence in Latin America*
Tucker Nichols
Faculty Sponsor: Alberto del Pozo Martinez, Department of Modern Languages & Literatures
Since its introduction to the American continent in the end of the 19th century by English immigration, soccer has been an unstoppable force in the region. Its influence can be seen in nearly all aspects of the modern Latin American society and represents one of the few truly universal passions. As a result of its undeniable power, it is evident that soccer is much more than just a game and demands deeper analysis. To understand better the way in which soccer shapes the modern American society, this project aims to analyze the different ways in which soccer is portrayed through a myriad of oral, literary and visual mediums. In doing so, one will gain a more in depth understanding of the meaning of soccer and the individual discourses that aim to encapsulate the essence of the sport. These mediums include the hymn, essay, short story, movie, radio and the press. The tensions between mediums that arise through this analysis will serve as critical points of comparison that will help uncover the purpose of these discourses and how their individual treatments of the sport illustrate soccer's critical role in Latin America.

Explorations in Greek and Roman Studies

1:00-2:15 p.m.
Palmer 207
Moderator: Austin Wall

1:00-1:15 p.m. *The Hellenization of Athletic Contests in Imperial Rome*
Aubrey Blackstock
Faculty Sponsor: Susan Satterfield, Department of Greek & Roman Studies
It is no secret that the Romans greatly admired Greek culture and attempted to emulate many of its elements; however, the Romans were very particular about which parts they adopted and which they left behind in Greece. Given this admiration for Greek culture, it is surprising that the Romans did not adopt Greek-style games openly and on a permanent basis until the Imperial period. As the political climate in the city began to shift as Rome moved from conservative Republican values to the more relaxed values seen in the Imperial period, three philhellene emperors, Augustus, Nero, and Domitian, sought to bring Greek-style games to Rome. This paper will analyze the successes and failures of the emperors' attempts to put on Greek- style games in Rome and the adaptations they employed in order to please the Roman people, while navigating the changing cultural and political environments.

1:15-1:30 p.m. *A Cult of Connections: An Examination of the Cult of Isis as a Link Between Traditional Paganism and Christianity*
Elise Crosswhite
Faculty Sponsor: Susan Satterfield, Department of Greek & Roman Studies
In 1996 a seminar on 'pagan forms of monotheism in late antiquity' was held at Oxford. The participants were dissatisfied with the view that in the Graeco-Roman world, Christianity abruptly replaced the polytheistic system with a monotheistic ideology. Instead, they posited that monotheism was increasingly widespread by the time that Christianity took over. In this paper I argue that the cult of Isis was one of these pagan monotheistic cults that predated the replacement of pagan polytheism with Christianity and furthermore, that Christianity shared important similarities with the pagan traditions of the cult of Isis. Resemblances are found in the comparable powers and ideas attributed to Isis and the Christian god, the way in which the religions were practiced, and the parallels visible in iconography and attributes of Isis and the Virgin Mary. While these similarities may be attributed to cause and effect, I find it more likely that they were developing within the same formative contexts and were under the same cultural influences. As a pagan monotheistic cult, the acceptance of Isis and the connections found between her cult

and Christianity helped foster a natural transition from ancient polytheistic society to early Christian society in the Graeco-Roman world.

1:30-1:45 p.m. *Becoming the Brauronian Bear*
Ginger Woods
Faculty Sponsor: Geoff Bakewell, Department of Greek & Roman Studies
The participation of unmarried girls in the Arkteia facilitated the divine agency of Artemis during the transition from Parthenon to potential bride as a guide and protector I reaching maturity, marking their introduction to womanhood. The worship and services performed at the sanctuary of Braydon prepared women for the adult sexual and social responsibilities of marriage and childhood, focusing on the cultivation of gynaikes suitable to Athenian society. Historical evidence related to these rituals highlights the effort within Ancient Greek society to both domesticate and enculturate females according to the strict system of gender division fundamental to the polis. However, extant dedication made at the site offer an understanding of this cult's activity as a complex metaphor through which Greek women in varying stages of life endeavors to transcend this kind of cultural confinement and express their own conceptions of identity, thereby exercising a greater degree of independence and direction over their participation in the religious sphere of Classical Athenian society.

1:45-2:00 p.m. *The Development and Use of Tripartite Shrines in Minoan Civilization*
Alexandra Howell
Faculty Sponsor: Kenny Morrell, Department of Greek & Roman Studies
This Honors Thesis explores the diachronic development of Tripartite Shrines, a religious architectural feature from Minoan Crete, made popular in the Neopalatial period, and their artistic representations throughout Bronze Age Aegean cultures. I will begin my discussion of the development of these shrines, discussing the general layouts and specific characteristics. At this point, I will discuss the four main examples of Tripartite Shrines. I will be using as evidence the Protopalatial cemetery at Petras, the Neopalatial peak sanctuary Anemospilia, the Neopalatial Villa Complex at Vathypetro, and the Neopalatial Palace at Knossos. Following the discussion of the physical layout of Tripartite Shrines, I will analyze various pieces of art from the Minoans and various other Aegean and Mediterranean civilizations to glean more information about their modern reconstruction and their potential uses in the Neopalatial Period. My theory, based on the physical remains and the analysis of art representations, is that the center space and the open space before it served as a seat of religious power, where a xoanon figure or human religious figure could be venerated.

Ethnography, Ideology and Race

2:15-3:30 p.m.
Palmer 210
Moderator: Austin Wall

2:15-2:30 p.m. *The Edge of the World and Beyond: European Expectations of the Lands Across the Atlantic*
Jessica Shainker
Faculty Sponsor: Marco Cabrera Geserick, Department of History
Christopher Columbus set sail in 1492 for what he believed to be Asia, a foreign, fabulous land of abundance, riches, and marvels at the edge of the known world. Based on accounts of Classical authorities, medieval travel writers, popular medieval romances, and Christian theology, Columbus formed certain expectations of the land, the people, and what his own role would be in the East. The many assumptions that Columbus and other Europeans held regarding the lands across the Atlantic formed a framework that guided their perception of and their behavior in the New World, as can be seen in the written accounts of their voyages. It wasn't until 1503 that Amerigo Vespucci realized the continent Columbus had discovered was not actually Asia - not the Eastern terrain on the margins of European maps, but lands that had never been mapped at all. In the face of the unknown, Europeans drew on

Classical accounts of the Antipodes as well as travelers' accounts of the Americas as they formed new expectations about the unexplored New World. This paper will examine the expectations of early European explorers so we may understand the minds and motives of the Old-World men who discovered and conquered America.

2:30-2:45 p.m. *Titian, Laura Dianti, and the Black African Page: Commodification of the Black Body in Western Visual Culture*
Erica Smythe
Faculty Sponsor: Victor Coonin, Department of Art & Art History
Titian, considered one of the greatest Renaissance painters, has intrigued art historians with his flawless technique and stunning portraiture. Despite extensive study of Titian's works, few scholars have explored the messages of hierarchy and race present in his oeuvre. This paper is a case study of Titian's Portrait of Laura Dianti, which features a white European woman accompanied by small, black African attendant. My analysis reveals ways in which Renaissance artists used color, value, and historical context to reinforce notions of racial superiority and value. Based upon the substantial amount of visual evidence in this piece regarding the perpetuation of toxic racial tradition, Titian's portrait likely implies a larger, more disturbing body of work that subtly, yet effectively, subordinates black Africans through visual culture. Renaissance visual culture may seem far removed from contemporary issues; however, critically analyzing race in Renaissance artwork may provide a way of approaching subtle and insidious racial oppression in contemporary society.

2:45-3:00 p.m. *Double Layer Thinking in Sino-Vietnamese Relation from 1949 to 1968*
ZongFang Li
Faculty Sponsor: Michael Drompp, Department of History
The topic of my paper is the relationship between China and North Vietnam and the ideologies behind their actions from the establishment of the People's Republic of China in 1949 to 1968. My research question is this: What ideologies shaped Sino-Vietnamese relations during the first Indochina war with the French and the early years of the second war with the United States? My conclusion is that there was a "double-layer thinking" practiced by both China and Vietnam in which the two nations' self-interest shaped their actions and policies toward each other. Three distinct periods can be seen in this process. The first period (1949-1954) shows active aid from China to North Vietnam, accompanied by the intention of spreading the radical political ideas of Mao Zedong. The Geneva Accords of 1954 specifically reveal the self-interest of Beijing at work in its treatment of Hanoi. The second period (1954-1959) emphasizes the radicalization of the National Liberation Front in South Vietnam. The third period (1959-1963) sees Mao become more radicalized, both domestically and in foreign policy, providing China with its underlying motivations in dealing with North Vietnam. The Soviet Union's change of leadership in 1963 turned the Sino-Vietnamese relationship in a new direction; the worsening of Sino-Soviet relations allowed the government of North Vietnam to play China and the Soviet Union against each other in pursuit of its own interests.

3:00-3:15 p.m. *Reflections on the Roles of Narrative in the Ethnographic Recentering of Survivors of Trauma*
Sara LaMonica
Faculty Sponsor: Noelle Chaddock, Associate Dean for Academic Affairs in Diversity & Inclusivity
This session is a reflective examination of the work done by the undergraduate researcher around capturing the narratives of survivance and resistance from survivors of trauma. Through ethnographic examples, as well as the theoretically informed analysis of interviews with survivors of trauma, the researcher will move attendees through a series of considerations around the use of narrative, ethnography, and auto-ethnography to re-center survivors of trauma in our theories of survival and resilience.

SCIENCE ORAL SESSIONS

Biology
1:30-2:15 p.m.
FJ-D
Moderator: Ashmeet Singh

1:30-1:45 p.m. *Land cover change in South America and the potential impact on Trypanosoma cruzi*
Katharine Goebel
Faculty Sponsor: Sarah Boyle, Department of Biology
Trypanosoma cruzi is the protozoan causing the potentially fatal Chagas disease, also known as American trypanosomiasis. The vector is able to infect a range of mammal species, including humans. The infection can be modulated by habitat fragmentation and biodiversity loss, indicating the importance in studying land cover change. Through a literature review, the geographic distribution of T. cruzi in marsupials, rodents, and non-human primates in South America, principally Brazil, was determined. Changes in land cover from 2005 to 2009 were identified, mapped, and then compared to the geographic distribution of T. cruzi. It was found that T. cruzi was primarily located in areas in which no land cover change occurred, suggesting maintenance of the hosts' habitats. The areas surrounding sites of T. cruzi occurrence which did undergo land cover change experienced the greatest change between shrubland to a mosaic of vegetation and cropland.

1:45-2:00 p.m. *Searching for Clues in Shed Skin: A Novel Technique for Monitoring Hormones in Snakes*
Emily Lichtenberger and Beth Roberts, The Memphis Zoo and Aquarium Research Fellow
Faculty Sponsor: Sarah Boyle, Department of Biology
Only recently have methods to monitor reproductive and physiological health using concentrations of reproductive hormones and glucocorticoids been explored in reptiles. This past year the Memphis Zoo herpetarium underwent a renovation through a grant from the Institute for Museum and Library Services, which led to improvements in the housing of a colony of bullsnakes (Pituophis catenis). Our objectives were to 1) determine if snake skin sheds can be used for non-invasive hormone monitoring, and 2) identify changes in fecal and skin corticosterone and testosterone concentrations associated with the housing improvements. Corticosterone and testosterone were measured using an enzyme-linked immunoassay. We found that skin corticosterone was deposited evenly throughout the shed. Shed skin corticosterone concentration significantly decreased from before the renovation to after, while fecal corticosterone concentration significantly increased from before the renovation to after. Housing ventilation and lighting were adjusted due to warmer than desired temperatures. This factor may have led to the increase in fecal corticosterone concentrations due to an artifact effect on the feces, rather than a physiological response. Shed skin testosterone concentration, fecal testosterone concentration, and their significance will be presented, as well as future directions of this research.

2:00-2:15 p.m. *The effects of aging on an African elephant's (Loxodonta africana) active behavior*
Evan Tucker
Faculty Sponsor: Sarah Boyle, Department of Biology
African elephants (Loxodonta Africana) are the largest land mammals in the world, and the oldest African elephant in captivity is Tyranza at the Memphis Zoo. As Tyranza has aged, anecdotal evidence of her changing matriarchal status has appeared from keepers and research students, possibly because of Tyranza's potential decrease in mobility. In order to determine if Tyranza's mobility has decreased, I use the more than 2,400 hours of behavior data collected since 2012 to determine if Tyranza is less active now than when she was younger. I also reviewed recent literature to predict what effect Tyranza's aging process will have on the rest of the captive elephants, and how we can use Tyranza as a model to help us better understand the social structure of these threatened animals.

Biochemistry and Molecular Biology I

2:30-3:15 p.m.
FJ-D
Moderator: Rachel Windmueller

2:30-2:45 p.m. *Aspergillus nidulans Protein kinase C and SepA physically interact at sites of polarized growth.*
Zainab Atiq, Elisabet Olsen, Paul Parish, Matthew Cannavo, Lance Myers, and Terry Hill, Department of Biology
Faculty Sponsor: Loretta Jackson-Hayes, Department of Chemistry
Both PkcA (protein kinase C) and formin SepA localize at hyphal tips and septation sites during polarized growth in Aspergillus nidulans. Using time lapse fluorescence microscopy, we have found that PkcA::RFP and SepA::GFP colocalize at septation sites and hyphal tips. A functional interaction between the two proteins is shown by PkcA::GFP failing to localize to septation sites in the presence of the aseptate sepA1 temperature sensitive mutant. Additionally, we have demonstrated reciprocal complementation of the septation defect in the sepA1 mutant by pkcA overexpression and of hypersensitivity to cell wall perturbing agents calcofluor white, Congo red, and sodium dodecyl sulfate by sepA overexpression in the calC2 mutant. Using a bimolecular fluorescence complementation strategy, we have found evidence that SepA and PkcA physically interact at both hyphal tips and septation sites. Interaction of these two proteins was confirmed using a GAL4-based yeast two-hybrid assay. We determined that the interaction occurs via FH1 and FH2 domain-encompassing amino acids 927-1761 of SepA.

2:45-3:00 p.m. *DFT Analysis of Phenylalanine Hydroxylase*
Madison Perchik and Rachel Giampapa; Larryn Peterson and Mauricio Cafiero, Department of Chemistry
Faculty Sponsor: Mauricio Cafiero, Department of Chemistry
There are many molecules that act on dopamine and dopamine-like binding sites in enzymes and transport proteins. Some effects of these proteins are beneficial while others are detrimental. We are designing inhibitors for this group of proteins. Phenylalanine hydroxylase (PheOH) is a tetradydrobiopterin-dependent monooxygenase that influences the rate determining step of converting phenylalanine into tryrosine by hydroxylating phenylalanine. Both phenylalanine and tyrosine are important components in the anabolism of dopamine. A deficiency of PheOH can cause hyperphenylalaninemia, which gives rise to phenylketonuria (PKU), a severe disease that can cause mental retardation if one's diet isn't strictly monitored. A suite of dopaminergic derivatives has been developed as potential inhibitors of the PheOH enzyme. The inhibitory effectiveness of these dopaminergic derivatives has been measured via in silico models in which the strength of interaction between each substrate and the enzymatic active site was analyzed. A crystal-structure of the PheOH active site, with bound thienylalanine, was isolated from the Protein Data Bank (PDB ID: 1KW0). The positions of novel dopaminergic derivatives were optimized in the active site using M062X/6-31G with implicit solvation and with flexible amino acid side-chains. Interaction energies between the ligands and the protein were calculated using M062X and MP2 with the 6- 311+G* basis set. At present, none of the potential inhibitors examined interact as strongly as the natural substrate phenylalanine.

3:00-3:15 p.m. *Understanding the DNA Requirements for Heterochromatin Recruitment via RevCen in S. pombe*
Patrick Smith and Bayly Wheeler, Department of Biology
Faculty Sponsor: Bayly Wheeler, Department of Biology
The genomes of eukaryotic organisms are packaged into two types of chromatin: euchromatin and heterochromatin. Formation of heterochromatin at a specialized locus, called the centromere, is essential for the division of genetic information between two cells. Furthermore, heterochromatin plays an important role in silencing gene expression. In the fission yeast S. pombe, heterochromatin forms at repetitive DNA sequences including RevCen, a short DNA sequence found within all three centromeres. RevCen produces transcripts that are cleaved into short interfering RNAs (siRNAs) by the RNAi pathway. While these siRNAs are essential for heterochromatin formation, how the

RNAi pathway targets RevCen remains incompletely understood. RevCen can silence genes when removed from its centromeric context, suggesting that the RNAi pathway is recruited to RevCen by specific DNA sequences. We have taken two different approaches to identify sequences within RevCen that are important for heterochromatin formation via the RNAi pathway. In one approach, we have created versions of RevCen that lack a region of abundant siRNA formation. In another, we have engineered versions of RevCen with a limited number of random mutations. By identifying mutations that abrogate RevCen-mediated heterochromatin formation, we will illuminate how DNA sequences within RevCen establish heterochromatin and contribute to centromere function.

Biochemistry and Molecular Biology II

3:30-4:15 p.m.

FJ-D

Moderator: Jenny Loome

3:30-3:45 p.m. *Biochemical characterization of the protein-protein interaction between UTX and 53BP1* ◙

Sam Jordan, Rhodes College; Brett Mulvey, Department of Developmental Neurobiology, St. Jude Children's Research Hospital; Robert Michael, Department of Computational Biology, St. Jude Children's Research Hospital; Jamy Peng, Department of Developmental Neurobiology, St. Jude Children's Research Hospital
Faculty Sponsor: Dhammika Muesse, Department of Chemistry

Pluripotent stem cells are unique self-renewing cells that are able to differentiate into all of the mature cells of the body. Our lab is interested in understanding epigenetic mechanisms that regulate pluripotent stem cell self-renewal and differentiation. Epigenetic mechanisms mediate heritable changes in gene expression without altering genomic sequences. UTX is an epigenetic factor involved in the activation of genes that aid in stem cell differentiation. Additionally, mutations at the UTX gene loci have been linked to the developmental disorder the Kabuki syndrome and various human cancers. Preliminary data from our lab identified 53BP1 as a novel protein binding partner of UTX. 53BP1 is a key protein involved in the cellular response to DNA double-stranded breaks. The results presented here show that UTX localizes to 53BP1 damage foci in several different human cell lines, suggesting a potential role for UTX in the DNA damage response. Furthermore, it is demonstrated that this colocalization does not take place in mice, suggesting this partnership is not present in mouse models. In addition, this study identifies the binding domain of 53BP1, providing insight into the molecular nature of this partnership.

3:45-4:00 p.m. *Molecular Tools for the Development of Potent Selective HDAC2 Inhibitors for the Design of Targeted Cancer Therapies*

Xavier May, Rhodes College; Shana Stoddard, Department of Chemistry, Rhodes College; Davita Watkins, Department of Chemistry and Biochemistry, University of Mississippi
Faculty Sponsor: Shana Stoddard, Department of Chemistry

Research has shown that knockdown of HDAC2 makes cells more susceptible to cell death by cancer therapies. We believe that if we can successfully inhibit HDAC2, we will have the same effect as cell knockdown. Pan-HDAC inhibitor vorinostat and class-I specific HDAC inhibitor panobinostat do not inhibit specific isozymes. Finding specific inhibitor molecules for HDAC2 will result in more targeted treatment. Using the crystal structure of HDAC2 (PDB ID: 4LXZ), we docked panobinostat, vorinostat, and various panobinostat derivatives into the active site. Analysis of the interactions showed that 5 compounds outcompeted panobinostat and all of our compound outcompeted vorinostat. Our data suggests that 5 member substituent rings are better for the inhibition of HDAC2 rather than 6 member or greater heteroaromatic rings due to multiple pi-pi stacking interactions between the core of the ligands, Phe-155 and Phe-210. Additionally, ligands with an indole ring that hydrogen bonds with Glu-103 on the left side of the entrance to the active site have higher binding scores than ligand that hydrogen bond with a network of structured water molecules on the right side of the entrance. This work will help develop more targeted and selective HDAC2i's for cancer therapy.

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4:00-4:15 p.m. *Improved Radiosynthesis of 3'-Deoxy-3'-[18F]fluorothymidine and Its In Vivo Application as a Proliferation Imaging Marker in Positron Emission Tomography* ◙
Andy Nguyen, Rhodes College; Jitendra Mishra, Amy Vāvere, Elizabeth Butch, Departments of Diagnostic Imaging and Chemical Biology & Therapeutics, St. Jude Children's Research Hospital; Zachary Visco, Department of Biomedical Engineering, Duke University
Faculty Sponsor: Scott Snyder, Departments of Diagnostic Imaging and Chemical Biology & Therapeutics
3'-deoxy-3'-[18F]fluorothymidine ([18F]FLT) is an imaging biomarker of cellular proliferation in positron emission tomography (PET). Goals were to optimize an automated synthesis for [18F]FLT and to perform in vivo PET imaging to determine the usefulness of [18F]FLT in measuring tumorigenesis. Methods: [18F]FLT chemistry followed three steps: 1) [18F]fluorination, 2) deprotection, and 3) neutralization. The phase transfer base and precursor solvent in the [18F]fluorination step were optimized. Mice (n=6) with right-rear flank tumors were injected with [18F]FLT. Mice were imaged and dissected to measure the biodistribution of [18F]FLT in the tissues. Results: As a phase transfer base, tetrabutyl ammonium bicarbonate (TBAB) resulted in the greatest fluorinated intermediate yield. Use of 3-methyl-3-pentanol (MEP) as a precursor co-solvent significantly increased the fluorinated intermediate yield. Under the optimized conditions, [18F]FLT was synthesized with a final yield of 48±2%. The right-rear flank tumor, kidneys, and spleen exhibited the greatest uptake of [18F]FLT in the mice, while the brain exhibited the least. Conclusion: Use of TBAB and MEP afforded high yields of the fluorinated intermediate (66±6%). [18F]FLT product yields increased more than three-fold from the initial synthesis performed. Finally, the in vivo study evidenced the efficacy of [18F]FLT in measuring tumorigenesis.

Chemistry
1:30-2:15 p.m.
FJ-C
Moderator: Barry Rich

1:30-1:45 p.m. *Design and Synthesis of Dopaminergic Derivatives for Analysis in SULT1A3* ◙
Skyler Cochrane, Kendall Reed, Jessica Rogowiec, Jennifer Rote, Gabrielle Bailey, Diana Bigler; Mauricio Cafiero and Larryn Peterson, Department of Chemistry
Faculty Sponsor: Larryn Peterson, Department of Chemistry
Sulfation, an important metabolic process in the human body, is an essential pathway through which endogenous catecholamine and xenobiotic substances can be inactivated and/or have their solubility increased to facilitate removal from the body. One family of enzymes that implement this sulfation, the sulfotransferases (SULTs), catalyze the transfer of a sulfuryl group (-SO3-) from 3´-phosphoadenosine-5´-phosphosulfate to various substrate molecules. Of particular interest is SULT1A3 because, while it shares 93% amino acid sequence identity with SULT1A1, the two sulfotransferases demonstrate very unique substrate selectivity with SULT1A1 preferentially sulfating simple phenols and SULT1A3 preferentially sulfating catecholamines, such as dopamine. In an effort to determine the molecular basis of its substrate selectivity, a library of compounds with various electron donating/withdrawing groups has been designed, synthesized, and analyzed for their binding affinities in SULT1A3. This study will focus on the multiple synthetic routes that have been attempted to synthesize and test these various substrates.

1:45-2:00 p.m. *Use of Pyrylium Salts in the Synthesis of CF3-bis-acyl-pyridine*
Thomas Fowler and Sam Trenner
Faculty Sponsor: Dana Horgen, Department of Chemistry
We are synthesizing trifluoromethyl-bis-acyl-pyridine in collaboration with Dr. Eckenhoff's lab. This molecule will be used to synthesize a ligand that will go on to be used in a catalyst for hydrogen production. We are testing reactions with readily available and cheap reagents to determine the correct procedures to apply to the synthesis of

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the desired product. A one pot reaction using an alcohol with acetic anhydride and tetrafluoroboric acid will produce a pyrylium salt. After this reaction, the pyrylium will be reacted with ammonium hydroxide to produce a pyridine which will then be oxidized resulting in a diketone containing product. Once the procedure has been successfully tested using the model system, the synthesis of trifluoromethyl-bis-acyl-pyridine will be completed.

2:00-2:15 p.m. *Synthesis of 6-substituted dopamine derivatives*
Jessica Rogowiec, Kendall Reed, and Jennifer Rote; Larryn Peterson and Mauricio Cafiero, Department of Chemistry
Faculty Sponsor: Larryn Peterson, Department of Chemistry
Dopamine is a neurotransmitter that is crucial for proper functioning of the human body. The catecholamine core of dopamine has shown utility as a scaffold for numerous drugs and in other applications, like metal detection and adhesive materials. Substituents at the 6-position of the dopamine catechol core can modulate its stereoelectronic properties, the acidity of its phenolic hydroxyl groups, and the overall hydrophobicity of the molecule. To further understand the function of dopamine, a series of dopamine derivatives substituted at the 6-position of the catechol core. 6-Iododopamine, 6-carboxydopamine, and 6-acetyldopamine were synthesized from commercially available 3,4-dimethoxyphenethylamine. In order to investigate the electron donating and withdrawing ability of the substituent the Hammett constants were correlated with the 1 H NMR chemical shift values. The synthesis of the dopamine derivatives and Hammett correlational analysis will be discussed.

Computer Science I
2:30-3:15 p.m.
FJ-C
Moderator: Andrew Williams

2:30-2:45 p.m. *Exploring the Relationship Between Music Dynamics and Schenkerian Analysis*
Zaid Baba
Faculty Sponsor: Phillip Kirlin, Department of Mathematics & Computer Science
Schenkerian analysis is a type of music analysis that seeks to model notes of a piece as a hierarchical structure. Notes can be given height values which correspond to their importance in a score, relative to the others. Previous work in this area has lead to the development of an algorithm which uses piano reductions of classical works and outputs probability-based Schenkerian analyses for them. However, this algorithm uses no information regarding musical dynamics, such as tempo and loudness, to analyze the music. This project explores the relationships between tempo, loudness, and Schenkerian height, in order to investigate if such additions could improve the original algorithm. Expressive, live recordings of each piece, played by a professional pianist, were used in order to gather such data. From this, various programs were used or developed in order to extract tempo and loudness values. A statistical analysis, however, reveals little evidence of correlation between any of the three parameters, and it was decided that there would be no significant impact on the original algorithm with these new fields.

2:45-3:00 p.m. *Probabilistic generation of ragtime music from classical melodies*
Joel Michelson and Hong Xu
Faculty Sponsor: Phillip Kirlin, Department of Mathematics & Computer Science
Many features of modern music are derived from the influence of ragtime, a genre of music that introduced traits such as the extensive use of syncopation to Western music around the turn of the 20th century. We present and compare three methods to algorithmically re-compose classical music pieces in a ragtime style. Our methods are based on an analysis of the rhythmic patterns in a corpus of 11,000 ragtime songs. The first two methods re-compose the classical music by choosing rhythmic patterns probabilistically from the patterns in the corpus, while the third method shifts the rhythmic positions of individual notes based on an algorithmic approach to syncopation.

Computer Science II
3:30-4:15 p.m.
FJ-A
Moderator: Luke Fairbanks

3:30-3:45 p.m. *The Effect of Time Constraints as Stressors in Real and Virtual Environments*
Jack Morrison, Josh Ladd, Joel Michelson, Hong Xu, and Donny Ramier
Faculty Sponsor: Betsy Sanders, Department of Mathematics & Computer Science
Commodity virtual reality (VR) systems are becoming more affordable and widespread, revealing new spaces for individuals to learn and work in. In psychology, the Yerkes-Dodson Law shows that there is a connection between a person's stress level and their performance completing a task. Our research follows an interest in how these two intersect. By studying the effects of time stressors on task completion in VR environments as compared to identical real-world environments, we observe how using VR technology impacts a person's productivity. The experiment tasks participants with building Lego models that adhere to specific conditions, forcing participants to problem solve against the clock. Legos are a creative engineering medium we've ported to VR to represent the type of work being done with VR products today. By observing how our productivity is impacted in virtual spaces, we hope to understand if VR is a viable space for both learning and working.

3:45-4:00 p.m. *Testing Presence in Virtual Reality*
Michelle Smith, Kira Curry, and Madeline Mechem
Sponsor: Betsy Sanders, Department of Mathematics & Computer Science
Phantom Limb pain is pain that people feel emanating from a body part that's no longer attached to their body. Phantom Limb Syndrome - and its sub-condition, Phantom Limb Pain- typically stems from traumatic amputations, which are the result of involvement in wars or amputations resulting from medical condition. Though the cause of this condition has not been precisely identified, approximately 80% of amputees experience some form of Phantom Limb sensation. Since amputees in the US have grown over two million, and technological innovations are rapidly evolving, that the medical field has taken advantage of the technology to create new therapies. In this study, we use virtual reality to measure a participant's sense of presence, and test what types of bodies and activities create the most presence in the virtual environment. The purpose of this study is to discern which qualities of the environments are most effective in creating a new therapy for phantom limb pain. Because embodiment is such a central idea in both the treatment of phantom limb syndrome, and the field of virtual reality, this research expands upon a key concept of both fields, uniting them in a way that, thus far, has been explored relatively little.

4:00-4:15 p.m. *City Trend*
Haider Tiwana, Wyatt Gale, Joe Boltuc, and Olivia Burton
Faculty Sponsor: Betsy Sanders, Department of Mathematics & Computer Science
Standard social networking websites like Facebook and Twitter allow individuals to connect and share on a platform. However, accessibility in these platforms are limited to what groups a user occupies and what friends that user has. In this project, we create a community based social news aggregation/discussion board iOS App called CityTrend. CityTrend presents a forum based on geographical location in which registered members can submit content ranging from text posts to direct links concerning news, concerts, pop-up shops, consumer deals, local alerts, etc. Users can manipulate the relevance of submissions by upvoting or downvoting content that is sorted categorically. In this manner, CityTrend provides a medium for communities to interact on a social platform, and as an aggregate, to dictate what content is significant at any point in time. With technology playing an increasing role in society and individual's lives, this unique project brings together small towns as well as densely populated cities to ultimately promote and raise awareness about news and lesser-known local events.

Math I
1:30-2:15 p.m.
FJ-A
Moderator: Elisabet Olsen

1:30-1:45 p.m. *The Kinetics of Type I Interferons During Influenza Virus Infection* ◙
Maggie Myers, Rhodes College; Amber Smith, Department of Infectious Diseases, St. Jude Children's Research Hospital
Faculty Sponsor: Erin Bodine, Department of Mathematics & Computer Science
Influenza A virus (IAV) infections are a leading cause of death. The host immune response works to limit virus growth and quickly resolve the infection. Type I Interferons (IFN-α,β) aid viral control by inhibiting the infection of epithelial cells. To investigate the role of type I IFNs during IAV infection, we infected groups of mice with influenza A/Puerto Rico/8/34 (PR8) and measured their viral load, IFN concentration, and immune cell populations. The data indicated a two-phase decline and double peak in virus titers and a double peak in type I IFNs. Because published kinetic models fail to reproduce these data, we developed two new models: a two-source immune model and a refractory-state reversion model. Both models indicate that the first wave of IFN is produced from infected epithelial cells. The competing models suggest that the second wave of IFN is either produced by an immunological source or by late infected epithelial cells that have exited the IFN-induced antiviral refractory state. Both models can reproduce a double peak in viral titers by assuming refractory reversion or by assuming IFN-β decreases the rate of virus production. These results provide insight into viral control and host immune responses during IAV infection.

1:45-2:00 p.m. *Modeling the Effects of the Treatment and Removal of Standing Water on a Yellow Fever Epidemic*
Jordan Ankersen and Daisy Sun
Faculty Sponsor: Erin Bodine, Department of Mathematics & Computer Science
In 1878, thousands in Memphis were killed during an outbreak of yellow fever, a viral hemorrhagic fever transmitted by the Aedes aegypti mosquito, which has affected regions including North and South America, Europe, Africa, and the Caribbean. This disease still affects individuals in Africa and Central and South America. We have developed a mathematical model consisting of seven ordinary differential equations which describe the dynamics of the human and mosquito populations during a yellow fever epidemic. Our model also investigates the effect that treatment and removal of standing water has on a mosquito population and consequently a yellow fever epidemic. We examined the stability of the disease-free equilibrium and the conditions under which the disease-free equilibrium is stable.

2:00-2:15 p.m. *Modeling the Effects of Insect Repellent and Vaccination as Control Measures Against Yellow Fever*
Casey Middleton and Erin Deery
Faculty Sponsor: Erin Bodine, Department of Mathematics & Computer Science
Yellow fever is a viral hemorrhagic fever transmitted by the Aedes aegypti mosquito, which has historically caused thousands of deaths throughout Africa, the Americas, Europe, and the Caribbean, and continues to pose a threat in Africa, and Central and South America. We developed an ordinary differential equations model of the dynamics of a yellow fever outbreak in a completely susceptible population (modeling both the human and mosquito populations), and examined the use of insect repellent and vaccination as a method of reducing the severity of the outbreak. We examine the conditions under which the disease-free equilibria are stable for the complete model and use uncertainty and sensitivity analysis to quantify the reduction in cumulative infections and deaths due to the frequent use of insect repellent by both susceptible and infectious individuals. Our results show that the use of insect repellent among the susceptible population is more effective in controlling the severity of a yellow fever outbreak than the use of insect repellent by infectious individuals.

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Math II
2:30-3:15 p.m.
FJ-A
Moderator: Luke Fairbanks

2:30-2:45 p.m. *Generalizing Hilbert Series for Matrix Groups Isomorphic to Zq* ◙
William Bitting, Rhodes College; Chris Seaton, Department of Mathematics & Computer Science, Rhodes College; Daniel Herden, Department of Mathematics, Baylor University; Hans-Christian Herbig, Departamento de Matematica Aplicada, Av. Athos da Silveira Ramos 149, Centro de Tecnologia
Faculty Sponsor: Chris Seaton, Department of Mathematics & Computer Science
Let zq be a primitive qth root of unity and let a1, a2,..., an 2 in the Natural Numbers be distinct, strictly increasing, and co-prime to q. Consider a diagonal matrix with the (i,i)th entry as zq^(ai) and the matrix group that it generates. We would like to know how many invariant polynomials there are with respect to this group of any given degree k. A polynomial f(x) is said to be invariant it f(x) = f(Lx) for any L in our matrix group. To help find these invariant polynomials, we turn to a formula from Invariant Theory called Molien's Formula. This helpful formula calculates a Hilbert Series, a special type of Taylor Series where the coeffcient of t^k if the number of invariant polynomials of degree k. My work focuses on computing a general form for these Hilbert Series, specificaly in the case where q is a prime number. Doing so would provide insight into these invariant polynomials and, due to how we have constructed our group, has allowed for progress on methods of solving certain Fourier-Dedekind Sums.

2:45-3:00 p.m. *Multi-Mode Quantum Noise Model for Advanced Gravitational Wave Detectors*
McKenna Davis, Rhodes College; Haixing Miao, Andreas Friese, Daniel Toyra, Alex Wormwald, and Harry Song, Institute of Gravitational Wave Astronomy, University of Birmingham (UK)
Faculty Sponsor: Chris Seaton, Department of Mathematics & Computer Science
We calculate the power spectral density of the light field incident on a photodiode for several situations involving multiple modes of coherent light and squeezed light. We compare these analytical results to those of Frequency domain INterfErometer Simulation SoftwarE (FINESSE) simulations of the same situation in order to verify the accuracy of the new multi-mode squeezing package of the program. We aim to update FINESSE as needed until it can match analytical results for these simulations; at this point the multi-mode squeezing package can be released for public use.

3:00-3:15 p.m. *Do Finitely Many Laurent Coefficients Determine a Finite Group?* ◙
Saad Khalid and Chris Seaton, Department of Mathematics & Computer Science
Faculty Sponsor: Chris Seaton, Department of Mathematics & Computer Science
Let G be a finite subgroup of GL_n(C). A polynomial H of degree d is invariant on G if H(AX) = H(X) for all A in G. The Hilbert series of G, taken at t=0, gives us a way to count the dimensions of the invariant polynomials of our group through its coefficients. Expressing this Hilbert series as a rational function and finding its Laurent series expansion, at t=1, gives us other information, again through its coefficients. For example, the first coefficient, called gamma_0, is equal to 1/|G|. We will be discussing progress that has been made towards gathering information about the group from its Laurent coefficients, and whether or not a finite number of Laurent coefficients is sufficient to determine the entire group.

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Physics
3:30-4:15 p.m.
FJ-C
Moderator: Emily Hanson

3:30-3:45 p.m. *DFT design of inhibitors of the LPXC enzyme* ◙
Carolyn Dishuck and Larryn Peterson, Department of Chemistry
Faculty Sponsor: Mauricio Cafiero, Department of Chemistry
In recent years bacterial infections have become more resistant to treatments, posing a challenge for both researchers and health professionals. It has become imperative that novel, effective therapies against these resistant bacterial infections be discovered. Gram-negative bacteria present an additional challenge due to the presence of a selectively permeable outer membrane. Among the components of the outer membrane is Lipid A, which is responsible for the growth and pathogenicity of Gram-negative bacteria. The enzyme LpxC is responsible for catalyzing the first committed step in the biosynthetic pathway of Lipid A. The inhibition of LpxC would therefore, prevent the production of Lipid A, and hence result in a corrupted outer membrane. Starting from a LpxC crystal structure with a natural substrate bound in the active site, we have designed and optimized the position of several novel ligands in the active site. The structure for these ligand-protein complexes were optimized using m06l and the 6-31G basis set both in vacuo and in solution phase. Interaction energies for the ligand and protein complex were calculated using m06l with the 6-311+G* basis set. Desolvation and simplified zinc binding studies have also been performed to confirm that our model chemistry describes the zinc binding in the protein appropriately. Initial work shows several promising candidates for the inhibition of LpxC.

3:45-4:00 p.m. *Evaluating Ultrasonic Backscatter Sensitivity to Microstructural Characteristics of Porous Bone Using Partial Correlations*
Joshua Moore, Luke Spinolo, and Matthew Huber, Rhodes College; Brent Hoffmeister, Department of Physics, Rhodes College; Jinsong Huang, The University of Tennessee Health Science Center
Faculty Sponsor: Brent Hoffmeister, Department of Physics
Background: Backscatter difference techniques are being developed to detect changes in bone caused by osteoporosis. Backscatter difference techniques compare the power in one portion of an ultrasonic backscatter signal to the power in a different portion of the same signal. Goal: Investigate how backscatter difference measurements depend on the density and microstructural characteristics of cancellous bone. Procedure: Ultrasonic backscatter signals were acquired from 30 specimens of bone using a 1 and 5 MHz broadband transducer. The normalized mean backscatter difference (nMBD) was determined by computing the power difference (in dB) between two gated portions of the backscatter signal and dividing by the center to center time separation between gates. Microstructural characteristics of the specimens and bone mineral density (BMD) were determined using x-ray micro CT techniques. Results: nMBD demonstrated moderately low to strong linear correlations (Spearman's coefficients) with microstructure and BMD ($0.36 \leq |R| \leq 0.85$). The measured correlations did not depend strongly on transducer frequency. Partial correlation coefficients were also measured to determine correlations between microstructural characteristics and ultrasonic parameters independent of BMD. Conclusions: The backscatter difference parameter nMBD may be sensitive to changes in density and microstructure caused by osteoporosis.

4:00-4:15 p.m. *Analysis of gas pockets in explanted, human femurs using ultrasound*
Phoebe Sharp and Sheldon Ebron
Faculty Sponsor: Brent Hoffmeister, Department of Physics
Ultrasonic backscatter techniques are being developed to detect changes in cancellous bone caused by osteoporosis. To evaluate a newly developed backscatter parameter called the normalized mean of the backscatter difference (nMBD), ultrasonic measurements were made on 14 explanted human femurs and compared to bone mineral density

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(BMD) measurements performed using x-ray computed tomography (CT). The resulting correlations were generally poor ($-0.15 < R < 0.41$). However, the CT images indicated the presence of gas pockets in some of the femurs that may have influenced the ultrasound measurements. The analysis of the ultrasound signals was repeated on a subset of the data that avoided possible gas pockets. The correlations improved as a result ($-0.15 < R < 0.67$). We conclude that explanted femurs may develop gas pockets, possibly as a result of freezing and thawing, which affect ultrasonic measurements.

FINE ARTS ORAL SESSIONS

The Cauthen Competition: Final Round
Tuthill Performance Hall
Moderator: Leah McGray, Department of Music

1:00-2:00 pm
Gladys Cauthen was one of the founding influences in the development of the Rhodes College Department of Music, which grew out of the Memphis College of Music. In her honor and memory, Gladys Cauthen's legacy is remembered through the naming of this solo competition. The winner will perform with the Rhodes College Orchestra in the following academic year.

Studies of the Past and the Present
2:00-2:45 p.m.
Clough 417
Moderator: Miriam Clinton, Department of Art & Art History

2:00-2:15 p.m. *Theophilus North:"Side-quests" in Nostalgia*
Leah Borsari, Arthur Frawley, and Emily Murphy
Faculty Sponsor: David Jilg, Department of Theatre
What does it mean to be a "free man?" In the Fall semester of 2017, the McCoy Theater will produce Matthew Burnett's Theophilus North. Set in the summer of 1926 in Newport, Rhode Island, the play is based on a novel of the same name written by Pulitzer prize-winning author Thornton Wilder. Leaving his safe and sheltered life, and setting out on a quest to satisfy his ambitions, Theophilus wants to quickly pass through Newport, but ends up spending the entire summer embroiled in the lives of all the people he meets. Through analysis of Burnett's script, and Thornton Wilder's novel, as well as background information about both authors, we are developing a production concept that begins to encompass all areas of the production.

2:15-2:30 p.m. *Modeling the Minoans in Maya: Digital Reconstruction of Ancient Structures* ◙
Kathryn Clark and Bao Bao Wang; Miriam Clinton and Darren Floyd, Department of Art & Art History
Faculty Sponsor: Miriam Clinton, Department of Art & Art History
This paper presents research completed as part of a Memphis Center Fellowship in the Arts. A team of students worked to create an online game using a 3D model of ancient architecture from the Minoan period in Greece, ca. 1450 BCE. This paper presents that art historical and archaeological research and the 3D models created as a result. The House of the Rhyta, a structure found on the island of Crete with both domestic and ritual purposes, reconstructed through digital modeling in Maya. The 3D modeled objects, inspired by actual artifacts from the site, populate a digital reconstruction of the ancient house. This paper presents both the use of objects in the house and their anticipated purpose for the game. The final project for fall of 2017 aims to create an online game used to educate users on Minoan culture and ritual.

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2:30-2:45 p.m. *Femininity, Sexuality, and Ritual: Ethical Art Practice and the Feminine/ist Aesthetic*
Alexandra Greenway
Faculty Sponsor: Rashna Richards, Department of English
Feminism and aesthetics have often been at odds with one another. Laura Mulvey's "male gaze" started a fire of feminist media criticism, much of which fought against essentializing and oppressive representations of women. Female bodies (specifically in this theory, but also raced bodies) are objectively portrayed from a male perspective, othering and essentializing them. In addition to furthering criticism of the male gaze, contemporary discourse has begun to explore theories of feminine/feminist aesthetics - the 'female gaze' - and pushes toward pluralist interpretations of bodied subjects. I aim to explore what this aesthetic looks like in practice. Beginning with an assessment of theories from Mulvey, Cixous, Irigaraf, et al., to contemporary art theorists and practitioners, including performance artist Taja Linley, then moving into a discussion of ethics in art practice, I will conclude my presentation with a discussion of my own work in which both the process and the product adhere to what I call the feminine/ist aesthetic - a way of art-making that reflects the specific, bodied experiences of women with an emphasis on process which focuses on ritual and healing in an act against a legacy of exploitation of female and otherwise deviant bodies.

Studio Art Senior Thesis Exhibition: The mirth that exists between everything else

Clough-Hanson Gallery

Moderator: Ryan Rasmussen and Joel Parsons, Department of Art & Art History

3:00 p.m.-5:00 p.m.
Bryan Martin, Shelby Glass, Emma Barr, Dylan Boutwell, McKenzie Drake, Jill Fredenburg, Malerie McDowell, Irene Shepley, Jean Xiong, Margaret Tronsor, and Haley Rushing
Faculty Sponsor: Ryan Rasmussen, Department of Art & Art History
Graduating senior studio art majors discuss their individual research, processes, and resulting artwork, which is currently on display in Clough-Hanson Gallery as part of the Senior Thesis Exhibition.

POSTER SESSION I

Multi-Sports Forum of the Bryan Campus Life Center

11:30 a.m. – 1:30 p.m.

Poster Numbers are listed with each title.

St. Jude Summer Plus Fellowships

#1 *Characterizing the phenotype of the Pax3-Foxo1 fusion transcription factor in alveolar rhabdomyosarcoma* ◙
Patrick Leavey III; St. Jude Children's Research Hospital
Faculty Sponsor: Rachel Jabaily, Department of Biology
Rhabdomyosarcoma is a soft tissue sarcoma with origins tied to muscle cell differentiation. It has two histological and molecular subtypes, embryonal and alveolar. Alveolar rhabdomyosarcoma (ARMS) has a worse prognosis. The majority of cases are molecularly characterized by the presence of the Pax3-Foxo1 (P3F) fusion transcription factor. The Hatley lab had previously created a doxycycline controlled P3F repression system within the Rh30 and Rh41 ARMS cell lines to study the effects of this protein on microRNA expression. Western blot and qRT-PCR analysis confirmed knockdown system efficiency. P3F knockdown's effect upon microRNA expression by microarray had previously been performed by the Hatley lab. Based off this data, miRNA-486-5p was selected as a potential oncogenic gene in ARMS. Using antimiRs to inhibit miRNA-486-5p, the invasion, migration, and xenograft growth

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capabilities were characterized to determine what role miRNA-486-5p played in metastasis. TargetScan, a microRNA target database was used to determine the targets of miR-486-5p responsible for these phenotypes. Through western blot and qRT-PCR, the affects miRNA-486-5p had upon the target gene expression was assessed. Luciferase assays were preformed to determine miRNA-486-5p's specificity for target gene mRNA transcripts. KaBoom!

#2 *Investigate separate functions of EZH1 and EZH2* ◙

Jenny Loome, Rhodes College; Jamy Peng, Department of Neurobiology, St. Jude Children's Research Hospital

Faculty Sponsor: Kim Gerecke, Department of Psychology

EZH1 and EZH2 are alternate catalytic components of PRC2, a complex that regulates gene expression and pluripotency during embryonic development by methylating lysine 27 residue in histone H3 H3K27. These two proteins have distinct functions, but their distinct functions are not well understood. Their functions in pluripotency and gene regulation were explored by using CRISPR/Cas9 to create EZH1 and EZH2 knockout stem cell lines. EZH1 knockout did not significantly affect the expression of pluripotency markers, but EZH2 knockout significantly decreased them. EZH2 knockout resulted in increased growth of embryoid bodies from stem cells, which mirrors the overgrowth phenotype of Weaver syndrome, a developmental disorder that is caused by EZH2 mutations. RNA-seq data show that EZH2 knockout affects the regulation of many genes, but RT-qPCR data validate only some of the RNA-seq data. However, RNA-seq, RT-qPCR, and Western blotting altogether conclusively indicate that EZH2 knockout causes up-regulation of BMI1, a main component of PRC1. These data suggest that EZH2 regulate human embryonic growth and that PRC1 compensates for the lack of PRC2 function.

#3 *Tissue Proteomics and Mouse Modeling Reveal U1 SnRNP and RNA Splicing Dysfunction in Alzheimer's Disease* ◙

Ariana Mancieri, Rhodes College; Junmin Peng, Ping-Chung Chen, and Bing Bai, Departments of Structural Biology and Developmental Neurobiology, St. Jude Proteomics Facility, St. Jude Children's Research Hospital

Faculty Sponsor: David Kabelik, Department of Biology

Alzheimer's disease (AD), the most common cause of dementia, affects nearly 44 million people worldwide. Unfortunately, current treatments alleviate symptoms but cannot slow down disease progression. Numerous clinical trials have recently failed, emphasizing the urgency for comprehensive understanding of disease mechanisms. Recently, we applied cutting edge proteomics to profile aggregated proteome, identifying the unique pathology of U1 snRNP splicing components (e.g. U1-70K) in familial and sporadic AD cases, raising an exciting hypothesis that RNA splicing deregulation may contribute to AD pathogenesis. To examine this working hypothesis, we generated a transgenic mouse model expressing an AD-related U1-70K fragment specifically in neurons. The mouse model renders a dominant negative effect to downregulate full length U1-70K, shown by immunohistochemistry and western blotting experiments. The animals recapture previously observed AD phenotypes, including U1-70K downregulation, cytoplasmic mislocalization, splicing deficiency, neuronal loss, as well as impairment of cognitive function. Deep transcriptomic analysis discovers concurrent aberrant splicing of synaptic components in the mice and human AD brain. Thus U1 snRNP dysfunction and splicing alteration may represent a novel pathway for potential therapeutic intervention.

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#4 *Identification of Novel Interactors of the Histone Demethylase UTX* ◙

Tanner Martinez, Rhodes College; Yurii Sedkov, Diana Balasubramanian, Satish Kallappagoudar, Lisa Velez-Velez, and Hans-Martin Herz, Department of Cell and Molecular Biology, St. Jude Children's Research Hospital

Faculty Sponsor: Kim Brien, Department of Chemistry

Mixed Lineage Leukemia 3 and 4 (MLL3 and MLL4) are Histone H3 lysine 4 (H3K4) methyltransferases that exist in large protein complexes and regulate cis-regulatory DNA elements called enhancers. UTX is a core component of the MLL3/4 complexes and acts as a histone H3 lysine 27 (H3K27) demethylase, removing H3K27 di- and tri-methylation, which are associated with gene silencing. Here we show that UTX interacts with ELMSAN1, DNTTIP1, HDAC1, and HDAC2, which constitute the MiDAC Complex (Mitotic Deacetylase Complex) and the zinc-finger protein, ZNF281. This is demonstrated through the co-immunoprecipitation of ELMSAN1, DNTTIP1, HDAC1, and HDAC2 with UTX and the reverse co-immunoprecipitation of UTX with ELMSAN1 and DNTTIP1 in Human Embryonic Kidney (HEK293) cells. ZNF281 and UTX have also been demonstrated as interactors by co-immunoprecipitation in HEK293 cells. MS/MS data from UTX immunoprecipitation from HEK293 nuclear extract reveals all of the mentioned proteins as significant interactors. All proteins segregate in the same molecular weight fraction upon glycerol gradient ultracentrifugation of HEK293 nuclear extract, suggesting that the proteins interact in vivo.

#5 *Cell fate commitment, a potential role for NuRD and PRC2 in the mammalian inner ear* ◙

Malerie McDowell, Rhodes College; Wanda Layman, Dan Williams, Yuxuan Wu, Jie Fang, and Bryan Kuo, Department of Developmental Neurobiology, St. Jude Children's Research Hospital

Faculty Sponsor: Jian Zuo, St. Jude Children's Research Hospital

In the United States, the prevalence of hearing loss in children and adolescents has risen to an estimated 19.5% (2005 to 2006) and is correlated with problems in reading, math, and attention. One of the primary causes of hearing loss is ototoxic drugs which damage the hair cells within the cochlea which are responsible for translating sound vibrations into electrical impulses which can be understood by the brain. In mammals, once these hair cells are lost, they are unable to regenerate. However, some studies suggest that mammals maintain this ability at neonatal ages, suggesting that mammalian cells undergo age dependent changes which limit regenerative capacity. While hair cell-like cells can be created through early induction of the transcription factor Atoh1, such induction is limited by epigenetic marks which prevent these cells from fully developing into functioning hair cells. By preventing epigenetic marks by knocking out repressive cofactors this regenerative capacity can be maintained. The repressive cofactors manipulated in this study are the NuRD and PRC2 complexes, which are involved in determining cell fate and maintaining cell fate respectively. By inhibiting these complexes before the definition of these developmental pathways, cellular plasticity can be maintained in these cells.

#6 *Ascertaining the Role of Calcium Dependent Phospholipases in the Sonic Hedgehog Pathway* ◙

Jacob Menke, Rhodes College; Angela Arensdorf, Miriam Dillard, and Stacey Ogden, Department of Cell and Molecular Biology, St. Jude Children's Research Hospital

Faculty Sponsor: Jonathan Fitz Gerald, Department of Biology

The Sonic Hedgehog (Shh) signal transduction pathway is evolutionarily conserved and vital during embryonic development. Post-developmental abnormal Shh signaling can be causative of cancers such as medulloblastoma and basal cell carcinoma. Currently, little is known about the regulatory mechanisms governing this pathway, therefore our lab seeks to elucidate these mechanisms in order to identify novel sites for therapeutic intervention. Previously, our lab identified that a class of calcium dependent phospholipases (cPLA2) interact with Smoothened (Smo), a G protein coupled receptor (GPCR) and essential signal transducer of the pathway, to promote signaling. After testing for the expression of specific genes within the cPLA2 family in mammalian 3T3 cells by quantitative real-time PCR (qRT-PCR), Pla2g4a, which encodes the protein cPLA2α, was the most highly expressed and therefore the most likely to be affecting the pathway. My project sought to inhibit and to show the effect that cPLA2α inhibition had on

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downstream targets of the pathway. Endogenous gene knockout attempts by using shRNA and cells treated with Crispr-Cas9 by other lab members showed some, but not complete, reduction in cPLA2α levels. Chemical inhibition of cPLA2α showed significant reduction of downstream targets further supporting our claim that cPLA2α helps promote Shh pathway activity.

#7 *Modeling of genetic alterations in acute erythroid leukemia (AEL)* ◙

Sarah Morris, Rhodes College; Ilaria Iacobucci and Charles Mulligan, Department of Pathology, St. Jude Children's Research Hospital

Faculty Sponsor: Mary Miller, Department of Biology

AEL is a rare and aggressive leukemia subtype with unknown genomic basis and controversial diagnosis characterized by predominant erythroid proliferation. A recent study in Dr. Mullighan's lab (manuscript under preparation) has provided a comprehensive genomic characterization of pediatric and adult AEL and identified markers for diagnosis, prognostication and targeted therapies. These findings have allowed for the establishment of models currently used to explore the roles of the different identified genetic alterations in leukemogenesis. In particular, my project is focused on two clinically relevant targets: i) ZMYND8-RELA gene fusion involved in NF-kB signaling and NTRK1 kinase mutations frequently co-occurring with TP53 mutations. In order to investigate their transforming ability, these genomic alterations were cloned in retro/lentiviral constructs and expressed in NIH 3T3 cells for focus formation assay (FFA), cell localization analysis (immunofluorescence), and in murine lineage negative hematopoietic stem cells for colony forming unit assays and transplantation of sub-lethally irradiated C57BL/6 mice. NTRK1 mutations were transforming in vitro as demonstrated by the formation of multiple foci in long term cultures and in vivo when combined with Tp53 mutations. Noteworthy, they proved to be sensitive to NTRK inhibitors. ZMYND8-RELA fusion is currently being investigated in FFA and in mouse transplantation studies.

#8 *Phase separation and multivalent interactions between human nucleolar protein NPM1 and prokaryotic ribosomal components* ◙

Christopher Parish, Rhodes College; Dhammika Muesse, Department of Chemistry, Rhodes College; Diana Mitrea and Richard Kriwacki, Department of Structural Biology, St. Jude Children's Research Hospital

Faculty Sponsor: Dhammika Muesse, Department of Chemistry

The nucleolus is the site of ribosome biogenesis in eukaryotic cells. Unlike many organelles, the nucleolus has no phospholipid membrane; instead, it is compartmentalized through a process termed phase separation. The molecular mechanisms that drive liquid-liquid phase separation (LLPS) of macromolecules in biology are not completely understood. Prokaryotes have not evolved compartmentalized organelles, such as the nucleolus, for ribosome biogenesis. However, the ribosomal machinery of prokaryotes is well conserved up to eukaryotes, including the persistence of arginine-rich primary sequences and multivalent arginine motifs (R-motifs) within ribosomal proteins. Nucleolar proteins, such as Nucleophosmin (NPM1), evolved later, and we have evidence that they act as a "glue" to compartmentalize ribosomal RNA (rRNA) and R-motif-containing proteins, including ribosomal proteins, within the nucleolus (Mitrea, et al., 2016, eLife). We hypothesize that human NPM1 will mediate LLPS of bacterial ribosomal components and, consequently, enhance the efficiency of ribosome assembly through compartmentalization. Here we describe efforts to create a hybrid, nucleolus-like system of human nucleolar phase separation machinery and prokaryotic ribosomal components as a tool to study and understand the biophysics and biology of ribosome biogenesis.

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#9 *Determining the role of ABIN1 in cell death through treatment of immortalized mouse embryonic fibroblasts with apoptotic agents* ◙

Peter Daniels, Rhodes College; Hans Haecker, Infection Diseases Department, St. Jude Children's Research Hospital

Faculty Sponsor: Gary Lindquester, Department of Biology

Natural Sciences

#10 *New methods for studying behavior and spatial movement of captive species* ◙

Erica Carcelen, Sarah Ferguson, and Miranda Rose

Faculty Sponsor: Sarah Boyle, Department of Biology

Spatial data are often collected to understand movement and social networks of wild species; however, these data are typically not collected for captive species. Studying captive species is important to provide valuable information for species conservation. We suggest methods to study spatial interactions and behaviors. We highlight three case studies (meerkat, fishing cats, and elephant) at the Memphis Zoo as examples of how to map spatial data, record behaviors, and analyze these data using GIS. This highlights individual use of space in captive settings, interactions with other individuals, and spatial distribution of behaviors. These methods can be essential for zoos to understand the behavior of the individuals they house, which is important for daily animal care, selection of mating pairs, and management of captive social groups. On a broader scale, scientists could use this information to better understand and predict how wild counterparts of these species may behave.

#11 *Correlation of ultrasonic backscatter difference parameters with bone density in clinical ultrasound images*

Abel Diaz, Rhodes College; Ann Viano and Brent Hoffmeister, Department of Physics, Rhodes College; Brian Garra, Department of Radiology, Washington D.C. VA Medical Center

Faculty Sponsor: Ann Viano, Department of Physics

Ultrasound is used to determine properties related to bone quality and is a clinically accepted form of imaging. This study aims to correlate ultrasound parameters with bone density, a quantity used to diagnose osteoporosis. The backscatter difference technique analyzes the power difference between two gated regions of an ultrasound signal attenuated by scattering off of bone. This difference is then used to determine three frequency-dependent ultrasound parameters known as the normalized mean, slope, and intercept of the backscatter difference (nMBD, nSBD, and nIBD, respectively). nMBD is the mean of the difference spectrum. nSBD and nIBD are determined by finding the slope and intercept, respectively. Clinical ultrasound images were acquired from three areas of the body of thirty patients; the hip and two vertebral bodies L3 and L4. The ultrasound parameters were determined for 25 different gate choices of width, separation, and delay and were compared with bone mineral density acquired by x-ray. Significant linear correlations were found for at least one choice of gate parameters for each ultrasound parameter. The strongest correlations were found when the ultrasound signal gates were chosen so that the difference spectrum compared a region of cancellous to a region of cortical bone.

#12 *Design and synthesis of novel inhibitors for the Tyrosine Hydroxylase enzyme*

Rebecca Evans; Larryn Peterson and Mauricio Cafiero, Department of Chemistry

Faculty Sponsor: Mauricio Cafiero, Department of Chemistry

Catecholamines are responsible for the fight or flight response and can be attributed to many functions within the sympathetic nervous system. Tyrosine Hydroxylase is the rate determining enzyme in the synthesis of the catecholamine, dopamine. Tyrosine Hydroxylase converts tyrosine to L-DOPA, which is administered in the treatment of Parkinson's patients. The inhibition of Tyrosine Hydroxylase allows for less feedback inhibition from catecholamines, aiding dopamine production. A crystal structure of the active site of Tyrosine Hydroxylase with a known inhibitor bound was obtained from the protein data bank (PDB ID: 2TOH). In this work, dopaminergic derivatives were inserted into the enzymatic active site in silico in order to test the strength of the interactions

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between the substrate and active site, to determine if any of these derivatives could be effective inhibitors. These derivatives were optimized with implicit solvent with M062X/6-31G and relaxed amino acid side-chains. Interaction energies between the ligands and protein were determined using M06L and MP2 with the 6- 311+G* basis set. Results shows that some of our dopaminergic derivatives show promise as inhibitors for Tyrosine Hydroxylase.

#13 *Ultrasonic bone assessment using backscatter power difference technique*
Luke Fairbanks, Sheldon Ebron, and Joey McPherson
Faculty Sponsor: Brent Hoffmeister, Department of Physics
Osteoporosis is a bone disease which disrupts the cellular remodeling of bone leading to increased porosity of bone tissue and increased facture risk. The focus of our research is to detect osteoporosis with ultrasound. Methods: 55 cube shaped specimens of bone were prepared from 14 human femurs. Ultrasonic measurements were performed by propagating 3.5 MHz ultrasonic pulses into the specimens, and receiving the returned, backscattered, signals. The backscatter signals were analyzed to produce the difference spectrum, representing the power difference between two portions of the backscatter signal over the measured frequency range. The difference spectrum was calculated for 21 different choices of location, duration, and separation with regard to the time segments of the signal chosen for analysis. Results: Varying separation did not change the spectrum. Varying the delay and width caused moderate changes in the difference spectrum. Conclusion: The portions of a backscatter signal chosen for analysis may influence the backscatter difference spectrum and parameters based on the backscatter difference spectrum.

#14 *Computational Identification and Characterization of the Epitope Regions in the C-Type Lectin Domain Number Seven on the Phospholipase A2 Receptor for Development of Epitope Binding Monobodies*
Liam Goldman, Omar Stocks, and Shana Stoddard, Department of Chemistry
Faculty Sponsor: Shana Stoddard, Department of Chemistry
In autoimmune diseases (AD), antibodies incorrectly attack healthy tissues, which can lead to long-term disease and death. Contemporary therapies include the use of immunosuppressive medicines (IM). This treatment diminishes the immune system's ability to fend off true pathogens, highlighting the need for more specific ways to treat AD without weakening the immune system. Idiopathic membranous nephropathy is an organ specific AD, which is treated by IM. Seventy percent of patients produce autoantibodies that target the Phospholipase A2 receptor (PLA2R). In this work, PLA2R antigen specific binding proteins that will prevent the PLA2R autoantibodies from binding to the CTLD7 domain of the PLA2R antigen are being designed. Using Epitopia and EPCES, three possible epitope sites (ES) were identified and characterized. Protein-protein docking runs were performed using Z-DOCK to determine which domain of the antigen templates would bind to. Results show that five and four areas are predicted to be reasonable binding spots for the 5FXB and the 5A40 epitope-binding protein caps respectively. Currently, mutations to the binding caps are being pursued to improve binding selectivity for CTLD7. This research could provide patients with more specific methods of treatment for AD than the current immunosuppressive therapies can provide.

#15 *DFT Study of the Selectivity of DOPA-decarboxylase* ◙
Emily Harrison and Abby Ritter; Larryn Peterson and Mauricio Cafiero, Department of Chemistry
Faculty Sponsor: Mauricio Cafiero, Department of Chemistry
L-DOPA is commonly used as a xenobiotic for patients with conditions such as Parkinson's disease. Clinically administered L-DOPA is transformed into dopamine by DOPA-decarboxylase. In order to be pharmacologically effective, L-DOPA must not be metabolized before it crosses the blood brain barrier. In order to prevent premature metabolism, DOPA-decarboxylase may be inhibited in the periphery. By selectively designing an inhibitor for the DOPA-decarboxylase enzyme, the effectiveness of the L-DOPA can be extended. A suite of dopaminergic derivatives have been developed as potential inhibitors of the DOPA-decarboxylase enzyme. The inhibitory effectiveness of these dopaminergic derivatives has been measured via in silico models in which the strength of interaction between each substrate and the enzymatic active site was analyzed. A crystal-structure of the DOPA-

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decarboxylase active site, docked with a known DOPA-decarboxylase inhibitor, Carbidopa, was isolated from the Protein Data Bank (PDB ID: 1JS3). The positions of novel dopaminergic derivatives were optimized in the active site using M062X/6-31G with implicit solvation and with flexible amino acid side-chains. Interaction energies between the ligands and the protein were calculated using M062X and MP2 with the 6- 311+G* basis set. At present, 6-nitrodopamine appears to be an effective competitive inhibitor of the DOPA-decarboxylase enzyme.

#16 *Do mutations lead to epitope sites? Characterization of the CTLD1 domain of PLA2R for the development of epitope binding caps*

Candace Hayes, Colin Welsh, Xavier May, and Shana Stoddard, Department of Chemistry
Faculty Sponsor: Shana Stoddard, Department of Chemistry

The phospholipase A2 receptor (PLA2R) is an antigen in the autoimmune disorder (AD) idiopathic membranous nephrophathy (IMN). Three domains have been identified to have epitope sites (ES) in this receptor, however the specific sequence of the epitope has only been identified in the ricin domain. Therefore, we investigated whether common mutations (M292V, H300D) in the CTLD1 domain led to greater probability of an ES. The CTLD1 domain was characterized. Epitopia and EPCES were used to identify any possible ES. Both programs predicted two separate clusters to be probable ES. No significant difference in epitope regions was observed between the mutated and nonmutated CTLD1 domain. For the development of antigen specific therapy for IMN, three monobody templates were chosen for optimization of CTLD1 binding. Using Z-Dock, binding specificity of the template caps was evaluated. The 3k2m, 3t04 and 5a43 monobodies were found to bind to the Ricin and CTLD1; Ricin, CTLD2 and CTLD1; Ricin, CTLD2 and CTLD1 domains, respectively. Currently, mutations are being made to improve the specificity and potency of these caps. This work suggests that common mutations in the CTLD1 domain do not directly produce ES but may instead may cause a structural change which produces an ES.

#17 *Examining Ultra Luminous Infrared Galaxies with Integral Field Spectroscopy* ◙

Eleanor Hook and David Rupke, Department of Physics
Faculty Sponsor: David Rupke, Department of Physics

Integral Field Spectroscopy is an astronomical technique that allows for the collection of individual spectra across a field of view. Effectively, this means that extended objects need not be treated as point sources when examined using spectroscopy. This research focuses on Ultra Luminous Infrared Galaxies (ULIRGs), a class of galaxies undergoing collisions with another galaxy, using data collected from the VIMOS instrument on ESO's Very Large Telescope. These galaxies are of interest because they are common at high redshift (that is, early in the universe's history) and are typically characterized by high star formation and black hole accretion rates. ULIRGs produce high-energy outflows from the energy in star death (supernovae) and black holes. To study these outflows, it is necessary to use a series of data reduction software to eliminate or reduce various artifacts in the data due to the atmosphere, telescope, and instrument. My work focuses on improving and expanding upon the data reduction process used for this project.

#18 *Ultrasonic Characterization of Trabecular Bone Phantom Attenuation and Speed of Sound at 0.5 MHz*

Matthew Huber and Brent Hoffmeister, Department of Physics
Faculty Sponsor: Brent Hoffmeister, Department of Physics

Ultrasound is being researched and used for diagnosing osteoporosis. Researchers use trabecular bone from humans as a test material, but such bone is bio-hazardous, not uniform, and of limited size. Here, the acoustic properties of commercially available open-cell polyurethane foam, known as "Sawbones", were explored to see if Sawbones could pose as a substitute for trabecular bone in ultrasound studies. Rectangular slices of Sawbones with densities of 5.5, 7.5, 15, and 30 pounds per cubic foot were scanned at 0.5 MHz, a frequency commonly used in medical ultrasound. From the power loss of the reflected signal and the time-of -flight, the normalized broadband ultrasonic attenuation (nBUA) and speed of sound through the phantom were found. Both properties were observed to be stable after being soaked in water, facilitating reliable measurements. Additionally, attenuation exhibited anisotropy,

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a characteristic of human bone. Attenuation increased with density from a nBUA of 5.60 to 27.4 dB/cm/MHz. Speed of sound also generally increased with density, ranging from 1550 to 1740 m/s. These values were within the range of what is expected in human bone. These findings provide a foundation for using Sawbones trabecular bone phantoms in ultrasound studies. [Work supported by NIH grant R15AR066900]

#19 *Residue Analysis via GC-MS of Archaeological Smoking Pipes from the Eastern Woodlands of North America* ◙
Ryan Hunt, Rhodes College; Jon Russ, Department of Chemistry, Rhodes College; Jera Davis, Department of Anthropology, University of Alabama-Tuscaloosa; Stephen Carmody, Department of Environmental Studies, University of the South
Faculty Sponsor: Jon Russ, Department of Chemistry
The tradition of pipe smoking was well-entrenched among the indigenous cultures of the Eastern Woodlands of North America. However, many questions remain concerning which natural materials were utilized in this smoking tradition and the temporal context in which they entered the tradition. For example, there is a sizable time gap between the earliest documented evidence of tobacco and the earliest discovered archaeological pipes from this region; this discrepancy could indicate the existence of a pre-tobacco smoking complex among these cultures. The ample recovery of smoking pipes from archaeological sites in this region makes the chemical analysis of extracted organic residues a promising avenue of exploration into answering questions regarding the development of an indigenous smoking complex. In this study, organic matter derived from over 60 pipe fragments excavated at sites throughout the Southeastern United States was extracted and analyzed via GC-MS. Several notable compounds were identified through these extractions; among these was nicotine, which serves as a biomarker for tobacco (Nicotiana rustica). In addition, residue analyzed from a pipe thought to have dated to over three millennia before present possessed a nicotine signature, which could be the earliest known evidence for tobacco use in the Eastern Woodlands.

#20 *DFT Study of the Selectivity of Monoamine Oxidase B (MAOB)*
Samantha Jelinek, Audrey Woody, and Mallory Morris; Larryn Peterson and Mauricio Cafiero, Department of Chemistry
Faculty Sponsor: Mauricio Cafiero, Department of Chemistry
MAOB is an enzyme located on the outer mitochondria that is responsible for degrading penylethylamine, benzylamine, and dopamine. MAOB inhibitors are generally used as a treatment for Parkinson's disease because they stop the breakdown of dopamine. By selectively designing an inhibitor for the MAOB enzyme, the breakdown of dopamine can be reduced leading to an increase of the neurotransmitter. A suite of dopaminergic derivatives have been developed as potential inhibitors of the MAOB enzyme. The inhibitory effectiveness of these dopaminergic derivatives has been measured via in silico models in which the strength of interaction between each substrate and the enzymatic active site was analyzed. A crystal-structure of the MAOB active site, docked with the widely employed diabetes drug pioglitazone, was isolated from the Protein Data Bank (PDB ID: 4A79). The positions of novel dopaminergic derivatives were optimized in the active site using M062X/6-31G with implicit solvation and with flexible amino acid side-chains. Interaction energies between the ligands and the protein were calculated using M062X and MP2 with the 6- 311+G* basis set. At present, dopamine appears to be the strongest inhibitor of the MAOB enzyme.

#21 *A centromeric promoter is important for establishing gene silencing*
Arati Joshi and Bayly Wheeler, Department of Biology
Faculty Sponsor: Bayly Wheeler, Department of Biology
When a cell divides, DNA is duplicated and partitioned equally such that the two new cells inherit the same genetic information. Formation of a centromere, a complex of DNA and proteins, is essential for this process. Failure to form a centromere causes errors in DNA division and can cause developmental defects in humans. Heterochromatin, a condensed form of DNA and DNA-associated proteins, is necessary for centromere formation. Despite the

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importance of centromeric heterochromatin, how heterochromatin is established remains incompletely understood. Previous work has shown that RevCen, a transcribed DNA sequence present in multiple copies at the centromere, is sufficient to silence the expression of nearby genes. Because gene silencing is a hallmark of heterochromatin, these results suggest that RevCen contributes to centromere formation by establishing heterochromatin. To test whether RevCen transcription is important for silencing, we engineered versions of RevCen without a promoter. We show that RevCen-mediated gene silencing is partially dependent on the presence of the RevCen promoter. Future work will measure RevCen transcript levels to determine whether RevCen's ability to silence the expression of other genes depends on its own transcription. This work will illuminate how centromeric DNA sequences form heterochromatin and contribute to centromere function.

#22 *Synthesis of Cyano-Nitro Dopamine Analogues*

Grace Kennedy, Lane Brandt, and Katie Hatstat; Mauricio Cafiero and Larryn Peterson, Department of Chemistry

Faculty Sponsor: Larryn Peterson, Department of Chemistry

The catecholamine core of the neurotransmitter dopamine has been used in numerous drugs and other applications. L-DOPA, a dopamine precursor, is commonly used as a pharmacological treatment for patients with conditions such as Parkinson's disease. This therapeutic L-DOPA, as well as the dopamine derived from L-DOPA, can be deactivated via metabolism by catechol-O-methyltransferase (COMT). A computational analysis shows favorable interactions with a nitrocatechol moiety through which the ligands bind in COMT, found in our second generation ligands. The second generation ligands had higher affinities in the active site than dopamine. Using this information, continued synthesis of analogues deriving from the second generation ligands showed the most promise for future biological and non-biological uses due to the promising interactions. For further synthesis of the catechol core, the affordable and easily accessible 2-(3,4-dimethoxyphenyl)ethanol (DMPE) was used for starting materials. Using the derivatives of DMPE, the synthesis of dopamine intermediates would be used for creating more efficient catecholamine-structured drugs, as well as being used for non-biological applications. The synthesis of these dopamine analogues, specifically the work towards both the methyl ether cleavage and addition of a nitro group, and the verification of the characterization and structures of previous compounds will be discussed.

#23 *Analyzing Protein Kinase C domain interactions with the formin SepA using Gal4 based yeast two-hybrid.*

Elisabet Olsen, Brianna Betton, Ashmeet Singh, Zainab Atiq, Lynsey Campbell, and Paul Parish; Loretta Jackson-Hayes, Department of Chemistry

Faculty Sponsor: Loretta Jackson-Hayes, Department of Chemistry

Our research focuses on understanding hyphal growth and cell wall metabolism in filamentous fungi. We explore proteins that localize to sites of cell wall synthesis, specifically growing hyphal tips and forming septa. In our model organism Aspergillus nidulans, protein kinase C (PkcA) is activated when the organism experiences cell wall stress. To further confirm the interactions between PkcA and SepA, we have implemented a GAL4-based yeast two-hybrid experiment. This entails fusing PkcA with the DNA binding domain of the transcription factor GAL4 and fusing SepA with its activation domain. Physical interaction of the two recombinant proteins will restore functionality of GAL4 transcription activation activity, which we monitor in a yeast system. We have been analyzing a series of truncated pkcA constructs to identify the regions of direct PkcA localization. The first region is a 10 amino-acid sequence near the carboxyl end of the C2 domain that is required for localization to hyphal tips and septation sites, while the second region is between the C2 and C1B domain, and is sufficient for localization to septation sites only. Through the execution of our yeast two-hybrid assay using the pkcA truncations, we hope to better understand the physical interaction between PkcA and SepA.

#24 *DFT analysis of the selectivity of known bioactive ligands in the sulfotransferase and catechol-o-methyltransferase enzymes* ◙

Calli Pinckney and Caroline Magee; Larryn Peterson and Mauricio Cafiero, Department of Chemistry
Faculty Sponsor: Mauricio Cafiero, Department of Chemistry

We have studied the substrate selectivity of a number of known bioactive ligands in sulfotransferase enzyme (SULT1A3) and catechol-o-methyltransferase (COMT) by identifying important protein-ligand interactions in the active-sites through electronic structure calculations. SULT1A3 is responsible for activating and improving the solubility of catecholamines while COMT deactivates catecholamines. Understanding how ligands behave in both of these enzymes leads to a greater understanding of the fate of dopaminergic molecules in the body. The SULT1A3 and COMT enzymes catalyze the addition of a sulfate group and a methyl group, respectively, to a variety of small molecules, including catecholaminergic molecules. Crystal structures of the SULT1A3 (PBD ID 2A3R) and COMT (PDB ID 2CL5) enzyme active sites were isolated from the Protein Data Bank. A suite of molecules with known activity in COMT were chosen from PubChem and their positions in each active site were optimized using M062X/6-31G including implicit solvation and using flexible amino acid residues. Interaction energies between the ligands and the proteins were calculated using M062X with the 6-311+G* basis set. Calculations have shown that molecules active in COMT also show a promise of strong activity in SULT1A3. The 5-carboxyl-3-nitrocatechol and 4-acetyl-3-nitrocatechol molecules show greater affinity for COMT and lower affinity for SULT1A3. In addition, multiple QSAR models for ligand binding in COMT have been developed and show promising results.

#25 *Synthesis and analysis of propargylglycine-based derivatives as potential inhibitors of LpxC*

Rebeca Roldan, Carter Embry, Kayla Wilson, and Gene Lamanilao; Mauricio Cafiero and Larryn Peterson, Department of Chemistry
Faculty Sponsor: Larryn Peterson, Department of Chemistry

The inhibition of LpxC, an enzyme involved in the first committed step of the biosynthesis of Lipid A, is critical for the development of novel antibacterial treatments. Through computational analysis of its crystal structure, it was determined that LpxC contains three key regions: a zinc binding motif, a hydrophobic passage, and a polar region. The design of simplified inhibitors containing the zinc and hydrophobic region was completed in order to analyze the importance of the nucleoside in zinc binding. Through Click Chemistry, a triazole linker was coupled between the nucleoside and zinc binding motif in order to yield the final inhibitors. Synthesis and chemical and enzymatic stability of these novel inhibitors will be discussed.

#26 *Design of novel inhibitors for the aldehyde dehydrogenases*

Emma Selner, Caroline Magee, and Larryn Peterson, Department of Chemistry
Faculty Sponsor: Mauricio Cafiero, Department of Chemistry

L-DOPA is commonly used as a xenobiotic for patients with conditions such as Parkinson's disease. L-DOPA is transformed into dopamine by DOPA-decarboxylase. Dopamine derived from L-DOPA is deactivated via metabolism by a series of enzymes including Aldehyde dehydrogenases (ALDH). The targeted inhibition of the ALDH enzyme may help to prolong the effectiveness of L-DOPA, resulting in a net increase in pharmacological efficiency. By selectively designing an inhibitor for ALDH, the effectiveness of the L-DOPA can be extended by regulating the metabolism of dopamine derived from L-DOPA. The effectiveness of a series of potential inhibitors has been measured via in silico models in which the strength of interaction between each substrate and the enzymatic active site was analyzed. A crystal-structure of the ALDH enzyme with an inhibitor bound in its active site (PDB ID: 4WP7) was used to create a model of the active site. Novel dopaminergic derivatives were optimized in the active site using M062X/6-31G with implicit solvation and with relaxed amino acid side-chains. Models with two ligands in the active site were explored along with point mutations to more fully understand binding of the ligands. Interaction energies between the ligands and the protein were calculated using MO62X with the 6-311+G* basis set. Some potential inhibitors show promising results.

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#27 *Utilization of python scripting to aid the design of CTLD1 epitope specific blocking caps*

Colin Welsh, Candace Hayes, Xavier May, and Shana Stoddard, Department of Chemistry
Faculty Sponsor: Shana Stoddard, Department of Chemistry

Autoimmune disorders (AD) are the second leading cause of long-term chronic illness. Among these disorders, 10-12 million individuals are affected by a kidney-specific AD called idiopathic membranous nephropathy (IMN). Current treatment of IMN, and all AD, is dominated by non-specific immunosuppressants, which leaves the patient vulnerable to other diseases. Instead, we propose the rational design of protein blocking caps that specifically target the CTLD1 region of the IMN antigen PLA2R. These caps consist of the monobodies 5IMK, 4JEG, and 4JE4, which target the α- and β-cluster epitope sites on CTLD1 which were characterized via EPCES and Epitopia. The design of these capping monobodies was performed using protein-docking simulations via Rosetta and the creation of mutated monobodies via Phyre2. The goal was to create caps that beat the binding scores, in Rosetta energy units, of these caps to the Ricin, Fibronectin, and CTLD2 regions of PLA2R. These predictions were output from Zdock. Python scripts were written to convert the .pdb files containing the caps to the appropriate format demanded by the various services employed. The successful creation of antigen-specific protein caps will allow for better, more effective treatment of IMN and, with further development, other autoimmune disorders.

#28 *Modeling the Development of Water Terrorism*

Andrew Williams and Erin Bodine, Department of Mathematics & Computer Science
Faculty Sponsor: Erin Bodine, Department of Mathematics & Computer Science

Water supply and distribution systems have historically represented prime targets for terrorist activity, both in the United States and internationally among developed nations. The critical need for water in every sector of industrialized society has resulted in a dependency on water which can have a significant impact a community with any disruption or intentional contamination of a supply and distribution system. Such a disruption, either if an isolated event or if coordinated as part of a terrorist attack could lead to serious medical, public health, and economic consequences. Currently, the public is poorly prepared to detect or defend themselves from water-related disease resulting from intentional contamination. The purpose of this research is to address this critical information gap, to present simulations of what such an attack would look like both with and without safe-guards, and to prescribe which prerequisites would need to be met to most effectively minimize the damage of such an attack. Modeling such an attack comprises a host of different factors. Model parameters include rate and efficacy of various biological agents to spread through a water supply and population, security of infrastructure, and efficacy of disease control methods within the population utilizing that water source. Model analysis demonstrates the potency of various pathogens against water security measures. Using model analysis, specifically agent-based modeling, I have simulated such attacks for a range of parameter sets.

#29 *DFT Study of the Selectivity of the Tyrosinase Active Site*

Danielle Wilson and Allie Young; Larryn Peterson and Mauricio Cafiero, Department of Chemistry
Faculty Sponsor: Mauricio Cafiero, Department of Chemistry

We have studied the substrate selectivity of the tyrosinase enzyme by identifying important protein-ligand interactions in the active-site through electronic structure calculations. Tyrosinase is involved in the conversion of tyrosine to melanin and mutation in this enzyme is the leading cause of albinism. It is also plays a key role in UV protection, detoxification, and healing. A variety of ligands analogous to known substrates of tyrosinase were chosen for study. M062X/6-31G optimization of the ligands was used to find the structures of the ligand-protein complexes in a relaxed active site with implicit solvent. Interaction energies between the ligands and the amino-acids of the active-site were calculated using MP2 and M062X with 6-311+g*; these energies can be used to determine the thermodynamic stability of the ligand in the active site, which can be correlated with inhibitory strength.

#30 *Rational Design of Epitope Binding Monobodies: New Tools for Autoimmune Therapy*
AliReza Zaravar, Xavier May, and Shana Stoddard, Department of Chemistry
Faculty Sponsor: Shana Stoddard, Department of Chemistry
Current therapeutic options for autoimmune kidney disease (AKD) involve the use of nonspecific immunosuppressive medications that weaken the entire patient's immune system. These therapies leave the patient more prone to contracting basic infections. Therefore, more targeted approaches, which suppress only the portion of the immune system that contributes to the AKD are needed. In our work we have developed and computationally evaluated over one hundred antigen binding monobodies to the phospholipase A2 receptor (PLA2R) antigen, which contributes to the AKD idiopathic membranous nephropathy (IMN). Antigen binding monobodies were optimized using in silico mutagenesis, homology modeling using Phyre2, and protein-protein docking using Rosetta. Our results show several prominent interactions lead to improved binding scores compared to the starting monobody template. Initial binding energy, measured in rosetta energy units (REUs), was -3.736 for the ySMB-1 template. In silico mutations Y73F, Y75W, Q42D, Y85W, and Y78W improved binding score to -5.647. Thus, several important molecular interactions have been identified that lead to improved binding of the ySMB-1 template to the PLA2R antigen in IMN. Experimental verification of binding of the ySMB-1 monobody candidates to confirm binding to the PLA2R antigen are underway. This work could assist in developing targeted therapeutic approaches for AKD.

#31 *HPLC analysis of sulfation of dopamine derivatives by SULT1A3*
Kendall Reed, Spencer Fields, and Jessica Rogowiec; Mauricio Cafiero and Larryn Peterson, Department of Chemistry
Faculty Sponsor: Larryn Peterson, Department of Chemistry
Dopamine (DA) is a neurotransmitter that plays a critical role in the human body and is metabolized by enzymes such as catechol O-methyltransferases or cytosolic sulfotransferases (SULTs). SULTs catalyze the transfer of a sulfuryl group from PAPS to endogenous compounds and xenobiotics, thus increasing the solubility of these compounds and/or regulating their excretion. Of particular interest is SULT1A3, which has a strong affinity for catecholamines, such as dopamine, yet a weaker affinity for simple phenolic compounds. Even though key residues in the active site are known, Glu and Asp, the molecular basis of this selectivity is not completely understood. Previously synthesized dopamine derivatives were examined in a SULT1A3 enzymatic assay to determine the enzyme's affinity for analogues. Derivatives substituted at the 6-position with varying electron donating and withdrawing groups and others that had the amino-ethyl tail substituted for a nitrile tail were examined. Preliminary studies have shown that these DA derivatives are sulfated by SULT1A3. Kinetic parameters for each analogue were determined, and results were compared to computational results.

Biomathematics

#32 *The Potential Impact of a Prophylactic Vaccine for Ebola in Sierra Leone* ◙
Mikayla Shorten and Connor Cook
Faculty Sponsor: Erin Bodine, Department of Mathematics & Computer Science
The 2014 outbreak of Ebola virus disease (EVD) in West Africa was multinational and of an unprecedented scale primarily affecting the countries of Guinea, Liberia, and Sierra Leone. One of the qualities that makes EVD of high public concern is its potential for extremely high mortality rates (up to 90%). A prophylactic vaccine for ebolavirus (rVSV-ZEBOV) has been developed, and clinical trials show near-perfect efficacy. We have developed an ordinary differential equations model that simulates an EVD epidemic and takes into account (1) transmission through contact with infectious EVD individuals and deceased EVD bodies, (2) the heterogeneity of the risk of becoming infected with EVD, and (3) the increased survival rate of infected EVD patients due to greater access to trained healthcare providers. Using fitted parameter values that closely simulate the dynamics of the 2014 outbreak in Sierra Leone, we utilize our model to predict the potential impact of a prophylactic vaccine for the ebolavirus using various vaccination strategies including ring vaccination. Our results show that an rVSV-ZEBOV vaccination coverage as

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low as 40% in the general population and 95% in healthcare workers will prevent another catastrophic outbreak like the 2014 outbreak from occurring.

Computer Science

#33 *Encampused*
Shaun Patel, Meredith Tufton, and Crawford Watkins
Faculty Sponsor: Betsy Sanders, Department of Mathematics & Computer Science
This paper presents the proposal for a social media system designed to encourage and connect students and teachers within their college campus. The website Encampused connects the Rhodes College Community by providing a user-based system for social networking within a college campus. Encompassing a wide range of categories for students to reach out, connect with, and help other students, Encampused differentiates itself from other social media by focusing on community-oriented post particular to that campus' needs and requirements. By crowdsourcing information, Encampused will provide information that emphasizes locality and community engagement. This paper presents the need for a website specific to a college campus in distributing information and outlines the layout and methodology in implementing Encampused for Rhodes College.

Social Science

#34 *Influence of Mood on Race and Social Class Judgments*
Bianca Branch, Raer Rawlings, and Maggie Rippeto
Faculty Sponsor: Matt Weeks, Department of Psychology
The shifting standards model (e.g., Biernat & Manis, 1994) suggests that making social judgments on objective rating scales reveal stronger assimilation to stereotype expectations than on subjective rating measures due to a "shifted" standard of comparison based on category membership, (e.g. black or women). Previous work has established that positive mood states increase the use of heuristic processing in relation to stereotype use. This research tested the influence of positive and neutral mood induction on stereotype-based shifts. One study investigated whether induced mood state would influence a participant's tendency to shift standards on a race and social class judgement task. We predict those in a positive mood to rely more on stereotyped heuristic processing and thus exhibit a greater shifting standard effect in comparison to the neutral mood condition. Two previously piloted video sets (one positive, one neutral) were used to induce mood. Participants were randomly assigned to either positive or neutral mood condition after which they judged a series of black and white male targets on social status characteristics (education, financial success) on subjective and objective measurement scales. The results are analyzed in regards to the shifting standards model.

#35 *The Effects of Age on the Shifting Standards of Race and Social Class*
Addie Klemm, Prentiss Smith, and Jacob Stansberry
Faculty Sponsor: Matt Weeks, Department of Psychology
Prior research has shown that individuals are more prone to make stereotype consistent judgments on objective rather than subjective measures. This experiment examined the hypothesis that older adults have a greater tendency to shift standards when making race based financial and educational judgments than younger adults. We proposed that older adults will rely more on stereotypes when making objective judgments because of the cognitive deficits associated with aging, particularly decreased inhibitory ability. We measured age to correlate with the tendency to shift standards and also measured motivation to control prejudice. Any significant differences of the tendency to shift standards between younger and older adults not due to motivation may be attributed to cognitive factors. Using an online survey, our experiment measured shifting standards tendencies of participants making social class judgments about both Black and White targets. While the shifting standards model was replicated, age and

motivation to control prejudice were not significant moderators of the effect. These results suggest that the shifting standards model stays true for all age groups though limitations will be discussed.

#36 *Religiosity, Morality, and Shifting Standards*
Emily Watkins, Maggie Mitchell, and Anna Wohlbold
Faculty Sponsor: Matt Weeks, Department of Psychology
The present study aims to investigate the influence of religiosity as a moderator to the shifting standards model when making judgments of morality. The shifting standards model says that people are influenced by stereotypes when making judgments. The influence of the stereotype is visible on an objective scale, but it is hidden on a subjective scale due to the shift in expectation. Although a lot of research has been done on shifting standards in regard to sex and race stereotypes, not many studies have been done related to stereotypes of religiosity and morality with shifting standards. Previous research has demonstrated a link between concepts of religiosity and morality. In this study, participants saw a target, with religious affiliation indicated as "Christian" or "None," along with demographic information about him. Participants were asked to indicate the minimum number of moral behaviors necessary to deem the target as moral. Furthermore, participants completed a Centrality of Religiosity Scale for themselves, to understand how participant religiosity affected the tendency to shift standards when judging a religious or non-religious target, and answered other demographic questions. The results are interpreted in light of the Shifting Standards Model.

#37 *Organized Inequality: Perceived Teacher Authority Within Rhodes' Classrooms*
Ryan Fennelly, Justin Powers, and Emily Orth
Faculty Sponsor: Dee Birnbaum, Department of Business
This study investigates students' perception of authority in teachers within Rhodes' classrooms. Our survey evaluates the importance of teacher qualities, curriculum, and persona in relation to the three types of authority presented by Max Weber: charismatic, traditional, and legal-rational. Substantial research has been conducted on preferred authority in organizations and pre-college education; however, there has been relatively less research on the perception of teacher authority among college students. This study examines the three types of authority involved in teacher student interactions at Rhodes College by assessing each one's importance in creating a positive authoritative relationship, or lack thereof.

#38 *Definitions of Student Success at Rhodes College*
Kathryn Bigler, Katherine Hill, Sawyer Kelly, and Grace Bertram
Faculty Sponsor: Dee Birnbaum, Department of Business
Previous research in professional environments has found discrepancies in the definition of success between professionals in the workplace. This study analyzed professor and student definitions of student success at Rhodes College and compared the results with previous findings in the business world. This study aimed to examine the extent to which students and professors agree or disagree about student success. Based on the overall patterns, there were no large differences in professor and student responses. However, there were interesting patterns of frequency in the values chosen.

#39 *Family interactions in an art museum: Parents' ability to enrich children's experience*
Samantha Newman, Amelia Mathis, and Shannon O'Brien, Rhodes College; Jamie Jirout, Department of Educational Psychology, University of Virginia
Faculty Sponsor: Marsha Walton, Department of Psychology
Compared to science centers and children's museums, research on children's experience when visiting art museums is lacking (Adams, Luke, & Ancelot, 2010), despite their potential to provide rich learning opportunities (Knutson & Crowley, 2009). Parents scaffold children's development of visual literacy skills by modeling how to think and talk about art (Munley & Center, 2012). In the current study, we investigate family interactions in an art museum, with a

focus on how these interactions foster children's visual literacy through relations between art talk and 1) use of museum resources, 2) children's connection-making, 3) children's information-seeking, and 4) parent directives. Participating families (N=32) were recruited if they included at least one child between 3-12 years old (M= 89.58 months). Children wore an audio recorder for the museum visit, and parents completed a questionnaire at the end of their visit, which focused on their use of museum resources. Preliminary analyses of 11 children showed that, consistent with prior research, parents do scaffold their children's art museum experience, and parent art talk relates to increased connection-making and information-seeking by the children. These behaviors are likely to lead to richer museum experiences that facilitate the development of visual literacy skills.

Social Science Interdisciplinary

#40 *Mapping the 2012 and 2016 General Elections in Shelby County, TN*
Corena Hasselle and Amelia Giancarlo
Faculty Sponsor: Sarah Boyle, Department of Biology
In 2013, the Supreme Court disassembled Sections 4 (and 5) of the Voting Rights Act of 1964 in Shelby County (AL) v. Holder. According to the New York Times, the section struck down the provision that made "judicial clearance" necessary before states made minor changes, like that of moving polling places ("Supreme Court Invalidates Key Part of Voting Rights Act"). Because of the results of this case, when compared to the 2012 general elections, we hypothesize that Shelby County (TN)'s polling locations have been shut down in certain areas, particularly in predominantly minority-accessible locations in Shelby County, for the 2016 general elections. Overall, we plan to look at not only the polling locations, as well as race and median household income for these neighborhoods, but also voter turnout. Presumably, we expect to find that voter turnout will be lower for the neighborhoods where polling locations were shut down.

#41 *Power Relations at Rhodes*
Blake Jacobs, David Glenn, Tej Suber, and Nic Rocha
Faculty Sponsor: Dee Birnbaum, Department of Business
Our research is on the power relations between students and professors. The purpose of this project was to determine which type of power, using French and Raven's framework, would convince students to accept professors' authority. To explore this topic, we sampled Rhodes students using a survey instrument we designed. The survey presented five hypothetical scenarios between students and professors in which professors used different power tactics to influence students' behavior. Our subjects were asked to rate the degree to which they would be likely to accept the authority of a professor given the professor's use of different power tactics in each scenario. The data indicate the degree of influence different types of power tactics have on students in different social situations.

Deaf Studies

#42 *Deaf Culture and Mental Health Care* ◙
Mary Sanderson
Faculty Sponsor: Lori Garner, Department of English
Deaf individuals have long struggled with their access to health care, particularly mental health care, many reporting negative experiences characterized by fear, mistrust, and frustration (Steinberg et. al., 2006). Three out of every 1000 infants is born with hearing loss, and 25% of deaf individuals have other disabilities as well, making this a group with complex mental health needs (Fusick, 2008; Fellinger, 2012). Communication barriers and lack of equal access to healthcare, education, and employment can sometimes prevent deaf individuals from seeking mental health care (Fusick, 2008). Additionally, negative perceptions of deafness as a medical issue that must be treated can also affect deaf individuals' willingness to seek out and continue with mental health care. Although some communication barriers between mental health counselors and deaf clients can exist because of a counselor's lack of knowledge or

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professionalism, research suggests that this barrier might also be due to the counselor's lack of understanding of the larger cultural phenomenon (Feldman, 2005). This project identifies institutional barriers affecting deaf individuals' access to mental health care, situates these issues within the context of Deaf culture, and describes counseling practices that have been effective in working with deaf individuals.

#43 *Sociolinguistic Variation in American Sign Language* ◙
Austin Wall
Faculty Sponsor: Lori Garner, Department of English
As with many minority communities in the United States, Deaf people and those that use American Sign Language (ASL) are often seen as a homogenous group. However, while standard ASL taught at institutions for the Deaf is relatively uniform, conversational sign language varies based on age, race, and region (Lucas, 2001). Generational difference in sign language is due to both education environment and the impact of more recent efforts to standardize modern sign language (Lucas, 2003). Institutional pressures that influence variation include the United States' history of racially segregated academies and differing pedagogical strategies, especially whether the oral or manual method was used for primary education and communication (Lucas, 2001). Negative societal perceptions of Black ASL have led to a code switching between Black ASL within racially homogenous groups and standardized "White" ASL in mixed race company (McCaskill, 2009). Regional variation often reflects cultural differences,and ASL grammar can vary both in the handshapes used and in the use of the signing space (Lucas, 2003). Analyzing the sociolinguistic variance of ASL allows the public to have a more rounded view of how Deaf history and Deaf culture in America have shaped ASL.

Fine Arts

#44 *Harp Techniques*
Petra Dhinakaran, Sidney Long, Nicole Quinones, Zhiyu Zhao, Quinn Kendall, Andie Caroline Dorn, and Shuliang Yu, Urban Studies Program
Faculty Sponsor: Gina Neupert, Department of Music
The harp is a stringed instrument of very ancient lineage that is synonymous with classical music and cupid's lyre. Over the years, the harp has morphed from its primitive hunting bow shape to its modern day elaborate design, fitting for its common use as a luxurious indulgence. While it is generally well known for its melodious music produced by plucking the strings, many are unaware of the various ways to play the harp. Ranging from dragging one's nails across the strings to banging on the soundboard, these anomalous techniques are what makes the harp unique from the rest of the music world.

#45 *Digital Architects* ◙
Lana Theriault and Aylen Mercado
Faculty Sponsor: Rosie Meindl, Department of Art & Art History
It is no surprise that Memphis, Tennessee has a rich architectural history, but the city has more to offer than Graceland. For six months a team of undergraduate students at Rhodes College has been working on making Memphis' architectural history more accessible. The project started by identifying historically and architecturally significant buildings in Memphis. The team, led by Lana Theriault and Aylen Mercado, photographed over 50 sites in just a few short months. For each site, geographical, historical, and architectural data was gathered. A short description was written for each site and the sites were tagged with relevant architectural terms. After the photos were edited and the data was collected, the sites were entered into the Rhodes Digital Repository, DLynx. These entries, however, are open to the public. The project was meant to do two things. First, it was designed to be a useful teaching and research resource for classes, especially ones focusing on architecture, art, or urban studies. Secondly, to get the public to learn more about the architecture in Memphis, as well as noticing the beauty in the everyday scenery of Memphis' cityscape.

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#46 *Where Elvis Became Elvis* ◙
Alice Fugate
Faculty Sponsor: John Bass, Department of Music
The address is 1034 Audubon Drive, Memphis, Tennessee. The place is an unassuming mid-century house tucked away in East Memphis, but it is where Elvis Presley became Elvis. He bought the home off the royalties from his first RCA hit, "Heartbreak Hotel," and lived there for thirteen months with his parents and grandmother between May 1956 and May 1957. It was in this house that he accomplished much of what made him an international superstar: recorded "Hound Dog," appeared on The Ed Sullivan Show, wore the gold lamé suit, bought the pink Cadillac. But there is more to this house than its famous former owner. 1034 has a rich, compelling history as a place of contention, instability, and pride spanning 65 years. From its first owners, through the Presleys, and up until the present owner, Nashville record executive Mike Curb, and its steward the Mike Curb Institute of Music at Rhodes College, there has been a pattern of instability and contention, but also a familiar relationship with fame in its residents, visitors, and neighbors. Through traditional archival work and interviews with former residents and neighbors of 1034, Rhodes College student Alice Fugate explores the story of this house from 1952 to the present: "Where Elvis Became Elvis: The History of 1034 Audubon Drive" tells the story of how a house became famous, transitioned back to a "normal" yet unstable house, and how it has now become a tribute to the King.

Biology 141

#47 *Effects of increased manganese concentration on duckweed (Lemna minor) growth*
Cal Masterson, Ryal Mitchell, and Amanda Salazar
Faculty Sponsor: Mel Durrett, Department of Biology

#48 *Does incentivized behavior play a role in crayfish substrate preference?*
Anne Cribb, Dani Kelly, Oronde Pendergrass, and Sneha Suresh
Faculty Sponsor: Mel Durrett, Department of Biology

#49 *Lichen species diversity on gravestones vs. tree bark*
Lindsey Blasius, Alexandra Lee, and Maggie Palopoli
Faculty Sponsor: Mel Durrett, Department of Biology

#50 *Differential attraction of insects to different colors of light*
Simon McSweeney, Jack Shell, and Jared Stover
Faculty Sponsor: Mel Durrett, Department of Biology

#51 *How sunlight intensity affects stomatal aperture of a pansy leaf*
Andrew Morton, Emma Nichols, Omar Stocks, and Saneela Tameez
Faculty Sponsor: Mel Durrett, Department of Biology

#52 *Temperature influence on cricket chirp rate*
Yanay Almalem, Giulia Ferrari, Krish Muthiah, and Emma Norman
Faculty Sponsor: Mel Durrett, Department of Biology

#53 *Lichen distributions on Rhodes College campus*
Andrew Scholnick, Elliot Gorski, Sri Velrajan, and Catherine Kirkpatrick
Faculty Sponsor: David Pike, Department of Biology

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#54 *Effects of UV radiation on germination and growth of Wisconsin fast plants (Brassica rapa).*
Catherine Owen, John Kemmerly, and Ian Chambers
Faculty Sponsor: David Pike, Department of Biology

#55 *The effects of temperature on cricket metabolism*
Moriah Muhammad, Darah Fuller, Erin Dindoruk, and Lauren Lazure
Faculty Sponsor: David Pike, Department of Biology

#56 *Crayfish substrate preference in the presence of a food reward*
Kelsey Healy and Ryan Palermo
Faculty Sponsor: David Pike, Department of Biology

#57 *Does the mimosa plant change its defense response to repeated, non-harmful stimuli?*
Michael Phebus, Taylor Ryan, Lelo Shamambo, and Sophia Quesada
Faculty Sponsor: David Pike, Department of Biology

#58 *Do domestic crickets avoid substrates with deceased conspecifics?*
Warren Sams, Walid Harian, and Annika Hedlund
Faculty Sponsor: David Pike, Department of Biology

#59 *Effect of air pollution on lichen growth in urban forests*
Sara Kate Capel, Rachel Giampapa, Sakura Horiuchi, Maria Popescu, and Zach Thorton
Faculty Sponsor: Tara Massad, Department of Biology

#60 *Effects of Urbanization on wariness behavior in feeding activity in Sciurus carolinesis*
Hailey Baeur, Spencer Beckman, Brinda Patel, and Bilal Siddaq
Faculty Sponsor: Tara Massad, Department of Biology

#61 *Alternative light treatments to eliminate detrimental effects on natural crayfish activity*
Abby Connor, Madie Holton, Nick Isolani, and Austin Ly
Faculty Sponsor: Tara Massad, Department of Biology

#62 *Effects of reflective and non reflective environments on crayfish behavior*
Elise Moix, Eimantas Norkevicius, Abby Polzin, and Patrick Wilkerson
Faculty Sponsor: Tara Massad, Department of Biology

#63 *Phototropism and thigmotropism: The effects of touch and light blockage on plant growth*
Tony Eskridge, Kennedy Graham, Francesca Healy, and Sam Trenner
Faculty Sponsor: Tara Massad, Department of Biology

#64 *Is lichen density greater on sides of trees not exposed to direct sunlight?*
Tamara Banna, Jade Calloway, and Philippe Lauture
Faculty Sponsor: Carolyn Jaslow, Department of Biology

#65 *The effect light color has on leaf stomata aperture size in Brassica rapa*
Lynsey Campbell, Zach Etzel, Dexter Griffin, and Will Schupp
Faculty Sponsor: Carolyn Jaslow, Department of Biology

#66 *Do more dominant crayfish take less time to reach food?*
Sarah Eiland, Abby Ellingwood, Hannah Lam, and Yufei Zhang
Faculty Sponsor: Carolyn Jaslow, Department of Biology

#67 *The effect of different concentrations of Gibberellic acid (GA) on the growth of Duckweed*
Kendrick Ashby, Annie Ouyang, Nithila Ramesh, and Julianna Szuwalski
Faculty Sponsor: Carolyn Jaslow, Department of Biology

#68 *The effect of light color on the stomatal density of Brassica rapa leaves*
Umer Aziz, Caroline Magee, and Hibah Virk
Faculty Sponsor: Carolyn Jaslow, Department of Biology

#69 *Effect of moisture on cricket substrate preference*
Mark Massey, Reece Stevens, and Shuliang Yu, Urban Studies Program
Faculty Sponsor: Carolyn Jaslow, Department of Biology

POSTER SESSION II

Multi-Sports Forum of the Bryan Campus Life Center
4:00 – 6:00 pm
Poster Numbers are listed with each title.

St. Jude Summer Plus Fellowships

#1 *Characterizing the phenotype of the Pax3-Foxo1 fusion transcription factor in alveolar rhabdomyosarcoma* ◙
Patrick Leavey III; St. Jude Children's Research Hospital
Faculty Sponsor: Rachel Jabaily, Department of Biology
Rhabdomyosarcoma is a soft tissue sarcoma with origins tied to muscle cell differentiation. It has two histological and molecular subtypes, embryonal and alveolar. Alveolar rhabdomyosarcoma (ARMS) has a worse prognosis. The majority of cases are molecularly characterized by the presence of the Pax3-Foxo1 (P3F) fusion transcription factor. The Hatley lab had previously created a doxycycline controlled P3F repression system within the Rh30 and Rh41 ARMS cell lines to study the effects of this protein on microRNA expression. Western blot and qRT-PCR analysis confirmed knockdown system efficiency. P3F knockdown's effect upon microRNA expression by microarray had previously been performed by the Hatley lab. Based off this data, miRNA-486-5p was selected as a potential oncogenic gene in ARMS. Using antimiRs to inhibit miRNA-486-5p, the invasion, migration, and xenograft growth capabilities were characterized to determine what role miRNA-486-5p played in metastasis. TargetScan, a microRNA target database was used to determine the targets of miR-486-5p responsible for these phenotypes. Through western blot and qRT-PCR, the affects miRNA-486-5p had upon the target gene expression was assessed. Luciferase assays were preformed to determine miRNA-486-5p's specificity for target gene mRNA transcripts. KaBoom!

#2 *Investigate separate functions of EZH1 and EZH2* ◙
Jenny Loome, Rhodes College; Jamy Peng, Department of Neurobiology, St. Jude Children's Research Hospital
Faculty Sponsor: Kim Gerecke, Department of Psychology
EZH1 and EZH2 are alternate catalytic components of PRC2, a complex that regulates gene expression and pluripotency during embryonic development by methylating lysine 27 residue in histone H3 H3K27. These two

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proteins have distinct functions, but their distinct functions are not well understood. Their functions in pluripotency and gene regulation were explored by using CRISPR/Cas9 to create EZH1 and EZH2 knockout stem cell lines. EZH1 knockout did not significantly affect the expression of pluripotency markers, but EZH2 knockout significantly decreased them. EZH2 knockout resulted in increased growth of embryoid bodies from stem cells, which mirrors the overgrowth phenotype of Weaver syndrome, a developmental disorder that is caused by EZH2 mutations. RNA-seq data show that EZH2 knockout affects the regulation of many genes, but RT-qPCR data validate only some of the RNA-seq data. However, RNA-seq, RT-qPCR, and Western blotting altogether conclusively indicate that EZH2 knockout causes up-regulation of BMI1, a main component of PRC1. These data suggest that EZH2 regulate human embryonic growth and that PRC1 compensates for the lack of PRC2 function.

#3 *Tissue Proteomics and Mouse Modeling Reveal U1 SnRNP and RNA Splicing Dysfunction in Alzheimer's Disease* ◙

Ariana Mancieri, Rhodes College; Junmin Peng, Ping-Chung Chen, and Bing Bai, Departments of Structural Biology and Developmental Neurobiology, St. Jude Proteomics Facility, St. Jude Children's Research Hospital

Faculty Sponsor: David Kabelik, Department of Biology

Alzheimer's disease (AD), the most common cause of dementia, affects nearly 44 million people worldwide. Unfortunately, current treatments alleviate symptoms but cannot slow down disease progression. Numerous clinical trials have recently failed, emphasizing the urgency for comprehensive understanding of disease mechanisms. Recently, we applied cutting edge proteomics to profile aggregated proteome, identifying the unique pathology of U1 snRNP splicing components (e.g. U1-70K) in familial and sporadic AD cases, raising an exciting hypothesis that RNA splicing deregulation may contribute to AD pathogenesis. To examine this working hypothesis, we generated a transgenic mouse model expressing an AD-related U1-70K fragment specifically in neurons. The mouse model renders a dominant negative effect to downregulate full length U1-70K, shown by immunohistochemistry and western blotting experiments. The animals recapture previously observed AD phenotypes, including U1-70K downregulation, cytoplasmic mislocalization, splicing deficiency, neuronal loss, as well as impairment of cognitive function. Deep transcriptomic analysis discovers concurrent aberrant splicing of synaptic components in the mice and human AD brain. Thus U1 snRNP dysfunction and splicing alteration may represent a novel pathway for potential therapeutic intervention.

#4 *Identification of Novel Interactors of the Histone Demethylase UTX* ◙

Tanner Martinez, Rhodes College; Yurii Sedkov, Diana Balasubramanian, Satish Kallappagoudar, Lisa Velez-Velez, and Hans-Martin Herz, Department of Cell and Molecular Biology, St. Jude Children's Research Hospital

Faculty Sponsor: Kim Brien, Department of Chemistry

Mixed Lineage Leukemia 3 and 4 (MLL3 and MLL4) are Histone H3 lysine 4 (H3K4) methyltransferases that exist in large protein complexes and regulate cis-regulatory DNA elements called enhancers. UTX is a core component of the MLL3/4 complexes and acts as a histone H3 lysine 27 (H3K27) demethylase, removing H3K27 di- and tri-methylation, which are associated with gene silencing. Here we show that UTX interacts with ELMSAN1, DNTTIP1, HDAC1, and HDAC2, which constitute the MiDAC Complex (Mitotic Deacetylase Complex) and the zinc-finger protein, ZNF281. This is demonstrated through the co-immunoprecipitation of ELMSAN1, DNTTIP1, HDAC1, and HDAC2 with UTX and the reverse co-immunoprecipitation of UTX with ELMSAN1 and DNTTIP1 in Human Embryonic Kidney (HEK293) cells. ZNF281 and UTX have also been demonstrated as interactors by co-immunoprecipitation in HEK293 cells. MS/MS data from UTX immunoprecipitation from HEK293 nuclear extract reveals all of the mentioned proteins as significant interactors. All proteins segregate in the same molecular weight fraction upon glycerol gradient ultracentrifugation of HEK293 nuclear extract, suggesting that the proteins interact in vivo.

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#5 *Cell fate commitment, a potential role for NuRD and PRC2 in the mammalian inner ear* ◙

Malerie McDowell, Rhodes College; Wanda Layman, Dan Williams, Yuxuan Wu, Jie Fang, and Bryan Kuo, Department of Developmental Neurobiology, St. Jude Children's Research Hospital

Faculty Sponsor: Jian Zuo, St. Jude Children's Research Hospital

In the United States, the prevalence of hearing loss in children and adolescents has risen to an estimated 19.5% (2005 to 2006) and is correlated with problems in reading, math, and attention. One of the primary causes of hearing loss is ototoxic drugs which damage the hair cells within the cochlea which are responsible for translating sound vibrations into electrical impulses which can be understood by the brain. In mammals, once these hair cells are lost, they are unable to regenerate. However, some studies suggest that mammals maintain this ability at neonatal ages, suggesting that mammalian cells undergo age dependent changes which limit regenerative capacity. While hair cell-like cells can be created through early induction of the transcription factor Atoh1, such induction is limited by epigenetic marks which prevent these cells from fully developing into functioning hair cells. By preventing epigenetic marks by knocking out repressive cofactors this regenerative capacity can be maintained. The repressive cofactors manipulated in this study are the NuRD and PRC2 complexes, which are involved in determining cell fate and maintaining cell fate respectively. By inhibiting these complexes before the definition of these developmental pathways, cellular plasticity can be maintained in these cells.

#6 *Ascertaining the Role of Calcium Dependent Phospholipases in the Sonic Hedgehog Pathway* ◙

Jacob Menke, Rhodes College; Angela Arensdorf, Miriam Dillard, and Stacey Ogden, Department of Cell and Molecular Biology, St. Jude Children's Research Hospital

Faculty Sponsor: Jonathan Fitz Gerald, Department of Biology

The Sonic Hedgehog (Shh) signal transduction pathway is evolutionarily conserved and vital during embryonic development. Post-developmental abnormal Shh signaling can be causative of cancers such as medulloblastoma and basal cell carcinoma. Currently, little is known about the regulatory mechanisms governing this pathway, therefore our lab seeks to elucidate these mechanisms in order to identify novel sites for therapeutic intervention. Previously, our lab identified that a class of calcium dependent phospholipases (cPLA2) interact with Smoothened (Smo), a G protein coupled receptor (GPCR) and essential signal transducer of the pathway, to promote signaling. After testing for the expression of specific genes within the cPLA2 family in mammalian 3T3 cells by quantitative real-time PCR (qRT-PCR), Pla2g4a, which encodes the protein cPLA2α, was the most highly expressed and therefore the most likely to be affecting the pathway. My project sought to inhibit and to show the effect that cPLA2α inhibition had on downstream targets of the pathway. Endogenous gene knockout attempts by using shRNA and cells treated with Crispr-Cas9 by other lab members showed some, but not complete, reduction in cPLA2α levels. Chemical inhibition of cPLA2α showed significant reduction of downstream targets further supporting our claim that cPLA2α helps promote Shh pathway activity.

#7 *Modeling of genetic alterations in acute erythroid leukemia (AEL)* ◙

Sarah Morris, Rhodes College; Ilaria Iacobucci and Charles Mulligan, Department of Pathology, St. Jude Children's Research Hospital

Faculty Sponsor: Mary Miller, Department of Biology

AEL is a rare and aggressive leukemia subtype with unknown genomic basis and controversial diagnosis characterized by predominant erythroid proliferation. A recent study in Dr. Mullighan's lab (manuscript under preparation) has provided a comprehensive genomic characterization of pediatric and adult AEL and identified markers for diagnosis, prognostication and targeted therapies. These findings have allowed for the establishment of models currently used to explore the roles of the different identified genetic alterations in leukemogenesis. In particular, my project is focused on two clinically relevant targets: i) ZMYND8-RELA gene fusion involved in NF-kB signaling and NTRK1 kinase mutations frequently co-occurring with TP53 mutations. In order to investigate their transforming ability, these genomic alterations were cloned in retro/lentiviral constructs and expressed in NIH 3T3 cells for focus formation assay (FFA), cell localization analysis (immunofluorescence), and in murine lineage

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negative hematopoietic stem cells for colony forming unit assays and transplantation of sub-lethally irradiated C57BL/6 mice. NTRK1 mutations were transforming in vitro as demonstrated by the formation of multiple foci in long term cultures and in vivo when combined with Tp53 mutations. Noteworthy, they proved to be sensitive to NTRK inhibitors. ZMYND8-RELA fusion is currently being investigated in FFA and in mouse transplantation studies.

#8 *Phase separation and multivalent interactions between human nucleolar protein NPM1 and prokaryotic ribosomal components* ◙

Christopher Parish, Rhodes College; Dhammika Muesse, Department of Chemistry, Rhodes College; Diana Mitrea and Richard Kriwacki, Department of Structural Biology, St. Jude Children's Research Hospital
Faculty Sponsor: Dhammika Muesse, Department of Chemistry

The nucleolus is the site of ribosome biogenesis in eukaryotic cells. Unlike many organelles, the nucleolus has no phospholipid membrane; instead, it is compartmentalized through a process termed phase separation. The molecular mechanisms that drive liquid-liquid phase separation (LLPS) of macromolecules in biology are not completely understood. Prokaryotes have not evolved compartmentalized organelles, such as the nucleolus, for ribosome biogenesis. However, the ribosomal machinery of prokaryotes is well conserved up to eukaryotes, including the persistence of arginine-rich primary sequences and multivalent arginine motifs (R-motifs) within ribosomal proteins. Nucleolar proteins, such as Nucleophosmin (NPM1), evolved later, and we have evidence that they act as a "glue" to compartmentalize ribosomal RNA (rRNA) and R-motif-containing proteins, including ribosomal proteins, within the nucleolus (Mitrea, et al., 2016, eLife). We hypothesize that human NPM1 will mediate LLPS of bacterial ribosomal components and, consequently, enhance the efficiency of ribosome assembly through compartmentalization. Here we describe efforts to create a hybrid, nucleolus-like system of human nucleolar phase separation machinery and prokaryotic ribosomal components as a tool to study and understand the biophysics and biology of ribosome biogenesis.

#9 *Determining the role of ABIN1 in cell death through treatment of immortalized mouse embryonic fibroblasts with apoptotic agents* ◙

Peter Daniels, Rhodes College; Hans Haecker, Infection Diseases Department, St. Jude Children's Research Hospital
Faculty Sponsor: Gary Lindquester, Department of Biology

Natural Sciences

#10 *Invasion checkmate: Puccinia rust attacks Syzygium jambos trees in Puerto Rico*

Erin Burman, Rhodes College; James Ackerman, Department of Biology, University of Puerto Rico; Raymond Tremblay, Department of Biology, University of Puerto Rico
Faculty Sponsor: Rachel Jabaily, Department of Biology

Biological invasions can have dire consequences for resident biota, particularly when disease-causing organisms are involved. Puccinia psidii, guava rust, is a fungal tree parasite of tropical Myrtaceae. In Puerto Rico, the rust has become common on Syzygium jambos, an invasive tree native to Southeast Asia. In this study, we ask whether certain regions provide refuge from infection, and whether climatic variables and tree size affect vulnerability to infection. Using MaxEnt software, we found that the potential distribution of Syzygium jambos is extensive, especially in mountainous regions with high precipitation. Every tree surveyed across Puerto Rico showed signs of guava rust infection. Using beta regressions to generate models, we found that some tree size, temperature and precipitation variables had predictive value of infection severity. However, variability was high and only temperature and precipitation variables were consistent components of our best models. We found no safe sites for S. jambos. Many trees were very unhealthy and some were dead, suggesting that S. jambos may soon become

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extinct on the island. While native vegetation may benefit from the local demise of invasive S. jambos, vigilance is required, as host-shifts to native Myrtaceae have occurred in other tropical regions.

#11 *Effects of habitat degradation on amphibian embryo development and survivorship*
Erica Carcelen, Rhodes College; Kristin Hinkson, University of Memphis; Connor Leggett and Kimberly Terrell, Memphis Zoo
Faculty Sponsor: Sinlan Poo, Memphis Zoo
The Bayou Sauvage National Wildlife Refuge (NWR) is one of the largest urban wildlife refuges in the United States. Located within the city limits of New Orleans, it is an area that is highly impacted by anthropogenic development. A recent study of dead or diseased snakes in the area revealed individuals had internal infections, lesions related to snake fungal disease, and skin abnormalities consistent with chemical or thermal burn. These results suggest environmental contaminants from anthropogenic activity surrounding the Bayou Sauvage NWR could have a negative effect on local fauna. Our study examines the effect of water quality in the NWR on amphibian embryos by using Fowler's toad as an indicator species. We raised embryos in water collected from multiple locations in intact and degraded sites within the Bayou Sauvage NWR. We monitored survival and development until hatching, and expected lower survival and more instances of abnormal development in embryos raised in water from degraded sites. Our findings have important implications in identifying areas in that need more toxicological analysis and providing information on the ecosystem health in the Bayou Sauvage NWR.

#12 *Investigation of MoCl4(diimine) Complexes for Solvatochromism*
Alison Chang and Will Eckenhoff, Department of Chemistry
Faculty Sponsor: Will Eckenhoff, Department of Chemistry
A solvatochromic compound is a chemical compound that changes its color based on solvent polarity. Various molybdenum anions with the form [Mo(N⌒N)Cl4]-, were found to possess solvatochromic behavior which is a color change based on solvent polarity. [Li(12-crown-4)][Mo(bpy)Cl4] was found to be soluble in solvents ranging from water to acetone with an accompanying color change from yellow to blue. Similar colors were observed for the related [PPh4][Mo(bpy)Cl4] in the same solvents with the exception of water which it was not soluble. The non-polar nature of it counter-cation extended its solubility to methylene chloride. When examined by UV-vis, the absorption of [Li(12-crown-4)][Mo(bpy)Cl4] shifted ~110nm across the visible region while [PPh4][Mo(bpy)Cl4] shifted ~70nm. X-ray crystal structures of both of these species show very little difference in the structure of their octahedral Mo anion and good agreement with previously known structures. Unexpectedly, changing the bipyridine ligand to the related 1,10-phenanthroline, completely mitigated the solvatochromic effect.

#13 *Synthesis and characterization of hyrdazone derivatives from 2,6-bis-hydrazinopyridine (BHP) and ketones*
Malcolm Charles and Kim Brien, Department of Chemistry
Faculty Sponsor: Kim Brien, Department of Chemistry
The preparation of a series of hydrazones made from 2,6-bis-hydrazinopyridine (BHP) has been proposed. BHP has already been synthesized and crystalized, and the proposed formation of hydrazones using the BHP and increasingly complex ketones will be attempted with the goals of determining the conditions for and efficiency of hydrazone formation from BHP upon reaction with ketones belonging to four distinct categories: symmetrical, unsymmetrical, electronically unsymmetrical, as well as unsymmetrical and chiral. Additionally, it is hoped that this research will further our understanding of the stereochemical (E/Z) properties of unsymmetrical ketones and chiral ketones by means of the characterization of the compounds using NMR, mass spectrometry and crystallography with the ultimate goal of studying the use of these hydrazones as ligands for transition metals.

#14 *Functional specificity of G1 cyclins depends on Thi73*

Amanda DellaGrotta and Mary Miller, Department of Biology
Faculty Sponsor: Mary Miller, Department of Biology

Three novel G1 cyclins are critical regulators of cell division in Saccharomyces cerevisiae by activating the cyclin-dependent kinase Cdc28. The G1 cyclin Cln3 forms a complex with Cdc28 that drives Cln1 and Cln2 expression and commitment to G1/S transition. CLN1/2 expression requires Cln3 targeting from the endoplasmic reticulum to the nucleus by a short, monopartite nuclear localization signal (NLS) on Cln3. Previous in vivo analyses suggested that nuclear Cln3 localization is regulated by a putative permease Thi73 (THI73). Evidence from homologs suggests that relatively high levels of exogenous thiamine repress THI73 expression and function. This study proposed that Cln3 targeting and function is indirectly regulated by exogenous thiamine. We engineered yeast models to with deletions of all G1 cyclins with and without a Δthi73 deletion, and used plasmids to express either CLN3 or CLN2. Strains were assayed for growth in the presence of exogenous thiamine and in the absence of exogenous thiamine to confirm a thiamine-dependent Cln3 function. The results show no THI73-dependent regulation of Cln3 function, but suggest an alternative mode of THI73 regulation over Cln2 function. These results propose a mechanism for potential for research on targeted therapies against proliferating malignant cells.

#15 *Investigation of Antimicrobial Drug Binding to Zn Containing Enzymes Through Mimicry*

John Dewar and Arnav Thakur; Larryn Peterson and Will Eckenhoff, Department of Chemistry
Faculty Sponsor: Will Eckenhoff, Department of Chemistry

The LPXC enzyme is needed for the first committed step in the biosynthesis process of cell membranes in bacteria. The active site of LPXC contains a zinc ion, which can be artificially inhibited using compounds that mimic the substrate, to prevent growth of harmful bacteria. The active site of LPXC can be modeled using homogeneous zinc complexes. For this study, Zn(Tp*)Cl was synthesized to serve as the enzyme mimic. The binding of acetohydroxamate (AHA) and acetic acid (AcOH) as mimics of the drug substrates was confirmed through 1H NMR. ZnTp*AHA and ZnTp*AcO were then fully characterized by NMR and X-ray crystallography. Competition studies revealed that AHA binding was preferred both kinetically and thermodynamically. These studies are currently being characterized. Binding of larger compounds was carried out and currently undergoing characterization.

#16 *Repeated subconcussive brain trauma leads to worse memory deficits in the long-term than repeated concussive brain trauma* ◙

Conor Dorian, Rhodes College; Anton Reiner and Marcia Honig, Department of Anatomy and Neurobiology, University of Tennessee Health Science Center
Faculty Sponsor: Kim Gerecke, Department of Psychology

Using a novel mouse model of traumatic brain injury (TBI) involving an air-pressure blast to the head, our lab has shown that a single 50-psi blast results in concussion-like deficits such as fear, anxiety, and depression. To model the often adverse long-term consequences of repeat head trauma in humans, we compared the effects of 4 repeat 50-psi (concussive) blasts at 13-14 months after blast to those of 4 repeat 30-psi (subconcussive) blasts and to control mice (0-psi). Surprisingly, repeat subconcussive mice performed worse on a spatial memory-based X-maze task than did repeat concussive mice, as well as on a contextual fear spatial memory task. I characterized the histopathology of the hippocampus, a brain region involved in spatial memory, to understand why memory suffered more in subconcussive mice. Both concussive and subconcussive mice showed decreased neurogenesis in the dentate gyrus. However, subconcussive mice, but not concussive mice, showed hippocampal swelling and CA2 and CA3 neuron loss. The neurogenesis deficit, hippocampal swelling and CA3 neuron loss were all greater contralateral to the blast impact than on the blast side. Taken together, my results show that the histopathological consequences of repeat subconcussive injury were generally more severe than those of repeat concussive injury.

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#17 *Synthesis and characterization of hydrazone derivatives from 2,6-bis-hydrazinopyridine (BHP)*
Natalie Galindo and Kim Brien, Department of Chemistry
Faculty Sponsor: Kim Brien, Department of Chemistry
Hydrazones potentiate a new class of transition metal ligands but have not been studied extensively as such. The imine groups of hydrazones can occur as E or Z isomers and are of particular interest for their photochemical and thermal properties. Bearing a similarity to photoactivated molecular motors, the nuances of this carbon-nitrogen double bond E/Z selectivity implicate a role for hydrazones in the development of chemical information storage and processing. Using 2,6-bis-hydrazinopyridine (BHP) our lab seeks to synthesize hydrazone derivatives and characterize them as ligands through utilization of NMR, mass spectrometry and crystallography.

#18 *Building an R Package for the Relative Belief Ratio Approach (RBRA) to the Two-Sample Problem*
Emily Hanson
Faculty Sponsor: Ibrahim Abdelrazeq, Department of Mathematics & Computer Science
Suppose you have two samples given x = x1, x2, ..., xn ~ F and y = y1, y2, ..., yn ~ G, with F and G are being unknown continuous cumulative distribution function (cdf's). If you need to test whether they have the same distribution (i.e Ho : F = G), then you are facing the two sample problem. While there are many classical methods to answer this question, Dr. Luai Al-Labadi from the University of Toronto has recently developed a Bayesian, nonparametric method. This method provides some unique, desirable features and is proven to be simple and superior to the classical methods. His test provides the user with a confidence measure called a relative belief ratio. My research focuses on understanding this method and creating an R package which efficiently computes this method. Publishing this package on CRAN is an important step to making new, better statistical methods accessible to the larger scientific community.

#19 *Do correlates of acute stress-induced eating differ for women with high versus low chronic stress?*
Ellery Hayden, Allie Baldassaro, Saniya Rashid, Rheedi Dasani, and Catrina Cattaneo
Faculty Sponsor: Rebecca Klatzkin, Department of Psychology
Heightened cortisol reactivity is associated with increased eating; yet this response is typically blunted under chronic stress (CS), a condition strongly tied to obesity. Thus, CS may lead to an uncoupling of stress physiology and eating. The present study sought to determine if women with high and low CS differed on factors that predict stress-induced eating. Women with high (n = 15) and low (n = 8) perceived CS underwent laboratory mental stress followed by snack food consumption. High and low CS groups did not differ on cardiovascular functioning, food intake, or cognitive restraint. For women with low CS, blood pressure (BP) during stress was negatively associated with food intake ($r = -0.72$, $p < .05$). For women with high CS, food intake was not associated with physiological stress reactivity, but rather negatively associated with restraint ($r = -0.61$, $p < .05$). Thus, stress-induced snacking may be disconnected from physiological stress responses in high CS and instead linked to cognitive control. In contrast, the negative association between BP and snacking in low CS may result in less eating post- stress, although this was not shown in our small sample. Replication with cortisol measures and in obese samples is needed.

#20 *The use of 2-Hydrazinopyridine in the synthesis of hydrazones as metal-binding ligands*
Carolyn Hilley and Kim Brien, Department of Chemistry
Faculty Sponsor: Kim Brien, Department of Chemistry
Hydrazones have been synthesized for years but the idea of using hydrazones as ligands has not been thoroughly studied. 2-hydrazinopyridine was first reported in 1915 but little has been explored using this compound. Combined with ketones and aldehydes, 2-hydrazinopyridine can be used in the synthesis of various hydrazones. The best conditions for efficiently forming these different hydrazones is still unknown. Once formed, 2-hydrazinopyridine and other hydrazine derivatives can be evaluated for their use as metal-binding ligands. The interest of this study is to determine what conditions and what ketones, and aldehydes, will successfully form hydrazones that can be used as ligands for transition metals.

#21 *Electrocatalytic Hydrogen Formation Using a Cobalt Schiff Base Complex*

Phillips Hutchison, Alex Graves, Omid Taghavi, Meghan Kiker, and Cameron Tinker
Faculty Sponsor: Will Eckenhoff, Department of Chemistry

As the world's population increases, developing new energy sources, such as artificial photosynthetic hydrogen production, is becoming a priority. Recent studies have shown the effectiveness of cobalt complexes with polypyridine ligands acting as catalysts for light driven hydrogen production. 1,1'-(pyridine-2,6-diyl)bis(2-(2-pyridinyl)ethyl)ethanimine is a promising ligand because of its electronic similarity to ligands previously used for cobalt catalyzed hydrogen production. The pendant bases of the ligand, however, could increase its catalytic activity. Another advantage of these pendant groups is their ability to be changed for other basic substituents, allowing the complex to be designed for a certain ligand pKa. Cobalt complexes were synthesized using this ligand and characterized both optically and electrochemically. Electrochemical analysis shows redox waves at -0.73, -2.09, and -2.26 V vs Fc/Fc+. In the presence of acetic acid, a catalytic wave, indicative of hydrogen formation, was observed at -2.04 V vs Fc/Fc+. The current associated with the catalytic wave has also been found to increase linearly with acid concentration which indicate a second order dependence in acid concentration. These results suggest that this complex might be suitable in light driven artificial photosynthetic systems.

#22 *Nickel Schiff Base Complexes for Hydrogen Production in Aqueous Solution* ◙

Meghan Kiker, Alex Graves, Omid Taghavi, and Will Eckenhoff, Department of Chemistry
Faculty Sponsor: Will Eckenhoff, Department of Chemistry

As the world's population increases, so does the demand for efficient energy. Such energy can be found in the use of artificial photosynthesis to generate hydrogen gas. Hence, the development of more active and robust catalysts is necessary to make artificial photosynthesis a viable method of hydrogen generation. Recent studies have shown that certain metals, such as nickel, can make complexes with polypyridyl groups and are highly active and thus lead to a lower overpotential and higher turnover rate of hydrogen gas. Using 1,1'-(pyridine-2,6-diyl)bis(2-(2-pyridinyl)ethyl)ethanimine (EtPyPDI) is a promising ligand to study due to its electronic similarity to previously used ligands. However, the two pyridine substituents may act as pendant bases, enhancing its activity. Furthermore, these pendant base groups can be changed to other basic substituents, allowing for the first example of such a catalyst to be "fine-tuned" for its ligand pKa. Nickel complexes were synthesized with this ligand and were structurally, spectroscopically and electrochemically characterized. X-ray diffraction revealed an octahedral geometry for [Ni(EtPyPDI)NO3]NO3 comprising pentadentate chelation of the EtPyPDI ligand and nitrate coordination. Cyclic voltammetry experiments showed reversible redox waves at -0.91 and -1.78 V vs Fc/Fc+. In the presence of acetic acid, a catalytic wave corresponding to hydrogen formation was observed at -2.11 V vs Fc/Fc+.

#23 *Engineering a Model System to Study G1 Cyclins*

Alexandra Lee and Mary Miller, Department of Biology
Faculty Sponsor: Mary Miller, Department of Biology

Cyclins and CDKs regulate the G1/S transition checkpoint in the cell division cycle, passing this checkpoint fates a cell for division. Dysregulation of the G1/S checkpoint often induces unchecked cellular division, a hallmark of cancer. Elucidating the complex genomic pathways must occur prior to any comprehensive understanding of the mechanisms by which oncogenesis hijacks these pathways. The complex human cyclin and CDK pathways are frequently studied using the less complex eukaryotic single cell model system Saccharomyces cerevisiae. Previous studies support the idea that the THI73 gene might be of importance for dynamic movement of G1 cyclins in a cell's interior. In this project, a model system was developed which allows for the measurement of specific cyclin activity due to the presence or absence of the THI73 gene. This model system was created using a PCR based deletion cassette where the HIS3 gene replaced the THI73 gene, allowing for auxotrophic selection. These THI73 deletion strains are used in determining the importance of THI73 for cyclin dependent viability in S. cerevisiae. This work elucidates potential regulatory networks that function to support commitment to the eukaryotic cell division cycle.

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#24 *A Preference for Flipped Depictions of Self*

Malerie McDowell, Rhodes College; Jordan Suchow, Institute of Cognitive and Brain Sciences, UC Berkeley; Jason Haberman, Department of Psychology, Rhodes College

Faculty Sponsor: Jason Haberman, Department of Psychology

Because the eyes point outward, visual experience of our own face is mediated by depictions and reflections, which are unlike what others see — a mirror reflects the image, and a depiction transforms it. Does this altered experience affect perceptions of appearance? Photographs of each observer were taken and we asked observers (N = 18) to view their likeness under flipped (as when viewed in a mirror) or not flipped (as when viewed in a depiction) conditions. In two of the four conditions, observers also adapted to the flipped or unflipped photograph before rating the alternate image to emphasize these differences. Observers rated (on a scale of 1-7) how much each image looked like them and how much they liked the image. Each observer was run in each condition three times in random order. One-way repeated-measures ANOVAs revealed a significant preference for the flipped, mirror image compared to the unflipped, depiction image for both questions. This effect was exaggerated for the condition in which observers first adapted to the unflipped image before viewing the flipped image. These results suggest that commonly viewing ourselves in a mirror makes unflipped images seem more 'unlike' one's self and less pleasant than a flipped image.

#25 *Investigating the effects of certain antigen mutations associated with idiopathic membranous nephropathy*

Anoushka Mullasseril, Zara Parkinson, and Zain Virk; Roberto de la Salud Bea, Kim Brien, and Shana Stoddard, Department of Chemistry

Faculty Sponsor: Kim Brien, Department of Chemistry

Idiopathic membranous nephropathy (IMN) is an autoimmune disease that affects the process of filtration in the kidneys and ultimately leads to kidney failure. Scientists have determined three regions that contain epitopes in ten domains of the antigen M-type phospholipase A2 receptors (PLA2R) on podocyte cells of the kidney that contain certain mutations found in IMN patients. Some of these mutations may play a role in allowing antibodies to bind to the antigens as part of an unwanted immune response. However, it has not been determined if any of these mutated epitopes plays a role in eliciting the autoimmune response producing IMN. One of these possible epitopes is part of the C-type lectin domain 1 (CTLD1) region of the antigen, containing two mutations: M292V and H300D. Two versions of mutated peptide chains from this epitope and the normal version of the peptide were synthesized in vitro. Tests will be run on the peptides to determine if antibodies bind to the mutated ones, which would indicate that the mutations of these regions indeed participate in the epitope sites and thus may promote the development of IMN. These results could also potentially contribute to the formulation of drugs to treat this disease.

#26 *Recurrent pregnancy loss evaluation combined with 23-chromosome testing of miscarriage tissue explains the cause of pregnancy loss in over 90% of all miscarriages* ◙

Filoteia Popescu, Rhodes College; W.H. Kutteh, R.W. Ke, P.R. Brezina, and A. Bailey, Fertility Associates of Memphis, Baptist Memorial Hospital

Faculty Sponsor: Carolyn Jaslow, Department of Biology

Recurrent pregnancy loss (RPL) is estimated to occur in 2 to 4% of reproductive age couples. Various etiologies, either alone or in combination, have been demonstrated to contribute to RPL including parental chromosomal translocations, congenital and acquired uterine anomalies, endocrine imbalances, autoimmune factors including antiphospholipid syndrome, as well as infectious and thrombophilic causes. We sought to determine if the evaluation of miscarriage tissue at the time of the second or subsequent loss would explain the majority of "unexplained" losses. Also, we desired to determine if our proposed algorithm of evaluating all miscarriage tissue after the second loss was valid and if it is more efficient, economical, and reliable in evaluating the cause of miscarriage in patients than the currently implemented official workup for RPL followed by fertility clinics. We have found that the combination of a genetic evaluation on miscarriage tissue with an evidence-based evaluation for RPL explains over 90% of miscarriages. Thus, genetic evaluation on miscarriage tissue obtained at the time of the second and subsequent pregnancy losses should be recommended to all couples with two or more consecutive pregnancy losses.

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#27 *Household Food Environment Among Pregnant Women and the Association with Excessive Gestational Weight Gain* ◙

Hannah Porter, Rhodes College; Rebecca Krukowski, Department of Preventive Medicine, University of Tennessee Health

Faculty Sponsor: Alan Jaslow, Department of Biology

Understanding the role that home food environment has on GWG may provide a useful weight management strategy to help reduce excessive GWG. Pregnant women (N=228, 10% African American) participated in a behavioral gestational weight gain intervention. Participants completed measures of high-fat food availability, low-fat food availability, and food storage practices at baseline and at 30 weeks. GWG was calculated as the difference between weights at the first and final prenatal visit at 36 weeks. Overweight and obese women stored more foods visibly in their home compared to normal weight women (β: 0.234; SE: 0.101, p-value: 0.021) (β: 0.266; SE: 0.116, p-value: 0.022), and at 30 weeks overweight women stored more foods visibly (β: 0.203; SE: 0.095, p-value: 0.032). At 30 weeks, there was a trend for obese women to have fewer low-fat foods in the home compared to normal weight women (β: -0.126; SE: 0.070, p-value: 0.070). There was no significant relationship between BMI and number of high-fat foods. Number of low-fat food items in the home was associated with decreased odds of excessive GWG, specifically each additional low-fat food in the home at baseline was associated with significantly decreased odds of excessive GWG (OR: 0.84, 95% CI: 0.72, 0.98). These findings suggest that encouraging pregnant women to increase the number of low-fat foods in their home and reduce the visibility of food may help to reduce excessive GWG.

#28 *The Synthesis of Novel Unnatural Amino Acids in Order to Synthesize Antibiotic Polypeptides*

Barry Rich, Zain Virk, and Roberto de la Salud Bea, Department of Chemistry

Faculty Sponsor: Kim Brien, Department of Chemistry

It has been reported that modifications of the primary structure of peptides can result in changes of their original properties. Our goal is to make a synthesis of novel peptides with potential antibiotic activities via the introduction of unnatural amino acids. We have designed a library of amino acids with specific hydrophobic and hydrophilic properties comprised of commercially available compounds and novel unnatural amino acids synthesized using nucleophilic and electrophilic substitution. We report our progress in synthesizing these compounds and our plans to achieve the completion of this library of unnatural amino acids.

#29 *Identification of New Genes Required for Cytokinesis in the Filamentous Fungus Aspergillus nidulans* ◙

Lauren Rowland, Peter Daniels, and Spencer Beckman

Faculty Sponsor: Terry Hill, Department of Biology

Cytokinesis is extremely important for hyphal growth in filamentous fungi. This involves formation of cross-walls called septa, which provide structural reinforcement. We have identified six candidate genes (Art1, Spa2, Inn1, Hof1, Rgf3, and Cyk3) in two species of yeast that are known to be involved in their cytokinesis. A. nidulans has homologous forms of these genes that have yet to be assigned functions. We hypothesized that these six candidates play roles in A. nidulans similar to those in yeast. We tested our hypothesis through GFP tagging and gene deletion to determine where the genes' products (proteins) carry out their function and if the genes play significant roles in cytokinesis. By engineering the genes so their products are tagged with GFP, we were able to observe localization of the proteins within the cells. Of the six genes, one, Spa2, was found not to play any detectable role in cytokinesis in A. nidulans. Deleting any of the remaining five genes was sufficient to abolish or severely impaired cytokinesis. In addition, we observed the proteins of four out of five genes localize at sites of developing septa. Our results demonstrate that five of our six genes are important for cytokinesis in A. nidulans.

◙ Rhodes Fellowship

#30 *Ensemble representations account for size constancy*

Sneha Suresh, Samuel Thomasson, and Jason Haberman, Department of Psychology
Faculty Sponsor: Jason Haberman, Department of Psychology

The visual system compresses redundant visual information into an ensemble representation by averaging features of groups of items. Ensemble perception has been shown to operate with remarkable flexibility — it combines features across a host of visual domains, extracts summary information in the absence of attention, and even integrates conceptual information into an ensemble representation (e.g., Pandita, Suresh, & Haberman, VSS, 2015). In the current set of experiments, we tested whether linear perspective cues such as size constancy might influence the perceived average size of a group of triangles. Although size constancy heuristics are well characterized, there has been limited investigation into whether the ensemble calculus takes into account the perceived size of an individual item or its physical size (e.g., Im and Chong, 2009). Observers viewed sets of triangles with and without the context of linear perspective cues and judged whether a subsequently presented test triangle was larger or smaller than the average size of the preceding set. Results revealed that observers did, in fact, take size constancy into account when estimating the average size of the three triangles. These results point to the flexibility of ensemble perception, which seems to incorporate physical and conceptual representations into the ensemble code.

#31 *Synthesis of Peptides with Biological Activity*

Zain Virk, Zara Parkinson, and Anoushka Mullasseril; Kim Brien, Roberto de la Salud Bea, and Shana Stoddard, Department of Chemistry
Faculty Sponsor: Roberto de la Salud Bea, Department of Chemistry

Solid phase synthesis (SPS) is an ideal technique for making long polymeric molecules such as peptides. Because peptides are biologically active and central to many of life's processes, peptide synthesis can be used to develop peptides with many important applications, such as therapeutic activity or modeling epitope sites. Our group is interested in two different types of peptides. First, we are working on the synthesis of unnatural peptides derived from scorpion venom with antimicrobial capabilities. In addition, we are interested in the synthesis of peptides that mimic potentially significant mutations in specific protein domains, such as the Fibronectin type II domain on the phospholipase A2 receptor (PLA2R) antigen. Thus, this second set of peptides is for the investigation of epitope sites on the PLA2R antigen and could implicate specific mutations in the onset of the autoimmune disease idiopathic membranous nephropathy. In my poster, I will present the latest sequences we have designed and prepared for both of these projects.

#32 *Optimization of GFP-Trap, a Variant of Co-immunoprecipitation*

Mac Williamson, Caylon Pettis, and Jenny Loome
Faculty Sponsor: Terry Hill, Department of Biology

Co-immunoprecipitation (frequently abbreviated to Co-IP) is a technique that can identify the binding affinity that proteins have for one another. Recently, interest has arisen in applying this technique in a context that is specific to proteins that have been genetically engineered to contain green fluorescent protein (GFP) at one of their ends. This variation upon Co-IP is useful in beginning to identify, in the context of cell wall development in Aspergillus nidulans, novel proteins that play a role in the formation of septa. Modifications and optimizations were made to several procedures within the overall process, including polyacrylamide electrophoresis, electrotransfer, and enhanced chemiluminescent visualization of proteins. Optimizing this procedure allows for more sensitive detection of novel proteins bound to GFP-tagged proteins. Modifications have been applied to all three of the above-mentioned procedures to broaden the range of protein masses that can be successfully transferred and to enhance the affinity of antibody binding, which gives the ability to visualize proteins at low concentrations. These optimizations will lead to sensitive protein detection in homogenates of A. nidulans.

#33 *Treefall gap regeneration in an old-growth urban forest*
Mac Wilson, Griffin Williams, Colleen Hulsey, Erin Deery, Luke Malanchuk, and Erin Gleeson
Faculty Sponsor: Tara Massad, Department of Biology
Treefall gaps are a critical component of forest dynamics that lead to the recruitment of a new cohort of seedlings and gap closure. Overton Park is an urban park with 126 acres of old growth forest, and long-term observations suggest gaps within the forest are failing to regenerate. Possible explanations include lower rates of seed arrival in gaps, low germination rates of seeds, competition from invasive and native plants, and seedling mortality from herbivory. In 2015 ten gaps were identified. Two 1m2 seed traps were randomly placed within each gap; two others were also located outside the gap. Seeds are regularly collected, identified, and counted from each trap. Four 1m2 seedling plots are associated with each seed trap. All seedlings within the plots are identified and tagged, and height, basal diameter, and herbivory are measured twice a year. Our findings suggest that seed richness and seedling diversity are higher in forest areas compared to gaps and that seedling diversity is negatively influenced by invasive species cover. Gap regeneration is therefore affected by seed dispersal and seedling survivorship and management of invasive species may be necessary for forest regeneration.

#34 *Identifying 'Confusability Regions' in Face Morphs Used for Ensemble Perception*
Emma ZeeAbrahamsen and Jason Haberman, Department of Psychology
Faculty Sponsor: Jason Haberman, Department of Psychology
The ability to extract summary statistics from a set of similar items, a phenomenon known as ensemble perception, is an active area of research. In exploring high-level ensemble domains, such as the perception of average expression, researchers have often utilized gradually changing face morphs that span a circular distribution (e.g., happy to sad to angry to happy). However, in their current implementation, face morphs may unintentionally introduce noise into the ensemble measurement, leading to an underestimation of ensemble perception abilities. Specifically, some facial expressions on the morph wheel appear perceptually similar even though they are positioned far apart. For instance, in a morph wheel of happy-sad-angry-happy, a facial expression between happy and sad may not be perceptually distinguishable from a facial expression between sad and angry. Without accounting for this perceptual confusability, observer error will be overestimated. The current experiment accounts for this by determining the perceptual confusability of a previously implemented morph wheel. In a 2-alternative-forced-choice task, 7 observers were asked to discriminate between an anchor image and all 360 facial expressions on the morph wheel. Results are visualized on a 'confusability matrix' depicting the images most likely to be confused for one another. This confusability matrix yields a better defined range of confusability of adjacent expressions found on the morph wheel and uncovers the easily confusable expressions in far separation on the morph wheel, previously gone unaccounted. By accounting for these 'confusability regions', we demonstrate a significant improvement in model estimation of previously published ensemble performance, suggesting high-level ensemble abilities may be better than previously thought.

Science Interdisciplinary

#35 *Regeneration Dynamics of an Old Growth Urban Forest: A 30-year Comparison in Memphis, TN* ◙
Helen Hope, Dwight Wilson, and Ethan Williford, Urban Forestry Fellows, Rhodes College; Eric Bridges, Director of Operations, Overton Park Conservancy
Faculty Sponsor: Kimberly Kasper, Department of Anthropology & Sociology
Overton Park in Memphis, Tennessee contains one of the last old growth forests in an urban setting. This presentation displays the ecological stand dynamics of the forest and the competitive interrelationships of its woody species. Urban forests are under constant stress from city air quality and invasive species in addition to changing dynamics. These findings will better help managers and stakeholders make informed planning for the future of the forest. The methodology is based off of Dr. James Guldin's 1987 Ecological Assessment and Management Recommendations for the Overton Park Forest for comparative reasons. Results show how the forest dynamics have

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changed with the progression of certain species. Because the Overton Park Old Forest is one of the last standing of its kind in an urban setting, it is important to understand and respond to its changing dynamics in order to return it to a regular and sustainable pattern of regeneration in its species.

Neuroscience

#36 *Does exercise promote the expression of the resiliency factor Neuropeptide Y in the hippocampus of stressed mice?*

Tabitha Joyner and Avani Alapati

Faculty Sponsor: Kim Gerecke, Department of Psychology

Exercise potently protects the brain against the harmful effects of stress, possibly via increases in the resiliency factor Neuropeptide Y (NPY). As the Ca1 region of the hippocampus is sensitive to chronic stress, we hypothesize that there will be significantly lower NPY in the Ca1 of stressed sedentary mice, and that exercise will protect against this decrease. Mice were randomly assigned to one of the four groups: Sedentary, Sedentary Stressed, Exercise, and Exercise stressed, two mice to each cage. After a two week acclimation, the mice in the stress conditions were placed into restrainers for two hours daily for fourteen days. The onset of each daily stress session was randomized during day light hours. Mice in the exercise conditions had free access to a running wheel. On day fourteen, mice were euthanized, and the brains were perfused, collected, and processed for immunohistochemistry labeling. Preliminary data showed no significant difference in NPY expression between the four different groups in the Ca1 region of the hp. The dorsal region of the hp is more vulnerable to stress, compared to the more resilient ventral region. Therefore, we will continue to analyze the differences of NPY expression in the dorsal versus ventral hippocampus.

#37 *Amputees misperceive the size of artificial limbs*

Ritika Mazumder and Jason Haberman, Department of Psychology

Faculty Sponsor: Jason Haberman, Department of Psychology

In creating a prosthetic device for lower-limb amputees, prosthetists report purposely making the limb smaller along the width dimension than the corresponding intact limb. This is in response to the patients' report that the limb appears too 'bulky' if exactly matched in size to the intact limb. In a previous experiment we verified that prosthetists do, in fact, make prostheses smaller than the corresponding intact limb by comparing the size of both in a set of 35 images depicting patients wearing artificial limbs. We also explored the perceptual bias exhibited by observers in perceiving prostheses. The results suggested that observers underestimated the size of a prosthetic device, and this was most evident in the context of whole, upright bodies. However, the direction of this bias is unexpected given the clinical standard. This experiment investigated whether amputees exhibit a similar perceptual bias under formal testing conditions. Participants adjusted the width of the prosthesis in the same set of images (both upright and inverted) until it looked 'right.' Unexpectedly, amputees showed a bias as the observers, since they adjusted the prosthetic limbs to be larger that the intact limbs by almost seven percent, suggesting they perceived it to be smaller than the intact limb. Although the bias persisted when the images were inverted, it was significantly reduced, suggesting configural processing enhanced the size misperception. In addition to this bias existing in the visual domain, it remains to be seen how the bias in the somatosensory domain affects the overall perception of prosthetic devices.

Social Science

#38 *The emotional valence of scene ensembles is less extreme than its constituents*
Chloe Burkhead and Jason Haberman, Department of Psychology
Faculty Sponsor: Jason Haberman, Department of Psychology
The visual system extracts summary statistics from crowds of similar items. This heuristic, known as ensemble perception, works across multiple visual domains ranging from low-level features such as size, shape, and orientation to high-level objects such as faces, biological motion, and animacy. In the current study, we examine how observers represent the emotional valence of a complex group of scenes. In a pilot experiment observers evaluated the emotional valence of several hundred scenes on a scale ranging from ±5. From these, a total of 190 scenes were selected that spanned the full range of emotional ratings (and had an equal number of positively and negatively rated images). Scenes included pictures of people grocery shopping, working, cooking, etc. Observers were first asked to rate the emotional valence of each scene, and then subsequently rate the average emotional valence of randomly assembled groups of four scenes. Results indicate that there is significant compression of the ensemble ratings relative to the expected rating based on the individual images (i.e., ensembles, regardless of their overall valence, were viewed as less extreme than the individual ratings would predict). These results are surprising for two reasons: 1) they demonstrate ensemble representations for abstract scene information and 2) they contrast with other work suggesting that ensemble ratings for certain objects are amplified relative to individual ratings (e.g., Harp, Haberman, & Whitney, VSS poster, 2009).

#39 *Do Mnemonic Benefits of Spaced Repetitions Extend to Auditory Stimuli?*
Claira Winget and Emily Boss
Faculty Sponsor: Geoff Maddox, Department of Psychology
Research has yielded strong evidence for the spacing effect, the benefit in long-term memory by spacing repeated study events with intervening time or material compared to massing study events (i.e., cramming).Although the spacing effect is robust and has been observed across a wide range of materials, research has yet to examine the degree to which the spacing effect extends to non-verbal paradigms. To address this question, the current study examined the spacing effect with auditory stimuli that cannot easily be verbalized. Participants were presented with repeated short rhythmic patterns (one musical measure). Repeated rhythms were separated by varying intervals (0, 5, or 9 intervening musical measures) and fillers. Following each of 12 trials, participants were presented with the repeated rhythms they had heard in the previous trial and with lures that resembled those rhythms. Participants were then asked to identify how confident they were that they had heard the measure on a scale from 1 to 7. Results indicated that recognition of repeated rhythms was optimized with the use of an intermediate spacing interval that was neither too long nor too short which is consistent with the non-monotonic relationship between spacing and final test memory in verbal learning (Maddox, 2016).

#40 *Taboo Distractors Influence Processing of Negative Distractors in Picture-Word Interference*
Nicolette Glidden
Faculty Sponsor: Katie White, Department of Psychology
It is well documented that strong emotional words command attention and disrupt cognitive processing. Two experiments investigated whether emotional context, defined by the presence or absence of taboo distractors, influences whether negative and positive distractor words disrupt speech production. Participants named target pictures accompanied by distractors that varied in valence (negative, positive, neutral), including taboo distractors in Experiment 1 but not Experiment 2. Carryover effects of emotional distractors were measured on subsequent filler pictures without accompanying distractors. Results showed that negative distractors slowed and positive distractors sped target naming times only in Experiment 1 when taboo trials were present. Facilitatory carryover effects from negative and positive distractors occurred, with faster filler naming times following target trials only in Experiment 2 when taboo trials were absent. These findings suggest that the presence of taboo words changes how non-taboo

emotional words are processed, which has implications for how emotional characteristics engage attention while speaking.

#41 *Relationship Between Childhood Trauma and Substance Use in the Transgender Community*
Sunya Ahmed, Bron McPherson, and Luke McNamara
Faculty Sponsor: Rylan Testa, Department of Psychology
Prior research has found that LGBT youth who experienced emotional abuse had a significantly higher risk for initiation of prescription drug use disorders. Recent literature has shown that gender minority youth disproportionately experienced bullying and harassment in the past 12 months, and this victimization was associated with increased rates of substance use. In the study, we investigate childhood trauma's effect on transgender adolescent's substance use. We hypothesize that childhood trauma in the transgender community correlates with an increase in substance use disorders later in life. A convenience sample of 1414 individuals who identify as a gender different than their sex assigned at birth participated in an online survey assessing gender-related stress, substance abuse, and mental and physical health outcomes. To assess childhood trauma and substance use we will utilize the Child Trauma Questionnaire – Short Form (CTQ-SF), Transgender Identity Scale, the Drug Abuse Screen Test (DAST), and the Alcohol Use Disorders Identification Test - Consumption (AUDIT-C). Analyses explore how childhood trauma influences substance use in transgender and gender non-conforming people. This study aims to contribute to a better understanding of the negative effects childhood trauma has in the transgender community. Implications will be discussed in the context of prior research.

#42 *Associations Between Childhood Trauma and Eating Pathology in Transgender Individuals*
Ashley Doyle, Celia Aloia, Rachel Coyle, Anna Manoogian, and Rylan Testa, Department of Psychology
Faculty Sponsor: Rylan Testa, Department of Psychology
Prior research has found that within the general population, childhood trauma is present as a predictor for eating psychopathology. Specifically, emotional abuse and physical neglect were seen as the most common predictors for eating pathology. Initial research has also revealed that transgender individuals may be at higher risk of eating pathology. Our study examines the relationship between childhood trauma and eating pathology in the transgender population. We hypothesize an association between childhood trauma and both past and present levels of eating pathology in transgender individuals. A convenience sample of 1414 individuals who identify as a gender different than their sex assigned at birth participated in an online survey assessing gender-related stress, resilience, and mental and physical health outcomes. In this study, childhood trauma was evaluated with the Childhood Trauma Questionnaire (CTQ). Eating pathology was evaluated with The Eating Attitudes Test (EAT-26) and response to an item assessing history of eating disorder diagnosis. Results will be discussed within the context of theories of childhood trauma and eating pathology in both the general and the transgender populations. This research will lead to a better understanding of how a history childhood trauma relates to eating pathology in a high risk population.

#43 *Negative Mental Health in Relation to Body Dysphoria in Transgender Populations*
Alexandra Howard, Kirsten Samuels, and Courtney Link
Faculty Sponsor: Rylan Testa, Department of Psychology
It has been publically noted that negative mental health conditions such as eating disorders, depression, and anxiety are highly prevalent in transgender communities due to the influence of multiple stressors. Body dysphoria is also common in these populations. This study investigates the possible relationship between body dysphoria and negative mental health. We predict that negative mental health outcomes such as eating disorders, social anxiety, general anxiety, and depression are positively associated with body dysphoria in transgender populations. Participants were recruited for the Trans Health Survey online through local and national TGNC public resources. Participants (n = 1,414) identified with a gender identity other than the sex that they were assigned at birth. Body dysphoria, depression, eating disorder symptoms, and general and social anxiety were assessed through several surveys, including: The Multidimensional Body-Self Relations Questionnaire, Center for Epidemiologic Studies Depression

Scale, The Eating Attitudes Test (EAT-26), The Mini-SPIN, and Generalized Anxiety Disorder (GAD) scale, respectively. This study's analyses will explore the relationship between negative mental health and body dysphoria in the transgender community. Findings will be discussed in the context of prior research. This study aims to contribute to a better understanding of the negative mental health in transgender populations.

#44 *Training in Spaced Retrieval Results in Memory Improvement*
Tierney Linville, Rahul Peravali, and Geoff Maddox, Department of Psychology
Faculty Sponsor: Geoff Maddox, Department of Psychology
Research indicates that memory is often enhanced for material that is repeatedly studied and tested across time versus material that is studied and tested in a single session (i.e. massing), a technique known as spaced retrieval (Landauer & Bjork, 1978). Typically, research has compared the effects of equal-spaced retrieval (study and retrieval trials occur with an equal number of items or amount of time between each event) and expanded-spaced retrieval (study and retrieval trials occur with an increasing number of intervening items or amount of time across events) on memory. The current study extended past research by training younger and older adult participants to use either equal spaced or expanded spaced retrieval techniques to enhance memory for face-name associations. We measured participants' ability to implement the trained strategies and examined how implemented strategies influenced recall accuracy for face-name associations. Results indicated that both younger and older adults improved implementation of each strategy with training and feedback. With successful implementation of strategies, expanded-spaced retrieval produced a benefit in memory over equal-spaced retrieval on the immediate test, but this effect was reversed following the 45-minute delay.

Social Science Humanities

#45 *Plantation Materialities in 19th Century Western Tennessee*
Claire Norton and Corena Hasselle, Rhodes College; Kimberly Kasper, Department of Anthropology & Sociology, Rhodes College; Jamie Evans, Ames Plantation
Faculty Sponsor: Kimberly Kasper, Department of Anthropology & Sociology
Throughout eleven years of excavation in western Tennessee, a more nuanced picture of 19th century everyday life in the antebellum South has emerged. With over twenty contiguous plantations on the 18,400-acre contemporary Ames land base, we compare specific characteristics of material culture from large (3,000+ acres) and small plantations (300-1000 acres). Our research focuses on Fanny Dickins, a woman with the financial means to purchase and run a small cotton plantation in Western Tennessee. Utilizing the distribution of ceramics and architectural materials excavated from slave households near the manor house, we investigate the daily lives of the slaves (38 total) owned by Mrs. Dickens from 1841-1853. Defining the "everyday" by using GIS technology creates an avenue of exploration for residential areas associated with slave life. This analysis generates a better understanding for the role of individual and collective agency of slaves within the plantation system of the antebellum South.

Social Science Interdisciplinary

#46 *The Effects of Crime on High School Graduation and Attendance Rates in the Memphis Area*
Terence Williams and Andrew Frantz; Erin Bodine and Rachel Dunwell, Department of Mathematics & Computer Science
Faculty Sponsor: Erin Bodine, Department of Mathematics & Computer Science
Using an agent-based model, we modeled and assessed the effect that crime has on the graduation and attendance rates in a Memphis High School. Attendance rates from 28 Memphis high schools (provided by Shelby County Schools) and regional crime data from the FBI crime report were used to parameterize the model. The model simulates one cohort of students (450-600 students) starting at the 9th grade. The daily attendance of each student is tracked through nine 20-day academic periods per school year over four school years. The daily attendance of each

student during each 20-day academic period is reduced by probability p_1 when non-violent crime (and by probability p_2 when violent crime) occurs within the neighborhood of the student's school. Using suspension and expulsion data from each school (provided by Shelby County Schools), we determined likely values for p_1 and p_2 using parameter uncertainty analysis.

Biology 141

#47 *Triple response in Brassica rapa with and without added ethylene gas*
Grace Booth, Emily del Valle, and Lulu Schultz
Faculty Sponsor: Mel Durrett, Department of Biology

#48 *Population growth of two species of Paramecia in light and dark environments*
Brealan Muniz and Katherine Tooley
Faculty Sponsor: Mel Durrett, Department of Biology

#49 *Effects of pH on duckweed (Lemna minor) propagation*
Mark Betonio, Karen Candia, Crawford Lampton, and Abi Smack
Faculty Sponsor: Mel Durrett, Department of Biology

#50 *Effects of food resources on aggressiveness of crayfish*
Caroline Cardwell, Bron McPherson, Paiton Raines, and Ali Ottinger
Faculty Sponsor: Mel Durrett, Department of Biology

#51 *Is there a difference in lichen growth on the east or west side of trees?*
Brenna Katz, Davis Neitzschman, and Madi Griffin
Faculty Sponsor: David Pike, Department of Biology

#52 *Cricket preference of light and dark habitats*
John McArthur, Kendall Whitt, and Ryan Gilliam
Faculty Sponsor: David Pike, Department of Biology

#53 *The effect of natural and artificial growing environments on Wisconsin fast-plant morphology*
Clay Hausberger, Claire McGuire, Lydia Slyter, and Meagan Kimbrell
Faculty Sponsor: David Pike, Department of Biology

#54 *Effects of crayfish mass on dominance coefficients*
Shehla Yousuf, Rainer Jones, Jessye Heyrana, and Trevor Van Vliet
Faculty Sponsor: David Pike, Department of Biology

#55 *Effects of temperature and light on cricket behavior between the sexes*
Samuel Cloyd, Elizabeth Leahey, and Valerie Rodriguez
Faculty Sponsor: David Pike, Department of Biology

#56 *Effects of sex on aggressive interactions observed in Cambarus bartonii*
Kira Lee, Abbey Plantz, and Andie Caroline Dorn
Faculty Sponsor: Alan Jaslow, Department of Biology

#57 *Gravitropic response in Brassica rapa flower buds*
Monroe McKay, Seth Rohlwing, and Sarah Prine
Faculty Sponsor: Alan Jaslow, Department of Biology

#58 *Substrate preference of Acheta domestica in sand versus crushed rock*
Morgan Hill, Nina Migneco, Kat Polster, and Henry Laurich
Faculty Sponsor: Alan Jaslow, Department of Biology

#59 *The effect of light on stomatal density in Brassica rapa*
Nick De Feria, Leya Gouto, Tzvi Nadel, and Catie Renna
Faculty Sponsor: Alan Jaslow, Department of Biology

#60 *Lichen growth in relation to light*
Reba Moody, Colin Welsh, and Peter Dorm
Faculty Sponsor: Alan Jaslow, Department of Biology

#61 *The effects of sound frequency on habitat selection in the cricket, Acheta domestica*
Allie Hill, Anjali Mangrola, Mallika Roa, and Mathew George
Faculty Sponsor: Alan Jaslow, Department of Biology

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