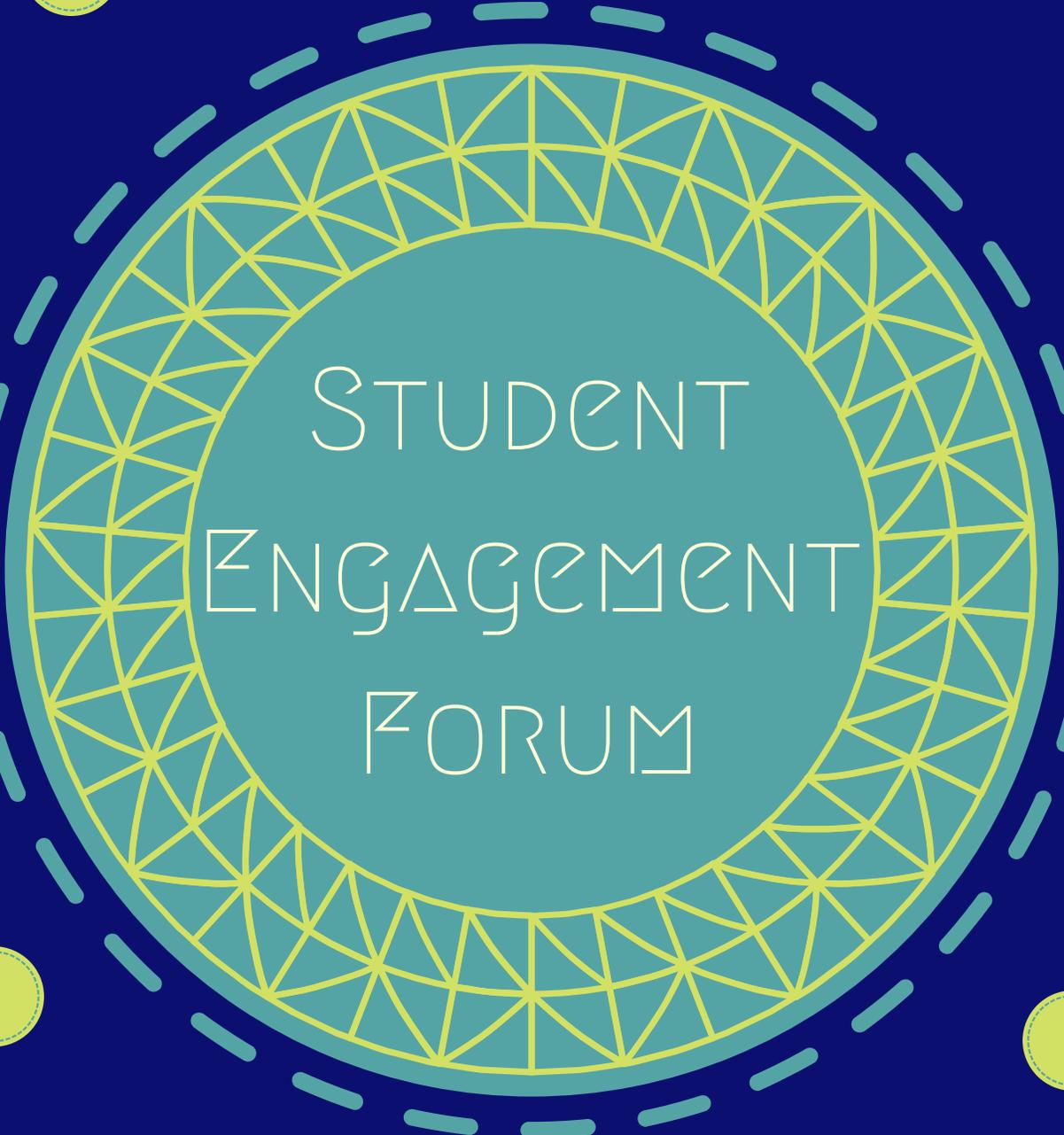


27TH ANNUAL



STUDENT  
ENGAGEMENT  
FORUM

APRIL 17 - 19, 2018



RADFORD UNIVERSITY

## ***Student Engagement Forum Coordinators***

Jenessa Steele, Associate Director OURS

Joe Wirgau, Director OURS

Jessica Mundy, Executive Student Assistant OURS

### ***The following individuals and offices are acknowledged for their contributions:***

Donna Boyd, Sigma Xi Chapter President

Kara Daniel, Graduate Assistant OURS

Jason Davis, Associate Director of the Honors Academy

Samantha Doncaster, Executive Student Assistant OURS

Mary Hagan, Honors Academy Administrative Assistant

Shannon Hauslohner, Dining Services

David Horton, Assistant to the ACSAT Dean

Jonathan Mayer, Printing Services

Jeanne Mekolichick, Assistant Provost

Jeremy Mobley, Scholar Citizen Initiative

Conner Philson, Beta Beta Beta

Debbie Rynberg, Conference Services

### ***About the Cover Art***

The cover art was created by Erin Taylor, a first-year student at Radford University majoring in Computer Science with a concentration in Software Engineering.

Over the course of the year, many students conduct research in a variety of fields. These individual projects are usually unknown to other projects happening at the same time, as if they were stand-alone dots on a two-dimensional plane. However, nearly every student in research will come together at the Student Engagement Forum. The Forum is sometimes the only thing that ties two vastly different research projects together. This idea was the inspiration behind my cover art design. The brightly colored polka dots scattered across the design represent all the talented students who conduct research during their time at Radford while the much larger, circle portrays the culmination of these projects. Although the majority of projects may appear unconnected to each other, the Forum fosters a tie between all of them that truly encapsulates the brilliance of every student behind the projects.

## Welcome!

It is my great pleasure and privilege to welcome you to the 27th Annual Radford University Student Engagement Forum! The Student Engagement Forum showcases the highest levels of academic achievement and creation of new knowledge at Radford University through our campus community's undergraduate and graduate students' creative works, scholarship and research. The displayed work represents a tremendous undertaking, often involving teams of students and faculty, to make progress on answering important questions for society.

Although what you hear and see represents countless hours of work, it is only the tip of the iceberg. Everyone who has worked to create new knowledge knows it is a crooked path filled with dead ends and back tracking before finally arriving at progress. This progress requires great perseverance, belief, and support. I want to publicly thank all the presenters for staying the course, everyone who sparked or encouraged the needed curiosity to get started, and everyone who said a supporting word or offered a shoulder to lean, or even cry on, when the inevitable challenges of conducting relevant research arose.

Much like these research projects, organizing the Student Engagement Forum is a team effort. The success of this year's forum is due to the preparation and hard work put in by the OURS team. It is an honor for me to get to work with such a dedicated group who believe in this event and supporting research across campus. Jessica Mundy and Samantha Doncaster have been amazing managing the poster printing work flow and helping with event logistics while maintaining a positive atmosphere. Kara Daniel for jumping in as needed with projects like the name badges. Mary Hagan who literally keeps OURS running while the "forum" gets so much time and attention. I continue to grow in my appreciation of Dr. Jeanne Mekolichick as a personal mentor and for her advocacy of URSCA, the Student Engagement Forum, and transformative experiential learning experiences across campus. Lastly, a warm welcome to the team and public thank you to Dr. Jenessa Steele who took over leadership in organizing this year's event. This group makes me look forward to coming to work each day, as do the many student-faculty teams daring to go where no one has before in their search for knowledge.

Enjoy the celebration of new knowledge and I hope to see you all next year for the 28th version of the Student Engagement Forum!

Joe Wirgau, Ph.D.

Associate Professor of Chemistry

Director, Office of Undergraduate Research & Scholarship (OURS)

**Sociology (SCI) Roots with Wings Oral Session**

12:45-2:00 PM

Heth 022

**Roots with Wings: Floyd County Place-based Education Oral History Project****Khalin Reid****Sanou Diallo****Alana Fanning**

Faculty Mentor(s):

**Eileen Lagos****Taylor Forrest****Hannah Koontz**

Melinda Wagner

Place-based education diverges from traditional teaching methods and tired standardized tests, by allowing students to learn through projects that delve into their surrounding culture and heritage. With the help of Floyd County High School, the Floyd Story Center at the Old Church Gallery, Radford University's Center for Social and Cultural Research, Appalachian Regional and Rural Studies Center, and the Scholar-Citizen Initiative, the Floyd County Place-based Education Oral History Project, "Roots with Wings," has been able to do so for the past eleven years. This project allows a group of FCHS students, with the help of RU student-mentors, to preserve the rich culture of Floyd County through recorded interviews of community elders, which are then archived at The Old Church Gallery for people to see for generations to come. The goal of "Roots with Wings" is to establish within the high school students' "roots" of community relationships, intergenerational senses of self, and cultural appreciation, while providing them "wings" of technological skills that will be translatable throughout their future endeavors. The focus of this year's project was on intentional communities located in or around Floyd County, learning about their ways of living, governing, sustaining, interacting, and teaching. The high school students were able to conduct ethical, and methodologically sound, interviews of four community elders who live or have previously lived in an intentional community, while utilizing skills of transcribing, video/audio recording, and movie-making. The presenters will share their experiences as mentors, as well as discuss the impact of place-based education on the lives of the FCHS students.

**Accelerated Research Opportunities Showcase**

3:00-4:30 PM

Heth 014

**Ripple Effects: Small Classroom Changes that Lead to Student Success****Jessica Mundy**

Faculty Mentor(s):

Joe Wirgau

The flipped model class delivers content outside of class time, typically through video and leaves class time for active learning, concept application, and team activities. While there are benefits to flipping a class, there are also obstacles, including technology implementation and time barriers. This work represents three years of such course design, implementation, and assessment of student success. We have moved our STEM class away from the default lecture where too much information is covered with little application or practice. Shifting the focus of our classroom to the students for more experiential and collaborative learning and promoting the development of broadly applicable skills. Three years ago we flipped a general chemistry course and used technology to guide the in-class learning. We refined the classroom management in year 2, including the removal of technology in the classroom and added a metacognitive intervention after the first test. In year 3 we have been able to collect longitudinal data and expand upon the metacognitive intervention. We will present the impact of course design and student mindset on student achievement, grades, and success in subsequent courses.

**Seismic Studies of the Arctic Sea Ice****Hunter Brandon**

Faculty Mentor(s):

Rhett Herman

We have designed a small battery-powered device for measuring vibrations through the use of an ADXL345 triple-axis accelerometer. The ADXL345 is the same accelerometer technology that is used in many devices such as your cell phone, airplanes, industrial machinery, and many other locations where one must know how vibrations and rotations affect the equipment. We will discuss the design of the monitors as well as our deployment of these monitors on the arctic sea ice. We will show the data recorded by these boxes, and how these data allow us to determine not only the magnitudes of the vibrations, but also the frequencies of the vibrations. We will discuss data obtained from the boxes both on the sea ice as well as from various locations around the University (e.g. next to roads, in hallways, etc.).

**Accelerated Research Opportunities Showcase**

3:00-4:30 PM

Heth 014

**Analysis of Ligand Binding in E. Coli Beta-Glucuronidase****Samantha Powell**

Faculty Mentor(s):

Kimberly Lane

$\beta$ -glucuronidase is an enzyme that catalyzes the breakdown of complex carbohydrates, like glycosaminoglycans. Glycosaminoglycans (GAGS) are polysaccharides that are a big part of connective tissue, and, because of this, the human body continuously regenerates them. Unfortunately, when  $\beta$ -glucuronidase has a mutation to it, it cannot properly break down glycosaminoglycans, resulting in Sly Syndrome (otherwise known as Mucopolysaccharidosis Type VII, or MPS VII), with several severe effects. These effects include malformation and intellectual disabilities. Currently, there is no treatment that has been approved for this disease, meaning Sly Syndrome is fatal. The purpose of this project is to study the correlation between binding sites in  $\beta$ -glucuronidase, a homotetramer with four substrate binding sites. We have expressed and purified the  $\beta$ -glucuronidase, and will begin analyzing the cooperativity of binding in the enzyme.

**Correlations of Sleep Quality to Food and Water Intake in Undergraduate College Students****Samantha Doncaster**

Faculty Mentor(s):

**Courtney Burton**

Laurie Bianchi

College students typically have unusual sleep habits and may not consume food in patterns as recommended by the USDA Dietary Guidelines. Previous research has indicated that less than 6 hours of sleep per night is correlated with a higher body mass index (BMI); higher BMI's indicate overweight and obesity. Furthermore, intake of simple sugars may also be related to poor sleep quality. The purpose of this pilot research is to determine if there are correlations between sleep quality and food and water intake in undergraduate students. If there are indeed correlations, it should allow us to guide college students on lifestyle behaviors, optimizing their overall health. Five subjects were recruited and instructed to complete accurate food diaries and a modified Pittsburgh Sleep Quality Index (PSQI). The PSQI was scored and assessed against quantity of sugar and water consumed the previous day for a 7 consecutive day period. We hypothesized that sleep quality and quantity would be negatively correlated with sugar consumption, and positively correlated with water intake. Linear regression analysis was completed on both daily water and sugar intake compared to the sleep score on each subject. It was difficult to conclude if water and sugar intake was correlated with sleep quality. However this pilot study indicates that college students are compliant with instructions to complete detailed food records. Therefore future research should extend the duration of the study and evaluate water and food intake with home-monitoring sleep quality equipment

**Accelerated Research Opportunities Showcase****3:00-4:30 PM****Heth 014****Dendrochronology: The Gateway To The Past****Siobhan Bowles**

Faculty Mentor(s):

Stockton Maxwell

Dendrochronology, or tree-ring analysis, can tell us a lot about the past environment of a geographical area. Working with the Radford University Tree Ring Lab, I sampled old-growth white oak (*Quercus alba*) trees near Mountain Lake, Virginia and brought the samples back to the lab. The samples were prepared by surfacing with a belt sander and polishing with fine sandpaper. Next, the tree cores were scanned in high resolution (2400 dpi). We used a computer program called CooRecorder to measure the width of each annual tree ring. The tree ring measurements were then visually and statistically crossdated to ensure that each tree core was accurately dated. We determined the approximate year of establishment and analyzed the growth rates of individual trees. We found that trees established in the late 1500s but the diameter of each tree varied because the trees did not grow at the same rate. Based on the data, we can draw conclusions about past climatic and environmental changes that affect the growth of forests.

**Developing a Marketing Campaign for the Interdisciplinary Makerspace at Radford University****Erin Taylor**

Faculty Mentor(s):

Jeremy Wojdak

Makerspaces are places where people find the tools and resources to create the objects of their imagination. Makerspaces are becoming more popular in schools, universities, and even public libraries and for-profit businesses across the country. There is a nascent “making” movement at Radford University, involving many constituencies of students and faculty from the RU Makers living-learning community to the Makers student organization to the student staff of the interdisciplinary Makerspace in Peery Hall. The making movement is meant to include all students from K-12 and majors such as Marketing, Design, Biology, Physics, and many more. Makerspaces offer students tremendously valuable hands-on, problem-solving, and collaborative opportunities for learning. I was challenged to create a marketing campaign for the interdisciplinary Makerspace in Peery Hall, including: 1) identifying the core message of the making movement and the major audiences targeted by it, 2) planning appropriate mechanisms to get the message in front of students and faculty, and 3) designing the logos, graphics, and appearance of the marketing materials. The skills I have sharpened and acquired through the creation of this marketing campaign have broadened my creative thinking as well as prepared me for a future in a design-based career.

**Accelerated Research Opportunities Showcase**

3:00-4:30 PM

Heth 014

**Does Perceived Empathy Reduce the Role of Gender Bias in Physician Choice for Women's Health?****Victoria Dunsmore****Rachael Harasink****Rachel Scott**

Faculty Mentor(s):

**Morrigan Duncan****Amanda Chappell**

Jenessa Steele

Nicholas Lee

When it comes to sensitive exams, such as a gynecological exam, patients need to be comfortable with their physician, which requires building a positive relationship with them (Kim, Kaplowitz, and Johnston, 2004). This positive relationship is sometimes built off gender-concordance between the physician and the patient, or through patient-perceived empathy of the physician. The results of choosing ones physician based on gender, tends to have mixed results when it comes to the realm of gynecology. Some studies have shown that if a female patient chooses a female physician, they tend to have high rates of satisfaction with their medical visits (Schmittiel et al., 2000; Zuckerman, Navizedeh, Feldman, McCalla, & Minkoff, 2002); however, other studies have shown that female patients benefit more from having male gynecologists (Balayla, 2011; Roter, Geller, Bernhardt, Larson, & Doksum, 1999); these benefits result from factors such as the physician having longer visits with the patient, exhibiting more partnership behavior, and displaying more empathy towards their patient. Other studies have shown that patient-perceived empathy of the physician is a more important factor in not only decision-making, but in the patient's outcome (Johnson, Schnatz, Kelsey, & Ohannessian, 2005; Howgego, Yellowlees, Owen, Meldrum, & Dark, 2003). Few studies have looked at whether gender of the physician or patient-perceived empathy, plays a more important role when a female patient chooses a gynecologist. The current study aims to evaluate the relative role each plays in the decision-making process for gynecologist choice.

**Effects of Trenbolone and Nithiazine on Breeding, Behavior and Morphology of *Gambusia Holbrooki*****Kristina Wade**

Faculty Mentor(s):

Sara O'Brien

Trenbolone is a synthetic steroid that is used in the United States as a growth promoter in beef cattle (Ankley et al., 2003). Our lab has focused on the effects of trenbolone as a runoff component in aquatic environments and how it effects the morphological, behavioral and breeding characteristics of *Gambusia holbrooki* (mosquito fish). So far, our lab has found that trenbolone creates masculine traits in the female *Gambusia holbrooki*. We have focused on trenbolone as a single pollutant and the effects of mixing trenbolone with other chemicals has not been tested thoroughly. My project will focus on reactivity of trenbolone and nithiazine, another endocrine disrupting chemical. Nithiazine has little research concerning its effects on aquatic life or as runoff pollutant. This chemical is commonly found in pesticides that are applied to the fur coats of mammals. Studies have showed that nithiazine has active ingredients that are effective against fly populations(Kaufman, Nunez, Mann, Geden, & Scharf, 2010). We predict morphological, behavioral and breeding characteristics of *Gambusia holbrooki* will be altered by the reactivity of trenbolone and nathiazine.

**Accelerated Research Opportunities Showcase**

3:00-4:30 PM

Heth 014

**How Experimental Research in Forensic Archaeology Informs Archaeological Practice:  
Differentiating Perimortem Fracture From Postmortem Breakage****Marta Paulson**

Faculty Mentor(s):

Donna Boyd

Cliff Boyd

Often perceived as a highly specialized and peripheral subfield of archaeology, forensic archaeology contributes to our understanding of not only forensic anthropology and forensic science, but also traditional archaeological practice. Forensic archaeologists' extensive knowledge of postmortem taphonomic effects on material objects has led to more precise interpretations of postmortem interval, environmental (including scavenger-induced) scattering and alteration of human remains, and site formation processes. Experimental taphonomic research has formed the core of these advances in site interpretation, particularly through its focus on differentiating perimortem (at or around the time of death) from postmortem events. This concept is illustrated through RU Forensic Science Institute (RUFISI) research aimed at differentiating perimortem bone fracture from postmortem breakage. A sample of 300 *Sus scrofa* ribs underwent controlled Blunt Force Trauma in the RUFISI at known periodic perimortem and postmortem intervals, ranging from 0 to 112 days of environmental exposure. Resulting rib fractures were analyzed macroscopically and microscopically to define signature fracture morphology across time periods. These results allow differentiation of perimortem fracture versus postmortem breakage and inform period of exposure and contextual history of field remains. Forensic archaeology research can therefore play an integral role in interpretations of traditional archaeological method and theory.

**Accelerated Research Opportunities Showcase****3:00-4:30 PM****Heth 014****Late Ordovician Marine To Terrestrial Transition, Mountain Lake, VA****Alyson Meador**

Faculty Mentor(s):

Elizabeth McClellan

In Late Ordovician time (460-444 m.y. ago), global glaciation coincided with a major mass extinction event in which ~60% of marine life died out. The Reedsville Formation, a rock unit in the Valley & Ridge of VA, contains an abrupt change in fossil content and rock type from the lower to the uppermost strata, which has been interpreted to represent a transition from marine to terrestrial conditions, perhaps due to sea-level drop associated with the glaciation. A small quarry on the property of the Mountain Lake resort (Giles County, VA) exposes rocks of the Reedsville Fm. Over a short distance in the quarry, fossil-bearing limestone and shale grades upward into a sandstone-dominated sequence. Up-section in the quarry the abundance of non-calcareous sandstone beds increases, and evidence of soft-sediment deformation is observed, as well as a possible stream channel deposit. During field work, we took examples of the fossil bearing limestone at Station 1, on Doe Creek Rd. below Mountain Lake Lodge. At the quarry (Station 2), we examined similar fossil bearing layers as well as overlaying sandstone and shale layers. Throughout the sequence we took rock examples from key layers. We flew the Mavic Pro UAV (drone) systematically across the outcrop to collect photo imagery of the quarry. My next objective for our research is to organize the photos and upload them on the computer, after which I will use Pix4D software to process the imagery and make a 3D model of the sedimentary strata. In addition, we will use rock saw equipment to prepare fresh surfaces on the rocks and describe the different rock types from lower and upper layers in the Reedsville Formation.

**Accelerated Research Opportunities Showcase**

3:00-4:30 PM

Heth 014

**The Effect of Fabric Layers on Sharp Force Trauma Signatures on Bone****Jackson Clayton**

Faculty Mentor(s):

Donna Boyd

Cliff Boyd

Sharp force trauma accounted for 1,064 of the homicides in the U. S. in 2016, according to the Federal Bureau of Investigations (2016). Previous research on sharp force trauma on unclothed samples of bone has led to differentiation of sharp force tool classes (e.g., serrated vs. non-serrated knives, axes, and saws). However, the influence of clothing and other fibers on knife wound characteristics has not been fully investigated. The purpose of this study is to determine the effect of fiber material on sharp force trauma signatures on bone. It is hypothesized that variability in fabric layers and types will create different sharp force trauma impressions on bone. More specifically, if the different fabric layers are increased, then there will be fewer distinctions between serrated and straight-edged knives because of the resistance of the fabrics, but there will be some distinction between serrated and straight-edged knives. Serrated and straight-edged knives of different lengths will be used via a guided-drop device on 3 of Sus scrofa rib samples wrapped in layers of both cotton and a cotton-polyester blend. Bone samples will be extracted through maceration and analyzed macroscopically and microscopically (at 5 - 50x). Signatures of sharp force trauma effects on bone will be compiled and compared across fabric groups. This research is important because it may enhance identification of sharp force tool class in traumatized human remains that are clothed. Reference: Murder by state, types of weapons (2016). Uniform Crime Reporting. Retrieved from <https://ucr.fbi.gov/crime-in-the-u.s/2016/crime-in-the-u.s.-2016/tables/table-12/table-12.xls>

**The Impact of Isometric Muscular Contraction Combined with Static Stretching on Measures of Muscular Power****Allan Flick**

Faculty Mentor(s):

**Kaylee Sturgis**

David Sallee

The purpose of this study is to measure the impact of static stretching on measures of muscular power in combination with isometric muscle contractions of the targeted muscle. While there is variability within the results, in general static stretching has shown to negatively impact muscular power in some studies while having no negative effect in others. Researchers hypothesize that static stretching decreases motor unit recruitment decreasing the participants' muscular contraction capacities. If static stretching reduces motor unit recruitment, can this be offset by having the participant isometrically contract the stretched muscle at the completion of the stretch? If this hypothesis is accurate, the negative impact of static stretching could be reduced or eliminated by having the participant perform a simple isometric contraction after completion of the stretching protocol.

**Accelerated Research Opportunities Showcase****3:00-4:30 PM****Heth 014****The Effect of Clothing Type on Human Decomposition and Postmortem Interval****Pearl Moore**

Faculty Mentor(s):

Donna Boyd

Cliff Boyd

An important goal of Forensic anthropology is the determination of Time Since Death (TSD) for a human decedent. Estimation of TSD requires a knowledge of decomposition and the many factors that can affect decomposition. While prior studies have explored the effect of clothing on decomposition, the influence of how clothing type affects the rate of decomposition has not been explored. The goal of this project is to determine if different types of fabric will result in different rates of decomposition, and therefore TSD estimations. Seven racks of ribs of *Sus scrofa* were used for this study. Three racks were covered in denim fabric, three were covered in cotton fabric, and one control rack was not covered. All the racks were placed in an outdoor environment and were protected from scavenging. They were then allowed to decompose over a period of three weeks. Status of decomposition was monitored regularly and measured aspects such as Accumulated Degree Days and Decomposition Total Body Score. Because fabrics such as cotton have porous fiber structures that make it more accessible to liquids, it is hypothesized that decomposition will proceed faster with cotton versus that of the durable and tightly woven fibers of denim. Important insight of the effect of differential variables on TSD estimation in forensic deaths investigations is offered through this research.

**Art Censorship Panel**  
**3:00-5:00 PM      Heth 022**

**Museums: “if we go down this road, our walls will be bare” (Museums, Censorship and the Call-Out Culture)**

**Mary Tippet**

**Regan Brown**

**Nadia Parada Villeda**

Faculty Mentor(s):

**Mikayla Harshman**

**Jennifer Boone**

**Jackson Howell**

Roann Barris

Freedom of speech and censorship have been big issues in the art world this year: from monuments to confederate leaders, questions of who owns the right to speak for traumatic incidents to the #metoo movement, art works have been singled out for a type of criticism that has little to do with the quality of the art. These issues aren't far from home: how do they affect the lives of people who are not museum goers? How do they affect us here at Radford? Censorship in the art world is a serious ethical issue. Censorship has more meanings and forms than one might suspect. For this discussion, our class proposes the topic of censorship in museums and how the public and museums should manage these controversial situations. This panel will feature presentations on some of the most contentious issues of censorship in the past year.

**Honors Academy Capstone Showcase**

4:00-7:45 PM

Young 302

**J.A.E. – How a Documentary is Made****Bailey White**

Faculty Mentor(s):

Kevin Bowers

Storytelling is a powerful tool. It serves as a mode of communication that can be effectively used no matter the time or place. A story itself can span thirty seconds or thirty days, but the concept is the same. To tell a story over a period of time takes time and commitment. When you follow a student around for an entire semester, that takes time and commitment on their end as well. Radford University Senior Fashion Design student Jaimi Evans graciously allowed me to follow her around with a camera for four months to document the process in designing, creating, and presenting her Senior Line Collection—Strings Attached. It is a culmination of a senior designer's personal line of five or six full outfits. In comparison, the most a design student typically makes in a semester could be one or two pieces. The lines are then presented in an annual fashion show where awards are determined. Jaimi has been preparing her collection, from concept to finished garments, for the past year. The story of the documentary divulges Jaimi's greatest triumphs, tragedies, and everything in between while completing this process. This story is not only important in showcasing her work, but going beyond the designer and providing the personal perspective of who Evans is. She is a student, daughter, classmate, friend. The documentary goes beyond the campus of Radford University to show Jaimi's worldly vision. Jaimi's passion, work, and love for life will be shown on the big screen for now, but someday her designs just might be walking down the street.

**Police of Naloxone****Chris Fleming**

Faculty Mentor(s):

Tod Burke

Stephen Owen

**The Effects of Vespa Amino Acid Mixture on Mitochondrial Defect Induced Locomotion Disorders in *Drosophila Melanogaster*****Justin Archer**

Faculty Mentor(s):

Jason Davis

Vespa Amino Acid Mixture or VAAM is a chemical compound found naturally in Japanese giant hornet larva (*Vespa mandarinia japonica*). VAAM, via tropholactic delivery from larva to adult, assists hornets in flying great distances to bring back resources to the colony. Although studies in our laboratory have shown that VAAM acts as a mitochondrial accelerator, little is still known about how it works inside the mitochondria. The purpose of this study is to expand our understanding of how VAAM works to modulate mitochondrial function and the subsequent influences of this on development and behavior. Two mutant strains of fruit flies (*Drosophila melanogaster*) that have known mutations impacting ATPase subunit 6 and Cytochrome c oxidase were exposed to VAAM. Longitudinal measures of mortality and endurance were conducted to determine whether or not VAAM has any effect on that particular part of the mitochondria. Here we discuss our findings and how they relate both to VAAM and to functioning of the electron transport chain as modulated by these particular mutations.

**Honors Academy Capstone Showcase**

4:00-7:45 PM

Young 302

**Slithering Through the Bible: How Serpents Are Portrayed In Modern Literature and Media As It Relates to Appalachian Religion****Katelyn Dobbins**

Faculty Mentor(s):

Paul Thomas

In a 2014 survey conducted by the Pew Research Center, 31% of Americans reported that they read Biblical scripture as the word of God that should be interpreted literally. Such statistics create the necessity of examining how the literal interpretation of the Bible is manifesting itself in modern culture. One such controversial practice that is often interpreted literally comes from Mark 16:18 in the New Testament which discusses the practice of snake handling. Scholarship has already examined the influence of translation across time and linguistic barriers as it relates to Biblical reception. With the existence of these reception studies there is now room to examine how these literally interpreted passages are being portrayed in modern culture. This presentation will explore how serpents and snake handling as a Biblical practice are being portrayed in modern literature and media specific to the Appalachian region of the United States. My thesis is that modern portrayals of religious snake handling in literature and media will demystify religion in Appalachia through its symbolism and as it relates to the tendency of literal Biblical interpretation. To support this thesis I will provide several examples of modern Appalachian serpent-related literary and media pieces and explain the religious context of serpents and their symbolic meanings in the religious sphere. This examination of serpent-centered practices in Appalachia contributes to scholarship by looking at a largely unexamined population while also discussing the contributing factors to literal Biblical interpretation. This new look at Appalachian religion serves as a way to demystify the mountains and breakdown the many stereotypes that accompany what is commonly referred to as “backwoods religion.”

**Examining the Effects of the Agricultural Pollutant, Trenbolone, in Aquatic Ecosystems****Abigail Malmberg**

Faculty Mentor(s):

Sara O'Brien

The molecule trenbolone is an anabolic steroid commonly used by cattle farmers as a growth promoter. Trenbolone acts as a testosterone mimic but has a greater binding affinity than testosterone, giving it a greater potential to alter species' physiology. Previously, the potential impacts on aquatic ecosystems have been studied by Radford University's Ecophysiology Lab and resulted in masculinization of matured *Gambusia holbrooki* (mosquitofish). The potency of the molecule puts homeostasis and reproductive health of exposed individuals at risk. Here, we conducted a multigenerational study, using *Gambusia holbrooki* fry to assess the influence trenbolone has on maturation and reproductive development by administering ecologically relevant doses. The external morphology was analyzed, specifically looking for alternations to sex characteristics to identify possible reproductive abnormalities.

**Honors Academy Capstone Showcase**

4:00-7:45 PM

Young 302

**Latinos in Higher Education: Overcoming Barriers to Increase Retention Rates****Brandon Dunford**

Faculty Mentor(s):

Blas Hernandez

Latino students are a large subset of the traditional college age population. It is known that Latinos face barriers when it comes to matriculation and retention; however, it is unknown which are the most difficult to overcome. This presentation will explore these barriers and the support services that can help these students overcome them. My thesis is that universities currently do not offer a sufficient amount of support services, and that making changes would improve matriculation and retention rates for Latino students. To support this, I compare support services offered at universities with large Latino populations to those with smaller populations. These services will help make getting a higher education more accessible to Latinos.

**You Are What You Wear: Unlocking and Unleashing the Power of the Consumer****Jaimi Evans**

Faculty Mentor(s):

John Jacob

The fashion industry thrives on the support of its consumers. Without individuals buying into what designers and companies produce, the industry would cease to exist. The power lies in the hands of the consumer, but that is not always evident. Because of the emergence of fast fashion and outsourcing, sweated labor including the use of underage workers are problems. As consumers, we can implement the changes that we deem necessary. With this project, I intend to communicate some of the issues that are not always visible within the fashion industry, as well as offering some solutions. This will be displayed with a wearable garment that also serves as a conceptual, yet informative piece. With the success of my capstone I will make the world more informed of problems in the fashion industry, empower them to make educated purchasing decisions and take better care of clothing after it is purchased.

**Honors Academy Capstone Showcase**

4:00-7:45 PM

Young 302

**The Evolution of the Concert****Lizzy Kunde**

Faculty Mentor(s):

David Zuschin

In this historical content analysis, the researcher explored and defined trends in Western concert etiquette as well as the role of classical music in society as Western civilization developed. Music during the Baroque and Early Classical Period (~18th c.) appeared to be a means of displaying status, especially through the sponsorship and appreciation of opera. Smaller, poorer villages began to put on “concerts” of music that were more akin to what the modern US might see as a “talent show.” Then, after the Enlightenment and the Napoleonic Wars, the Romantic Period (~late 18th c. ~ early 20th c.) saw a shift in music away from that of the nobility towards the common man; a shift that was also present in the politics of the time. This changed the role of music and the concert to a place of reverence and almost religiosity. Finally, around 1860 fundamentalism and nationalism began to take root in Western civilizations both politically and musically. Musical nationalism and fundamentalism resulted in a conversion from performer as composer to performer as interpreter which lead to a focus on historical pieces and composers. With that final transformation, the modern concert etiquettes and classical music role was established in Western society and has been upheld since the Victorian and Edwardian Eras of the 19th and early 20th centuries.

**Optimization of EDC Detection in Aquatic Environments:LC-MS/MS Detection & Quantification of Trenbolone****Alex Atwood**

Faculty Mentor(s):

Christopher Monceaux

Sara O'Brien

Endocrine disrupting chemicals (EDCs) directly interfere with an organism’s endocrine system by mimicking naturally occurring hormones. For this reason, many EDCs are considered environmental pollutants. One compound that has been of particular concern as of late is trenbolone acetate, a synthetically produced anabolic-androgenic steroid that has a high affinity for androgen and progestin receptors in vivo. Because trenbolone is used in the cattle industry and has a half-life upward of eight months, there is an immense potential for aquatic organisms to become exposed to the steroid via agricultural runoff. Therefore, exploring the levels of trenbolone in aquatic environments is exceedingly important to the health of our environment. To date, several studies have demonstrated that trenbolone is, in fact, present in water sources due to runoff. However, the relationship between aquatic trenbolone levels and the amount of trenbolone present in the tissues of aquatic animals is far less understood. Herein, we optimized a LCMS method for the detection of trenbolone in aquatic and biological samples in order to determine the exposure rate that organisms face.

**Honors Academy Capstone Showcase**

7:45-8:45 PM

Young Atrium

**An Exploration of Green Design and the Clothing Brand Patagonia.****Delanie Bachand**

Faculty Mentor(s):

Tammy Robinson

Farrell Doss

The goal of my honors capstone was to explore the concept of green design and green design in the retail industry through a case study of Patagonia. Green design has become a priority in some businesses because that is what attracts the customers today. Green Design is “the philosophy of designing physical objects, the built environment, and services to comply with the principles of social, economic, and ecological sustainability.” (McLennan, 2004). I researched a company that promotes their green design, Patagonia, and examined if their retail environment fully lives up to these standards. This case study included an overview of green design, an overview of Patagonia, and an exploration of their green design and sustainable practices. This information was analyzed by looking for common themes of green design in Patagonia’s company. Through this case study, I found that Patagonia does practice the following green design principles: BIM Building, production and manufacturing, green leadership, and employment verifications.

**How Dance Travels****Nicole Diambra**

Faculty Mentor(s):

Amy Van Kirk

Jason Davis

**Exploring the Impact of Exercise on Stress Across Ages****Lindsay Graham**

Faculty Mentor(s):

Sara O’Brien

David Sallee

The college years provide a time point in young adults’ lives that may prove to be more stress-inducing than any time points experienced thus far. A young adult’s ability to cope with stress is related to the cortisol levels in his/her body. Previous studies have explored the effects of an individual’s physical conditions and the types of exercise, varying by rigor on cortisol levels, it remains less explored however when examining how regular exercise in college students may influence their lifestyle and their ability to cope with the stress they experience in college. The objective for this research project is to identify the differences in basal cortisol levels (as a marker of stress load) of Radford University students who exercise regularly and those that do not. To explore this relationship, saliva samples will be collected from two groups of students: those that exercise regularly and those that do not. A cortisol assay will be used to test saliva samples for cortisol levels. These results will be examined along side results from a self-reporting survey, which will analyze subject demographics, life style characteristics and behavioral feelings of stress, and will be compared between the two subject groups. Research done on college students specifically will add to existing knowledge on the subject as past studies have focused on other age groups. Ultimately, research findings could provide college students with a lifestyle choice, routine exercise, as a method to improve their ability to deal with the stress of college life.

**Honors Academy Capstone Showcase**

7:45-8:45 PM

Young Atrium

**The Perception of Code-Switching on Academic Success and Language Maintenance among Native Americans****Kayley King**

Faculty Mentor(s):

Karen Davis

Code switching is defined as an alteration of words and phrases between two languages (Roth & Worthington, 2016). Research shows that code-switching has become a debatable topic regarding its impact in academic contexts, especially pertaining student's language use and learning (Adger, Christian, & Taylor, 1999; Gatlin & Wanzek, 2015). Recently, speech language pathologists' (SLP) role in addressing the needs of culturally and linguistically diverse populations has increased. While there has been research about perceptions and use of code-switching between languages and dialects such as Spanish, African American English and Chicano English, there have been few studies evaluating the qualities of Native Americans. This population is unique due to the value of cultural maintenance. Specifically, increasing numbers of Native American children enter school with English as their primary language. However, community languages continue to be a part of linguistic ecologies, which typically includes one tribal language and Nativised English varieties (McCarty, Romero-Little, & Zepeda, 2006). Therefore, the purpose of this study is to examine the factors leading Natives to code-switch, including the importance of language maintenance, and how this may affect their academic success. Data will be gathered using an online Qualtrics survey that will be distributed to members of state and federally recognized tribes. By analyzing these participants' past experiences, we hope to garner knowledge regarding how SLPs should serve Native clients in the future. The survey results could provide first-hand considerations for development of culturally-competent assessment and treatment by SLPs with additional advice to foster an environment that values code-switching.

**The Emergence and Launch of the Outer Space Economy****Benjamin Gerhart**

Faculty Mentor(s):

Dan Farhat

Countless times, our species attempted to imagine the scientific achievements of the 20th Century, when we first began to turn visions into reality. Today, emerging into the 21st Century, mankind stands poised to expand upon a plethora of scientific and economics gains orbiting within and outside of our solar system. "The Emergence and Launch of the Space Economy" addresses the expanding technological and potential economic actors that define the expanding aerospace industry and economy. This study has collected data and drawn conclusions from several sources, like "SpaceX" and "Planetary Resources", to produce several individual reports assessing the state of those select aerospace industries. Out of several studies conducted, the "Encompassing Effects of International Space Law and Militarization of Outer Space" discovered a correlation between a destabilizing world peace and the implementation of anti-ballistic missile acts. When it comes to an overall assessment of this capstone, topics ranging from manufacturing in outer space to the search for mineral resources cover in-depth and intro level topics within those fields of discussion. From this Honors Academy Capstone, I hope to build a greater understanding of not only the state of the current aerospace economy but also its potential as a new frontier of economic prosperity.

**Honors Academy Capstone Showcase**

7:45-8:45 PM

Young Atrium

**Enhancing Active Learning: Physical to Digital****Collier Crisanti**

Faculty Mentor(s):

Joe Chase

My capstone examines converting existing physical systems and structures to a digital format, with respect to the unique interactive aspects of the physical system. Many conversions of physical systems to digital take advantage of the new medium to automate or remove some of these features. In my capstone, unique features of physical systems are kept on a digital conversion of the physical system. Specifically, my capstone is a helper app to the educational board game rEvolution, that attempts to preserve the novel aspects of island flipping and movement of islands featured, through manipulation of images and abstracted objects. This will show how conversions and ports can keep core qualities of a system while minimizing the amount of redesigning necessary.

**Facilitating Success for College Students with Autism Spectrum Disorder****Shelby Lineberry**

Faculty Mentor(s):

Diane Millar

Students with autism spectrum disorder (ASD) who enter college or university often demonstrate deficits in time management, social interaction, and academic success. Current resources for students with ASD at Radford University do not extend beyond those offered to all students on campus; this is common for many universities across the country. This research study was developed to investigate the needs of college students with ASD from the perspective of parents of children with ASD. Parents served as informants given that they typically serve as the main source of support and advocacy for children with ASD from kindergarten through highschool. Parents of adolescents and adults with a diagnosed with ASD shared their views on strategies that may help students like their children succeed in a higher education program. The results of the study, in addition to a proposal for a peer mentorship program will be shared in this presentation.

## Honors Academy Capstone Showcase

7:45-8:45 PM      Young Atrium

### How Experimental Research in Forensic Archaeology Informs Archaeological Practice: Differentiating Perimortem Fracture From Postmortem Breakage

**Marta Paulson**

Faculty Mentor(s):

Donna Boyd

Cliff Boyd

Often perceived as a highly specialized and peripheral subfield of archaeology, forensic archaeology contributes to our understanding of not only forensic anthropology and forensic science, but also traditional archaeological practice. Forensic archaeologists' extensive knowledge of postmortem taphonomic effects on material objects has led to more precise interpretations of postmortem interval, environmental (including scavenger-induced) scattering and alteration of human remains, and site formation processes. Experimental taphonomic research has formed the core of these advances in site interpretation, particularly through its focus on differentiating perimortem (at or around the time of death) from postmortem events. This concept is illustrated through RU Forensic Science Institute (RUFESI) research aimed at differentiating perimortem bone fracture from postmortem breakage. A sample of 300 *Sus scrofa* ribs underwent controlled Blunt Force Trauma in the RUFESI at known periodic perimortem and postmortem intervals, ranging from 0 to 112 days of environmental exposure. Resulting rib fractures were analyzed macroscopically and microscopically to define signature fracture morphology across time periods. These results allow differentiation of perimortem fracture versus postmortem breakage and inform period of exposure and contextual history of field remains. Forensic archaeology research can therefore play an integral role in interpretations of traditional archaeological method and theory.

### Implications of Alternative Treatment Methods for ADHD

**Maria Downey**

Faculty Mentor(s):

Wendy Eckenrod-Green

Attention Deficit Hyperactivity Disorder, (ADHD), is a condition that includes attention difficulty, hyperactivity, and impulsiveness. Approximately 11% of school age children have this disorder. This presentation focuses on alternative methods to reduce common behaviors associated with ADHD. The most common method for treating ADHD is through stimulants or medication. Other treatments can include complementary and alternative medicine (CAM), nutrition/diet, sleep, bio-feedback, or routines. These alternative treatments can be used on their own or combined with the tradition method or each other. Conclusions derived from the research will highlight benefits of alternative treatments for ADHD and discuss how this may apply to educators.

**Honors Academy Capstone Showcase**

7:45-8:45 PM

Young Atrium

**Isolation in Deafness: Helping DHH College Students Overcome Social Isolation****Blakely Coughenour**

Faculty Mentor(s):

Tracey Nielsen

The purpose of this research is to provide insight into what hearing colleges and universities can do to help students with hearing loss adjust and be more involved in their school environment. This research discusses the different aspects of hearing loss that can later impact socialization such as age of identification, type and degree of loss, type of amplification, and mode of communication. Overall, the research shows that a student with hearing loss that chooses to attend a hearing college or university is more likely to experience feelings of isolation and loneliness. However, there are steps that professors, residential life, and other university employees can take to help these students become more socially, emotionally, and academically successful. One of these steps was created to be incorporated into Radford University Residence Halls if needed. This took the form of “sign sheets” that included words and pictures of signs and QR codes that were linked to videos of the signs and facts about Deaf Culture. These sheets can be used to encourage better communication between residents and residence life staff with those who are Deaf or Hard of Hearing. The research shows that even a small change like this can be monumental in overcoming social isolation in DHH students. All hearing colleges and universities should be equipped with technology and resources like this in order to help their students be successful. Therefore, these sheets have been given to the OHRL office for future use.

**Realizing the Scarcity of African American Designers in the United States Fashion Industry****Sian Brown**

Faculty Mentor(s):

John Jacob

In American culture, fashion plays a huge role in how an individual defines himself or herself. The acceptance of diversity has progressed quite a bit in the United States and it has also followed suit within the fashion industry, particularly with the diversity of people represented in fashion modeling and advertisements. However, when trying to name a currently prominent African American fashion designer the list is noticeably short. What came along with the acceptance of cultural diversity in the United States was the emergence of a fashion market segment that appeals to African Americans and other minorities. Thus one could assume that with the emergence of this market segment included equally diverse brands and designers. However when reviewing the fashion industry in its entirety, this is not the case. It is important to view the history of black fashion designers and the corresponding market segments in order to understand why high success rates are so brief and rare. By using magazines geared towards African American consumers such as Ebony, Essence & Jet quantitative observations can be gathered concerning the scarcity of African American designers.

**Honors Academy Capstone Showcase**

7:45-8:45 PM

Young Atrium

**Relational Algebra Teacher - A Homework and Practice System for Database Students****Christopher Anglin**

Faculty Mentor(s):

Robert Phillips

Databases are used in just about every aspect of information technology to easily store and access data. When data stored in a database is needed, a query written in a language called Structured Query Language is used to select and return the wanted information. When a query is submitted to the database it is converted to relational algebra, a symbolic representation of the SQL. Understanding the relationship between relational algebra and SQL allows one to gain a deeper understanding of the inner workings of a database. Therefore, relational algebra is often taught in upper level database courses. Radford University currently has an online system, called SQL Teacher, that allows students to create queries in SQL and receive instant feedback on the correctness of their statement. However, no such system exists for relational algebra statements. This project is the creation of a system, called Relational Algebra Teacher, that allows students to create relational algebra statements, submit them, and get instant feedback. Relational Algebra Teacher takes student input in, converts it to SQL using an algorithm created for this project, and then submits it to SQL Teacher to be checked for correctness. The feedback from SQL Teacher is then passed to the student.

**Honors Academy Capstone Showcase**

7:45-8:45 PM

Young Atrium

**Seeing Through a New Lens: Memory Aiding Prosthesis and the Future of Healthcare****Cassidy McRorie**

Faculty Mentor(s):

Megan Hebdon

Introduction: Chemotherapy-related cognitive impairment is a significant side effect or late effect of chemotherapy that affects daily functioning of cancer survivors. Clinical manifestations include: difficulty concentrating; trouble remembering specific details such as dates, times, names and occasionally larger events; and even difficulty recalling common words. The cause of this condition remains unknown, although the impact on patient quality of life is significant. The purpose of this study is twofold: first to examine the current knowledge of health care providers in regards to chemotherapy-related cognitive impairment; second, to assess the attitudes of healthcare providers in relation to the use of memory prosthesis glasses in individuals with chemotherapy-related cognitive impairment. Method(s): Data will be obtained through an electronic cross-sectional survey based on the Technology Acceptance Model that will be sent to healthcare providers and healthcare providers in training. Through multiple choice, likert scale, and open-ended response questions, the survey will address demographics, basic knowledge of chemotherapy-related cognitive impairment, and attitudes toward the use of smart glasses as a memory aid in chemotherapy-related cognitive impairment. Results: Researchers are in the process of data collection. Once all data is obtained from the target population, the responses will be analyzed using a descriptive qualitative approach for open-ended response questions. Quantitative data will be evaluated using SPSS for descriptive and inferential statistics. Discussion & Conclusions: The substantial impact it places on the lives of cancer survivors requires that healthcare providers both understand the condition and are aware of supportive treatment options. Wearable technologies are a novel, patient-centered approach to care, but can only be effective if designed to meet the needs of consumers and health care providers. Through understanding the knowledge health care providers have of chemotherapy-related cognitive impairment and their perceptions of smart glasses as a memory aid, smart glasses can be effectively designed to promote positive patient outcomes in this condition.

**Honors Academy Capstone Showcase**

7:45-8:45 PM

Young Atrium

**STEM-inists and The Leaky Pipeline: A look at Gender Issues in STEM****Kirsty de Wit**

Faculty Mentor(s):

Sara O'Brien

While there has been a significant increase in formal and informal programs to encourage women to pursue secondary educations in STEM fields, there remains a lack in programing the both informs and prepares women for the gender equality issues they will face. Women in STEM as well as the rest of the scientific community lack the knowledge of some of the major issues that women in STEM face, especially those that are prevalent in their chosen fields. The case study, "STEM-inists and The Leaky Pipeline," discusses these major gender issues while applying and testing the knowledge of participants' basic scientific skills. These scientific skills include, but are not limited to: data collection and analysis, use of databases, simple statistical analysis, comprehension of scientific figures, and creation and analysis of visual representations of data. Additionally, working through this case study encourages the participants to integrate their scientific skills, as well as their personal observations and experiences with the exploration of topics applicable to their role as scientists within society. This goal of this project is to determine whether assigning students a case study examining gender issues such as the pay gap, gender stereotyping, bias, and sexual assault and harassment would increase their awareness and advocacy of these issues while also strengthening their scientific skillset in data analysis, visualization, etc.

**A Different Use of Time: Stimulation Boards for People with Alzheimer's****Carly Mannon**

Faculty Mentor(s):

Joan Dickinson

The purpose of my project is to design a textural board to appeal to individuals diagnosed with dementia of the Alzheimer's type. Most of these individuals spend their days folding towels, playing with children's toys, or watching television. Some patients with dementia, called "exit-seekers" tend to pace while looking for a way out of the building. Through my research I have found multiple different sensory boards created for individuals with dementia, but they appear childlike. Other toys that are popular for people with memory loss include stuffed animals, baby dolls, and textural lap mats. With the use of journals, websites, and a site visit to Heritage Hall in Rich Creek, I have determined textures that are most appealing and least appealing to individuals with dementia. During my site visit I was given the suggestion to incorporate animals and nature into my design. From that suggestion, I was inspired by the texture of different animals and nature to create an age-appropriate board that appeals to the different senses. I will be building a small-scaled prototype to test my designs before building the board to actual size. After the board is complete, I plan to have my sensory board installed in a memory care unit for testing. My hope is that I can give people diagnosed with Alzheimer's a better use of time and help keep exit-seeking patients distracted while minimizing escapes.

## Honors Academy Capstone Showcase

7:45-8:45 PM

Young Atrium

### **The Effect of Varying Coaching Styles on Individual & Team Success**

**Carolyn Clary**

Faculty Mentor(s):

David Sallee

Athletes of all sports encounter a variety of coaching styles throughout their careers from autocratic to democratic and more. These coaching styles, while individual in nature, all have effects on the athletes themselves as well as the team as a whole. These numerous aspects are involved in the success of one team versus another; however, the question is rather unanswered as to how these coaching styles effect the characteristics of individual and team success via the viewpoint of these same individual athletes in relation to their perception of success. This study will answer some of these questions by surveying Radford University's collegiate student-athletes that encompass multiple sports, backgrounds, etcetera as well as delving into individual commentary on the athlete's feelings with relation to changes in the team/individual athletes because of said coaching style.

### **The Benefits of Equine-Assisted Therapy**

**Haley Jensen**

Faculty Mentor(s):

Holly Robbins

Equine Assisted Therapy dates as far back as 460 B.C. when Hippocrates referenced this form of treatment for physical and psychological disabilities as “natural exercise”. In 1952, at the Helsinki Olympics, horse back riding was credited for helping Liz Hartel, a silver medal recipient, overcoming Polio. In 1969, the North American Riding for the Handicapped Association (NARHA) was established as equine therapy centers arose across the United States and Canada (History of Hippotherapy and AHA Inc., 2018). People with physical and psychological disabilities have seen many forms of treatment within the history of the human race, and the use of horses and other animals has been a key player. Since the establishment of equestrian therapy centers, a goal for equine assisted therapy has been put into place, which promotes physical, emotional, cognitive, and social growth (Memishevikj & Hodzhikj, 2010). The main belief behind this treatment is that “simply being around the horse, grooming and working with the horse, has a healing power” (Memishevikj & Hodzhikj, 2010). This therapeutic strategy is well established internationally, but the United States has specific certification requirements that are established by the Equine Assisted Growth and Learning Association (EAGLA). Within the program there must be a mental health professional that has a university degree along with a board of professionals governing over the practitioner, and there must be an equine specialist professional present at all times. In this research, I will examine therapeutic protocol used by two different Equine Assisted Therapy centers in Virginia. Through interviews with key stakeholders within these programs, I will examine the affordances and limitations of equine therapy for students with disabilities.

## Honors Academy Capstone Showcase

7:45-8:45 PM

Young Atrium

### The Impact of Social Media on Community Engagement

**Katie Annetti**

Faculty Mentor(s):

Angela Stanton

This project explores the specific elements of a post that encourages individual engagement on a social media platform. This research provides insight as to what types of social media posts are most effective to better help companies and organizations successfully utilize and maximize their social presence. Data from a non-profit organization's Facebook page, Preserve the NRV, was analyzed using text mining/sentiment analysis in SAS Enterprise Miner. Sometimes referred to as opinion mining, a sentiment analysis works to discover the types of posts individuals reacted to in a positive, neutral, and negative manner based on an established set of guidelines. Approximately 1,600 posts were coded and analyzed from the inception of the Facebook site through October 2017. The social media posts were also divided by the specific elements each post includes (i.e. photo, video, external link, no additional element, etc.) and the response/engagement ratings provided by Facebook. The data was analyzed using regression and decision tree analysis to determine what factors contributed to and/or predicted user engagement. The results were further interpreted by being compared to a historical timeline of what occurred with the non-profit's supporting project at the time of the significant data findings. This information helped to better establish the effectiveness of the social media posts.

### The Influence of Three-Layered Cranial Architecture Development on Non-Accidental Pediatric Cranial Blunt Force Trauma Outcomes

**Kimber Cheek**

Faculty Mentor(s):

Donna Boyd

Cliff Boyd

Development of three-layered (diploe, inner and outer table) bone in the juvenile cranium has important consequences for pediatric Blunt Force Trauma (BFT) outcomes; however, the timing of this development is unknown. Macroscopic and microscopic metric and morphological comparisons of juvenile crania from the Scheuer collection ranging in age from perinatal to 17 years chronicle the ontogenetic development and spatial and temporal variability in the emergence of a mature cranial architecture. Results indicate the absence of a three-layered cranial architecture until 4-6 months of age, when initial development of diploe combined with differentiation of inner and outer tables can be noted in the posterior parietal/superior occipital. By 9-12 months, this has expanded to include other buttressed areas of the frontal and occipital crest and pterion. Development of the three-layered structure lags behind at fontanelles and sutures as well as lateral vault walls. A more mature cranial architecture pattern is not seen until age 8. These data are used to topographically map cortical and diploic thickness variability across the growing cranium. Interdigitation of clinical forensic case fracture locations with these mapped cranial fracture high-risk BFT impact regions across the growing juvenile cranium shows a concordance, supporting the hypothesis that absence or lesser development of a three-layered architecture in very young subadults leaves their cranial bones thin and vulnerable to the effects of BFT. These results have important applications for pediatric BFT cranial trauma prevention.

**Honors Academy Capstone Showcase**

7:45-8:45 PM

Young Atrium

**The Story Behind Cold Cases****LaKisha Williams**

Faculty Mentor(s):

Eric Snow

Cold cases are unsolved criminal investigations that remain open until new evidence is brought forth. There are many reasons behind why cases become cold and there are numerous assumptions of what plays the biggest role within a criminal investigation that causes them to remain unsolved. Many believe that cases become cold because law enforcement official's caseloads are too heavy, causing them to overlook key factors within a case that could have helped an ongoing investigation. Along with that belief, the assumption of police departments lacking in resources needed to properly investigate certain cases, are discussed. Some believe that cases become cold due to the lack of cooperation from the witnesses, the suspects, and sometimes the victims. Others believe that the media, the time of the offense, and the seriousness of the crime plays the biggest role within a criminal investigation. Along with these beliefs, it has been proven that tactics and methods used by police departments within an interrogation room with the witness, the victim, and the suspect has played a significant role in whether a case is solved. I, on the other hand, believe that they are all contributing factors to the list of reasons why cases become cold. Therefore, I will be conducting a research study with multiple police departments to gather information on why most of the cases within their departments become cold. This would provide me with an inside perspective on why they're reopened and what steps and procedures are taken to try and solve these cases.

**Virtual Reality-Based Training on Upper Body Movement and Activities of Daily Life in Older Adults with Parkinson's Disease****Adanna Cheek**

Faculty Mentor(s):

J. P. Barfield

Parkinson's Disease (PD) is a progressive neurodegenerative disease that affects both a person's motor and non-motor functions. Technology has allowed physical therapy to make leaps and bounds in the treatment of patients with PD. This study's purpose was to examine how virtual reality video games (VG), focused specifically on the upper body, affected upper body mobility and activities of daily life in people with PD. To determine whether there was a change in upper body mobility and activities of daily life, the Arm Motor Ability Test (AMAT) was administered before and after 8 weeks of VG training. The participants trained on the Nintendo Wii Sports interactive video game (i.e., VG). The participants played 3 games that specifically focused on the use of their arms and upper torso: boxing, bowling, and golf. Results support the potential of VG training to improve upper body function in adults with PD.

**Interdisciplinary Oral Session****3:30-5:00 PM****Heth 016****Internships through a Sociological Lens****Shayna Gutcho**

Faculty Mentor(s):

**Eileen Lagos**

Melinda Wagner

As students of the Sociology Department, we have gained an understanding of sociological perspectives and applying them to real-life problems in the modern day. Through our internships, we have hands-on experience interpreting qualitative and quantitative research while applying sociological theory to realize how it affects day to day lives in the New River Valley. With experience in the Center for Social and Cultural Research (CSCR) and the Floyd Story Center: Roots with Wings Oral History Project, we will share how lessons from the classroom shaped our practical experiences in the real world.

**Peak Experience and Caregivers of Children with Disabilities****Jenna von Schlichting**

Faculty Mentor(s):

James Newman

Caregivers of children with disabilities face high amounts of stress in the areas of, cognition, emotional, social, and physical functioning. Leisure can be an effective means of reducing stress. Leisure as Peak Experience is essential for a balanced lifestyle. Cziksentmihalyi's FLOW Theory (1990) speaks of "Peak Experience" as an important aspect of human life. Peak Experience produces feelings of contentment, satisfaction, and joy necessary for all humans. Peak Experience requires a balance between levels of challenge and skill. Eustress is necessary for individuals to achieve Peak Experience. However, challenges perceived as too high increase distress and high levels of distress have negative health ramifications. Individuals who care for a child with a disability have high potential to experience distress due to physical, emotional, cognitive, and social factors. In the New River Valley, caregivers of children with disabilities struggle with this balance between skill and challenge. These caregivers may feel over-challenged by a child with a disability and never reach Peak Experience. This condition leads to decreased caregiver health and has implications for child development. The purpose of this research is to explore ways to increase the skill of the caregiver commensurate with the challenge of providing care for these children. The study will explore caregiver wants and needs and assist with coping strategy development. This presentation will take the audience through the current literature and the goals of the continued summer and fall research.

**Interdisciplinary Oral Session****3:30-5:00 PM****Heth 016****Predicting Grades and Retention of First Semester College Women****Caitlin Martin****Crishauna Rolack****Jennifer Madonia****Cassandra Homick****Rebecca Wiegmann**

Faculty Mentor(s): Jeff Aspelmeier

Ann Elliott

Anja Whittington

A longitudinal study of academic success identifies factors that predict the first semester GPA and second semester enrollment of women enrolled in their first semester of college. Initially, 264 freshmen, recruited from the Psychology Department participant pool, completed measures of resilience, psychological functioning, social-support, self-esteem, and attachment security during the first 4 weeks of the semester. Participants also provided permission to obtain their Fall 2017 GPA and Spring 2018 enrollment data from university records. During the last four weeks of the semester, 152 participants returned to complete measures of resilience, psychological functioning, social-support, locus of control, and social desirability. Regression and Logistic regression models were used to evaluate the group of variables that best predict first semester GPA and persisting to the second semester of college.

**Developing and Validating an Implicit Measure of Attitudes Towards Pornography 2.0****Alex Latham****Jordan Joyner**

Faculty Mentor(s):

Valerie Leake

**Background.** There is a lack of research in the area of attitudes toward pornography. Previous research has evaluated attitudes toward pornography using explicit methods, rather than implicit (Bridges & Morokoff, 2011; McKee, 2008; Batak et al., 1999). Due to the nature of sexuality research, this creates a tendency to convey responses in a socially desirable manner, and may not depict an individual's true attitudes regarding pornography. IAT has been validated as an appropriate form of assessing an individual's true thoughts and feelings regarding specific subject matter (Greenwald et al., 2003). At this time, there has been no use of IAT to assess attitudes of pornography. This is an important avenue to pursue due to the effects of social desirability, and to gain further insight on the overall impact of pornography (Ogas & Goddam, 2011). The current project aims to validate an IAT for attitudes towards pornography (IATP). An Explicit Attitudes Measure (EAM) was created to parallel the IATP in order to demonstrate multiple forms of validity. Participants (N = 154) were gathered through Amazon's MTurk program. The IATP was administered, assessing attitudes by displaying images of pornographic and non-pornographic website images in conjunction with positive and negative words. Bridges & Morkoff (2011) and EAM explicit measures were administered.

**Results.** Convergent and Divergent evidence for validity was established for the IATP and EAM. A factor analysis of the items contained in both the IATP and EAM was conducted.

**Conclusions.** Data suggests the IATP and EAM are promising measures for assessing implicit and explicit, respectively, attitudes toward pornography use. Further information is needed to determine whether these measures are both valid and reliable for clinical purposes, rather than just research purposes.

**Makers & Innovators: Interactive Event**

5:00-7:00 PM

Heth Lobby

**Mobile Makerspace: Making Paper Circuit Thank-You's for your Mentor****Psychology Interactive Brain Event**

5:00-7:00 PM

Heth Lobby

**Watch Your Brain Behave: Live EEG Monitoring****History Oral Session**

5:30-6:30 PM

Heth 016

**Continuation of Botetourt County Digitization****Adam Thompson****taylor Frasure**

Faculty Mentor(s):

**Mikayla Harshman****Alexander Christie**

Sharon Roger Hepburn

A continuation of the collaboration with the Botetourt County Courthouse to transcribe rare documents from the 18th and 19th century. The History 400 students are focusing on three different subjects; land surveys and maps, the 28th Virginia Regiment during the Civil War, and the Free Black Registries. Utilizing a collection of digitized documents, students are working to make these documents available to public access in an easy to understand format. Mikayla Harshman will be working with the land surveys and maps. She will transcribing then explaining the different purposes for them and what you can learn from them. Adam Thompson and Alex Christie will be working with the 28th Virginia regiment called the Blue Ridge Rifles that fought in the Civil War. These documents were written in the late 19th and early 20th giving the summary of the Blue Ridge Rifles and their actions during the Civil War. Taylor Frasure is transcribing Botetourt's Free Black Registries of the early 1800s, these registries provide modern readers with information concerning the names, locations, and ages or professions of the counties free black population.

**History Oral Session**

5:30-6:30 PM

Heth 016

**Looking into the Past: The Experiences of Colored Troops in the Civil War****Kate Sundie****Mason Mowbray****Corbin Morse**

Faculty Mentor(s):

Sharon Roger Hepburn

A group of students in HIST 400, Digital Archives, are working on transcribing and analyzing various documents focused on the 102nd United States Colored Troops during the Civil War. The students are looking into the medical and service records of soldiers to refine our understanding of their experiences during and after the Civil War. The students are examining monthly service reports, medical files, compiled military service records, and pension files to track the welfare of soldiers in the company. The students are developing an interactive digital presentation to summarize their findings.

**Interdisciplinary Poster Session**

5:30-6:45 PM

Heth 014

**Ascorbic Acid May Reduce the Septic Response In Critically Ill Patients****Ajla Becirevic****Emilee Wells****Morgan Wyatt**

Faculty Mentor(s):

Laurie Bianchi

Sepsis is the leading cause of death in the United State among the critically ill. Sepsis is an uncontrolled inflammatory response to infection or trauma. With 300 cases per 100,000, it is essential to determine if clinicians can mitigate the septic response. Ascorbic acid (Vitamin C) is known to help maintain the integrity of the endothelium and may play a role as a cofactor to catecholamine with cortisol in treatment of sepsis. Recent findings indicate that high doses of ascorbic acid provided during sepsis may reduce the incidence of fluid resuscitation, organ dysfunction complications, and mortality rate. This research project critiqued the use of intravenous infusions of ascorbic acid to reduce sepsis and septic shock in critically ill adults. A literature review was completed of article in which ascorbic acid was purported to reduce sepsis. Peer reviewed articles were located using the National Institute of Health Pubmed database; "Ascorbic acid" and "sepsis" were key words used to locate five animal studies and randomized controlled trials. Results of this research illustrated a positive correlation between the intravenous infusion of ascorbic acid and the severity of sepsis in the critically ill. Most of these studies were well controlled, but there might be unaccounted confounding variables that affected the results. Future research should include a larger sample size and the intravenous infusions should not include the use of other vitamins. Recommendations for routine use of ascorbic acid for sepsis should not be made at this time.

**Interdisciplinary Poster Session**

5:30-6:45 PM

Heth 014

**Cocoa Polyphenols Improve Glucose Tolerance****Jennifer Cook****Britney Phekoo****Alexandra Harris**

Faculty Mentor(s):

Laurie Bianchi

The Center for Disease Control estimates that nearly one in four Americans is living with diabetes. Approximately 17 billion dollars is spent annually treating avoidable complications of diabetes such as skin infections, renal disease, or amputations. Management of diabetes includes various insulin regimens such as, insulin pumps, manual injections, and routine carbohydrate counting. The purpose of this research project was to identify potential benefits of cocoa polyphenols on glucose tolerance. The NIH Pubmed database was used to locate 6 peer reviewed journal articles. The key words “cocoa” and “diabetes” were used, and randomized control trials, epidemiologic, and animal studies were found. The Academy of Nutrition and Dietetics systematic review process was used to ensure the studies were reliable and valid and were not impacted by confounding variables or potential biases. Our findings critiqued effects on non-diabetic, pre-diabetic, and type one and type two diabetic subjects. The studies suggest that intake of cocoa polyphenols have favorable effects on insulin resistance and glucose tolerance. While the use of cocoa polyphenols may have potential as adjunctive therapy in glucose control, it is not clear what quantities are needed for long term clinical management. Furthermore, it has not been demonstrated that cocoa polyphenols, extracted or in a typical food form, is practical because certainly, consumption of chocolate bars is not recommended for diabetic patients. Future studies should elucidate the mechanisms by which cocoa polyphenols aid in glucose control to ensure it is the polyphenols alone that have effects on blood glucose.

**Interdisciplinary Poster Session**

5:30-6:45 PM

Heth 014

**Consumers rate sensory attributes of cookies made with cricket flour similarly to conventional cookies****Brittany Mejia-Blanco**

Faculty Mentor(s): Laurie Bianchi

**Emilee Wells**

Jason Davis

**Rachel Barron**

Iain Clelland Andrew Ray

Typical dietary protein sources require water, and agricultural resources that may not be sustainable for the growing world population. Crickets require little water and agricultural resources, thus have higher potential for sustainability. They have nutritional value, as they are a source of protein and vitamin B12 among other nutrients. The purpose of this research project was to evaluate the acceptability of food products containing various amounts of cricket flour. Three variations of chocolate chip cookies were prepared including a low cricket flour cookie (LCF;  $\hat{A}$ ¼ cup cricket flour/recipe) and a high cricket flour cookie (HCF;  $\hat{A}$ ½ cup cricket flour/recipe); a no cricket flour (NCF) served as the control. Nutritional analysis of the cookies was completed. A sensory study was conducted; participants were presented with each cookie in a randomized blocked design. Participants were asked to rate each cookie on a hedonic scale of 1-7 with 1= dislike extremely and 7= like extremely for appearance, sweet taste, bitter taste, overall taste and aftertaste attributes. Statistical comparisons among treatments were completed with Wilcoxon/Kruskal-Wallis as the data was nonparametric. Significant differences between treatments were found for sweetness, and overall taste ( $p < 0.05$ ). Appearance, bitter taste, and aftertaste were not statistically significant; consumer acceptability of sweetness and overall taste may be related to color of the cookies. Further research should focus on consumers who are willing to consume insect containing foods and assess product acceptability of a range of products. It would also be important to learn if cricket protein alters Maillard browning reactions.

**Interdisciplinary Poster Session**

5:30-6:45 PM

Heth 014

**Implications of Newly Determined Mechanisms of Water and Sodium Balance on Recommendations for Sodium Intake****Lauren Sigmon**

Faculty Mentor(s):

**Samantha Koester**

Laurie Bianchi

Hypertension affects approximately 75 million American adults. Cardiovascular disease (CVD) is the leading cause of death in the United States, and hypertension has been connected to development of CVD and CVD-related deaths. There has been extensive research regarding the relationship of sodium intake to blood pressure. The consensus is high salt intake is related to higher blood pressure. This project aims to investigate new evidence regarding water and sodium balance under different dietary salt intake levels; recommendations for guidance on salt intake will then be presented. Original research articles were located utilizing online resources at McConnell Library and the National Institute of Health Pubmed database using the keywords sodium, salt, hypertension, and blood pressure. Eight relevant articles that included randomized control trials, cross sectional population-based studies, cohort studies, and a longitudinal clinical trial were found. The research critique was performed using the Academy of Nutrition and Dietetics Quality Criteria Checklist for Primary Research and Evidence Analysis Library worksheets. The newly reported research that points to counterintuitive mechanisms of water and sodium balance was critiqued. The researchers found that water intake actually decreases with increased salt intake. This is contrary to what has previously been assumed. Results of the literature indicate that lowering sodium intake does lower blood pressure; however, mechanisms of water and sodium balance appear to be different than previously believed. Still, a low-sodium diet for those with hypertension should continue to be recommended. Future research should assess dietary sodium recommendations with consideration of this newly proposed mechanism.

**Interdisciplinary Poster Session**

5:30-6:45 PM

Heth 014

**Iron Bioavailability in a Novel Soy-Based Cookie****Madison Smith**

Faculty Mentor(s):

Laurie Bianchi

Iron deficiency anemia is the most common worldwide nutrient deficiency, with estimates of 5 to 10 million people in the United States and 2 billion people worldwide affected. It is particularly widespread in third world and developing countries, and highly prevalent among women and children. Iron deficiency in children can cause permanent cognitive delays. Soybeans are a rich source of iron, but high in phytic acid. Phytic acid, myoinositol hexaphosphate (phytate) is an antinutritional factor that acts as storage molecules for phosphorous in plants. Phytates chelate metals tightly, including iron, thereby decreasing its bioavailability. The purpose of this research project is to provide an analysis of iron and an estimate of phytate concentration in a novel soy-based cookie. Nutrient analysis of the cookie was completed using the ESHA Food Processor<sup>®</sup> Nutrient Analysis software. One suggested serving contains 8.26mg of iron, 16 mg of vitamin C, 387 mg of phosphorus, and 345 calories. Phytate content in soybeans is estimated to be 1.0 to 5.4% of the dry weight, but the milling process and baking reduce phytate concentration. One serving of the cookie may contain 385-707 mg phytates based on previous studies of soy flour composition. Future research should determine the phytate content of the cookies and how different baking methods and ascorbic acid content might affect phytate concentration, thus iron bioavailability. Studies might then be completed to determine how well the cookies improve iron status to assess efficacy of the cookies. Compliance with consumption could be completed with sensory analysis studies.

**Interdisciplinary Poster Session**

5:30-6:45 PM

Heth 014

**Methods for Assessing Vitamin D Status Need to be Readdressed****Brittany Mejia-Blanco****Cory Toler****Meredith Brubaker**

Faculty Mentor(s):

Laurie Bianchi

Current guidelines recommend that individuals have a serum 25-hydroxy cholecalciferol of 30 nmol/L for adequate vitamin D nutriture. Recent studies have raised concern that this recommendation cannot be applied to the entire population. A single Dietary Reference Intake (DRI) value for vitamin D seems to be inadequate to prevent deficiency in all populations. The purpose of this project is to critique research regarding reliable methods for vitamin D nutriture and better determination of adequate dietary intake recommendations. Possible considerations should include the definition of vitamin D insufficiency to the relationship with parathyroid hormone and bone health. Research articles were obtained from ScienceDirect and National Institute of Health PubMed database using the keywords "Vitamin D Assessment," "Vitamin D Nutriture" and "Vitamin D DRI". All articles were published in peer-reviewed journals. We evaluated observational, cohort, experimental, cross-sectional and double blinded placebo-controlled studies using an evidence analysis library worksheet and quality checklist. Our findings indicate that normal lab values should not be limited to one number; ranges are needed to meet vitamin D needs in subsets of populations based on melanin concentration in skin and quantity and quality of sun exposure, among other factors. Also, other vitamin D markers may be necessary for assessment of nutriture. There may not even be one adequate assessment method for all persons; other methods such as vitamin D metabolite ratio and serum vitamin D binding protein should be evaluated to determine vitamin D status. There needs to be a reassessment regarding adequate vitamin D intake.

**Social Media and Crisis Medical Communication****Hanna Jang**

Faculty Mentor(s):

David Beach

My project examines how social media has become the most effective communication means for medical emergency crisis management because of its sharing network ability. In times of uncertainty during medical crises, people choose social media, especially Twitter and Facebook, as a solution to retrieve updated information about the medical emergency crisis and spread information to communicate with the survivors and rescuers.

**Interdisciplinary Poster Session**

5:30-6:45 PM

Heth 014

**Social Media and Culture****Austin Wayne**

Faculty Mentor(s):

David Beach

My project explores the controversy of social media ruining the reliability of news. With social media, humans can now try to discern the truth. Connected to this is another question about if social media is an extension of the right to freedom of speech. Countries that completely limit or slightly limit what citizens can say on social media limit their citizens' right to freedom of speech to control public opinion. Social media allows freedom of speech and keeps humans from being ignorant of truth, because multiple viewpoints, including the minority opinions, are being presented.

**Social Media and Music****C. J. Rader**

Faculty Mentor(s):

David Beach

My project explores a few of the different ways in which social media and technology in today's society have influenced how we interact with music across many different areas. Technology has changed music as a whole, whether it be in a classroom or the way in which we listen to and perform it.

**Social Media and the Fashion Industry****Morgan Gray****Christopher Rader****Hanna Jang****Dessiry Eugenio**

Faculty Mentor(s):

**Austin Wayne****Kendree Roberts****Rachel Ator**

David Beach

My project looks at the effects of Social Media on the Fashion Industry. It introduces the variety of ways that Social Media has influenced brands and changed the power of the consumer. While the "lack of rules" for fashion today and the cheaper trendy clothing that has arrived have benefitted from social media, the rise of Fast Fashion and the lack of control that the brands have now has caused some ethical issues that concern human rights.

**Social Media: Ethical Issues in Medicine****Dessiry Eugenio**

Faculty Mentor(s):

David Beach

My project examines the rising ethical issues of using social media in the medical field. It focuses on Issues dealing with confidentiality infringement, unprofessional relationships between medical personnel and patients, misleading or incorrect information, and liability, and grey areas and fine lines of what is right and what is wrong determining whether an ethical issue has occurred in medicine with regards to the use of social media.

**Interdisciplinary Poster Session**

5:30-6:45 PM

Heth 014

**Social Supports in Aging****Elease Cook**

Faculty Mentor(s):

Sarah Gilbert

Medicaid is a government funded program that covers 4.6 million low-income seniors. Through this funding there are care centers such as the Program for All-Inclusive Care of the Elderly (PACE) that accept Medicaid. Through PACE, there are social supports for caregivers such as, respite which allow the continuance of independence for older adults. Comparatively, there are Adult Day Care Centers that also provide caregiver support through respite. This independent literature review will examine how caregiver supports through PACE and adult day care facilities can delay the need for long-term care for the elderly. The focus will be on the increased burden on caregivers in managing their loved one's chronic disease such as Alzheimer's, Dementia, and Stroke. This review will also focus on caregiver burnout and stress, which is common when caring for an older adult with these diseases. Discussion of how expensive long-term care facilities are, how they utilize a large portion of allocated Medicaid funds, and how decreasing the time for older adults in long-term care facilities would be more cost-efficient.

**The Effect of Professional Development Workshops on Self-efficacy and Content Knowledge of Speech-Language Pathologists****Amy Weldon**

Faculty Mentor(s):

Karen Davis

The purpose of this study is to explore the effects of service learning on practicing speech-language pathologists in rural southwest Virginia in regards to serving bicultural/multicultural and bilingual/multilingual students. The U.S. Census Bureau (2012) indicated that in the United States the percentage of racial/ethnic minorities, currently at 37%, would increase to 57% of the population in 2060. With an increasingly diverse population also comes the need to provide more training and education for professionals. According to the American Speech-Language Hearing Association (2018), managing diversity is a topic of focus for the 21<sup>st</sup> century. Currently, nearly half (44% - 46%) of practicing speech-language pathologists rate themselves as a "3" or qualified (on a scale from 1= not at all qualified to 5= very qualified) to address cultural and linguistic influences on service delivery and outcomes (ASHA, 2016). Therefore, it may be beneficial to implement professional workshops in order to better prepare speech-language pathologists to serve diverse populations. The study is designed to answer the questions: (a) What is the impact of professional developmental workshop on professional speech-language-pathologists' self-efficacy in serving culturally and linguistically diverse populations? (b) What is the impact of professional development workshop on professional speech-language pathologists' content knowledge in serving culturally and linguistically diverse populations?

**Interdisciplinary Poster Session**

5:30-6:45 PM

Heth 014

**The Marketing Myth****Kendree Roberts**

Faculty Mentor(s):

David Beach

My project uncovers the trends, hashtags, selfies, tweets, snaps etc. that has engrossed my current generation since the launch of social media. Many people find social media to be an online database for jovial exploration and serendipity through posting various subjects and topics. However, there is an undeniable counterargument that social media is a false sense of reality. We are in fact vulnerable to other people's opinions and notions that are non-factual and are controlled by the "puppeteers" known as corporate America.

**The Use of Social Media in Modern Day Politics****Rachel Ator**

Faculty Mentor(s):

David Beach

My project analyses the use of social media in modern-day politics to discover if social media is or is not impacting politics. I examine the impact of politics on social media, social media's impact on politics, how society does/does not change its political views based on social media, and the influence of social media strictly on the election process. In addition, the most recent 2016 election is also featured to provide a relatable campaign.

**Center for Gender Studies Keynote Address  
3:30-4:30 PM Heth 022**



**Dr. Ann Marie Klotz  
Radford University  
Vice President for Student Affairs**

**A High Heel in the Door: Lessons Learned from Women College Presidents**

**Abstract: 23% of college presidents are women and if you take out community colleges that number plummets to 13% (Klotz, 2015). These numbers tell the story of persistent barriers for women in advancing to executive roles in academia but are also applicable to understanding the challenges for women in all industries. Join us for a lively discussion about what the research tells us about career advancement for women through the stories of ten women who made it to the top. You will be inspired by their journey and compelled to take action through the practical advice they share for young women who want to blaze their own trail.**

Center for Gender Studies Poster Session  
4:30-5:30 PM Heth 022

**Changing Views of Human Sexuality: An Overview of Alfred C. Kinsey's Research and its Impact on Society in the United States**

**Victoria Dunsmore**

Faculty Mentor(s):

Tom Pierce

The sexual revolution of the 1960s and the 1970s had a tremendous impact on how Americans view and think about sexuality. Up until then many people would not openly discuss topics such as contraception and masturbation, but would rather keep that information "at home". Influential figures such as Margaret Sanger and Masters and Johnson, brought these topics to the public eye as well as into the laboratory. This public shift towards embracing research into sexuality did not come lightly, however. The history of sexuality in the United States consists of Victorian-Era beliefs such as waiting until marriage to engage in sexual intercourse. The actual sexual behaviors individuals engaged in was brought to light by Alfred C. Kinsey who conducted multiple nationwide surveys on the sexual behaviors men and women engage in. These two surveys produced the books "Sexual Behavior in the Human Male" and "Sexual Behavior in the Human Female" (Brown & Fee, 2003). The current proposal aims to explain the nature of these studies, how they were conducted, what Kinsey found, as well as the backlash that ensued in a time where conservative beliefs about sexuality were held by the nation.

**Does Feminist Ideology Mediate between Gender Studies Education and Self-Esteem?**

**Victoria Dunsmore**

Faculty Mentor(s):

Benjamin Biermeier-Hanson

Women's and Gender studies courses are a common component of academic institutions. Instructors who teach these courses typically have two sets of goals in mind: (1) To educate students and provide them with a comprehensive understanding of the subject matter and (2) to promote positive personal changes within each individual who takes the course (Brush, Gold, & White, 1978). If students undergo a personal change and shift their views of gender roles, they sometimes become committed to feminist ideology which was defined by Brush and colleagues (1978) as the attitudes towards changing the social roles of women. Some studies have shown that individuals can experience feminist identity development after taking a Women's and Gender studies course (Bargard and Hyde, 1991; Liss, Crawford, & Popp, 2004; Nelson, Liss, Erchull, Hurt, Ramsey, Turner, & Haines, 2008; William & Wittig, 1997). As Women's and Gender studies courses have been shown to increase feminist ideology, feminist ideology has been shown to increase self-esteem (Cash, Ancis, & Strachan, 1997; Dionne, Davis, Fox, & Gurevich, 1995; Leavy & Adams, 1986; Tiggemann & Stevens, 1999). There has not been a great deal of research on the role feminist ideology plays on taking a Women's and Gender studies course and higher levels of self-esteem, but one study found that exposure to feminist images resulted in an increase in satisfaction with appearance and increased the likelihood to self-identify as a feminist (Peterson, Tantleff-Dunn, & Bedwell, 2006). The current study aims to examine this relationship further by investigating whether feminist ideology works as a mediator between taking a Women's and Gender studies course and increasing self-esteem levels.

Center for Gender Studies Poster Session  
4:30-5:30 PM Heth 022

**Does Perceived Empathy Reduce the Role of Gender Bias in Physician Choice for Women's Health?**

**Victoria Dunsmore**  
**Rachael Harasink**  
**Rachel Scott**  
Faculty Mentor(s):

**Morrigan Duncan**  
**Amanda Chappell**

Jenessa Steele      Nicholas Lee

When it comes to sensitive exams, such as a gynecological exam, patients need to be comfortable with their physician, which requires building a positive relationship with them (Kim, Kaplowitz, and Johnston, 2004). This positive relationship is sometimes built off gender-concordance between the physician and the patient, or through patient-perceived empathy of the physician. The results of choosing ones physician based on gender, tends to have mixed results when it comes to the realm of gynecology. Some studies have shown that if a female patient chooses a female physician, they tend to have high rates of satisfaction with their medical visits (Schmittiel et al., 2000; Zuckerman, Navizedeh, Feldman, McCalla, & Minkoff, 2002); however, other studies have shown that female patients benefit more from having male gynecologists (Balayla, 2011; Roter, Geller, Bernhardt, Larson, & Doksum, 1999); these benefits result from factors such as the physician having longer visits with the patient, exhibiting more partnership behavior, and displaying more empathy towards their patient. Other studies have shown that patient-perceived empathy of the physician is a more important factor in not only decision-making, but in the patient's outcome (Johnson, Schnatz, Kelsey, & Ohannessian, 2005; Howgego, Yellowlees, Owen, Meldrum, & Dark, 2003). Few studies have looked at whether gender of the physician or patient-perceived empathy, plays a more important role when a female patient chooses a gynecologist. The current study aims to evaluate the relative role each plays in the decision-making process for gynecologist choice.

**Center for Gender Studies Poster Session  
4:30-5:30 PM      Heth 022**

**The Effects of Experimenter Gender on Gender Role Attitudes**

**Sofia Martinez**

**Victoria Moncion**

**Amanda Chappell**

Faculty Mentor(s):

Jeffrey Willner

Within the field of psychology, there is rising concern about the ability to replicate results. Most researchers fail to include the gender of the experimenter when describing the methods of their study. However, the gender of the experimenters may not only influence the reactions of the participants within the experiment but also may be a reason why there are replication problems within the field. In the current study, college-aged participants will complete an online study. The participants will view an informed consent page which will include a picture and the names of either two male researchers, two female researchers, or one male and one female researcher. Then, participants will complete three surveys. The main survey of interest will assess attitudes towards gender role stereotypes. However, participants will also complete surveys on their health perceptions and music preferences. It is expected that for gender stereotypes, males will report more conservative and traditional attitudes than females. Male experimenters may produce more traditional gender stereotypes for both male and female participants. Lastly, it is expected that male participants will report less traditional attitudes when they believe the study is conducted by a female but female participants will report more traditional attitudes when they believe the study is conducted by a male. This study is the first to assess whether participants may be influenced by the gender of the experimenter in an online format.

Keywords: experimenter gender, experimenter effects, sex-role attitudes

**Do Attachment Styles Moderate Pluralistic Ignorance and Infidelity in Dating Relationships.**

**Rachel Given**

**Shelby Barr**

Faculty Mentor(s):

Jeffery Aspemeier

The present study investigates the presence of pluralistic ignorance in attitudes about infidelity in serious committed relationships with attachment style as a potential moderator. The subjects are 100 undergraduate students at Radford University, who are at least 17 years of age or older and of any gender. The study was administered through an online survey, and records data through self-report measures of attachment (the Relationship Questionnaire; Bartholomew & Horowitz, 1991; and Experiences in Close Relationships-Revised; Brennan, Clark, & Shaver, 1997), a demographics questionnaire, and author constructed questions about participants' own attitudes about infidelity and participants beliefs about the average Radford University Student's attitudes on infidelity. It was expected that self-ratings of comfort with infidelity would be significantly lower in levels than ratings made for the average Radford University students perceived ratings of infidelity. Also, It was expected that those who are the fearful or preoccupied attachment style will also report more extreme levels of pluralistic ignorance, while those who are dismissively attached will not be expected to report pluralistic ignorance. It was also expected that those who are securely attached will report moderate levels of pluralistic ignorance.

English *Elsewhere*: Creative Writing on Place Panel  
2:00-2:50 PM Heth 022

**Burn it Down**

**Chandler Phipps**

Faculty Mentor(s):

Rick Van Noy

**Get Me Up and Out of Here**

**Shayna Dotson**

Faculty Mentor(s):

Rick Van Noy

**Living with Liminal Space**

**Rylee Rucker**

Faculty Mentor(s):

Rick Van Noy

**Relentless, Rolling Beach**

**Allison Sockman-Gillis**

Faculty Mentor(s):

Rick Van Noy

**The Land Remains the Same**

**Christy Myers**

Faculty Mentor(s):

Rick Van Noy

**Psychology Poster Session I**  
**5:30-6:30 PM          Heth 014**

**Age, Gender, And Persuasion: An Analysis**

**Tyler Grossheim**

Faculty Mentor(s):

Jenessa Steele

The effectiveness and strength of a persuasive argument can be moderated by several different cognitive factors. For this study, I will be examining the influence of cognitive load coupled with source similarity on how a receiver views a persuasive argument. Under the Elaboration Likelihood Model, peripheral cues such as source similarity should be more effective while under higher cognitive load as it depletes resources and leads to less substantive engagement (Petty & Cacioppo, 1986). Participants will be placed under either high cognitive load or low cognitive load using an N-back task, and then asked to examine a neutral product review matched to them on similar characteristics (age, gender, age + gender, or a mismatch of both). Following this, they will be given a survey and asked to rate the product, the effectiveness of the argument, and their opinion of the reviewer. It is predicted that those under high cognitive load will rate the product higher in the matched conditions than those under low cognitive load. Additionally, those ratings in the age + gender match will be significantly higher than either single category alone, or the mismatched category.

**An Examination of Self-Efficacy as a Moderator of the Relationship Between Autonomy and Work-life Balance**

**Martha Epperly**

**Ashley Thomason**

Faculty Mentor(s):

**Eric Holtz**

**Charlotte Watkins**

Benjamin Biermeier-Hanson      Jenessa Steele

The present study investigates whether self-efficacy moderates the relationship between autonomy and work-life balance. Previous literature has demonstrated a positive relationship between autonomy and work-life balance, with high levels of autonomy correlating with high levels of work-life balance (Anderson, Coffey, & Byerly, 2002). Additionally, self-efficacy has been shown to be positively related to both work-life balance and autonomy (Gist & Mitchell, 1992; Chan, Kalliath, Broug, Siou, O'Driscoll, & Timmus, 2016.) To examine the proposed moderation model, participants are being recruited through snowball sampling, and are being surveyed via Qualtrics. Participants will complete a 9-item autonomy measure, a 5-item work-life balance measure, and an 8-item self-efficacy measure. R. Studio will be used to test whether self-efficacy moderates the relationship between autonomy and work-life balance. Researchers expect to find that increased self-efficacy values will increase the relationship between autonomy and work-life balance, wherein self-efficacy will moderate the relationship between autonomy and work-life balance. Methodology, findings, and implications will be discussed.

**Psychology Poster Session I**  
**5:30-6:30 PM          Heth 014**

**Does Music Matter? The Effect of Context-Dependent Music on Word Recall**

**Jennifer Madonia**

Faculty Mentor(s):

Erin Kerfoot

The ways in which students study for exams ultimately influences how well they cognitively perform. For example, many college students study while listening to music. Under the principles of context-dependent learning, that would mean that listening to the same music during learning and testing should improve memory performance. The current study investigated this theory by measuring memory performance in context congruent (learning and testing music were the same) or context non-congruent (learning and testing music were different) situations. Participants were asked to study a list of 16 words while listening to happy music in the background. After a delay period, participants were shown a list of 20 words with instructions to select which words were presented or not presented in the original list. During this memory phase, either the same happy music (context congruent) or different, angry music (context non-congruent) was played in the background. It was hypothesized that memory scores would be higher for those who experienced the context congruent musical situation as compared to those who listened to different types of music during learning and testing.

**Effects of MK-801 On Anxiety and Activity In Male And Female Rats**

**Mckenzie Picard**

Faculty Mentor(s):

**Gabriel Medley**

Pamela Jackson

This study seeks to investigate the effect of MK-801 on rats' activity and anxiety levels. MK-801, also known as Dizocilpine, performs similar to the drug Phencyclidine (PCP). MK-801 is a noncompetitive antagonist of the N-Methyl-D-aspartate (NMDA) receptor. Turgeon et al. (2011) found ambiguous results concerning the effect of PCP on anxiety-like behavior. Adult female rats tended to display decreased anxiety while adult males exhibited an increase in anxiety on the light-dark exploration test. The purpose of this study is to compare how the drug affects the rats' in an open-field task while measuring anxiety and activity levels in relation to the difference sexes. MK-801 was measured utilizing an open field task on an apparatus referred to as a cheeseboard. For the first two weeks of the study the rats were handled and weighed daily by the same researchers. This study consisted of injecting a control group with .1 ml/kg of saline solution and an experimental group with .1 ml/kg or .6 ml/kg of MK-801. Approximately 30 minutes after the injection, a rat would be placed on the open field. Locomotor activity was measured by the distance traveled on the apparatus, and anxiety was measured by the number of fecal boli and the percent of time in the center versus periphery of cheeseboard. Rats that are more anxious will stay close to the center of the apparatus instead of venturing to the outside edge. It is hypothesized that there will be an increased level of activity and anxiety in the rats that were injected with MK-801 compared to the control group. It is also predicted that the effects of MK-801 will be exhibited more in the females rather than the males.

**Psychology Poster Session I  
5:30-6:30 PM          Heth 014**

**Everybody Does It: Pluralistic Ignorance Within College Students' Attitudes About Academic Dishonesty**

**Elizabeth Giles**

**Cameron Holmes**

**Victoria Staten**

Faculty Mentor(s):

Jeffery Aspelmeier

The present study examines the phenomenon of pluralistic ignorance within college students' attitudes about cheating. Using an online questionnaire, approximately 100 students were given two different scenarios involving cheating in class. The first scenario involved a student cheating on an exam. The second involved a student seeing another student cheating and not reporting it (complicity in cheating). Participants were asked to report their personal level of comfort with each type of cheating. They also rated how comfortable they believe the average student is with each type of cheating. Overall, it was expected that participant's self-reported comfort level with cheating would be significantly lower than their perception of what the average student's comfort with cheating is. Due to pluralistic ignorance, we expect the discrepancy between self ratings and the rating for the average student to be greater for the direct cheating scenario than the complicity in cheating scenario, because participants are expected to be more comfortable with seeing someone cheat and not report it.

**Psychology Poster Session I**  
**5:30-6:30 PM            Heth 014**

**Extraversion and Resilience as Protective Factors for PTSD Symptom Severity in Military Personnel**

**Jordan Joyner**

**Jennifer Lindamood**

Faculty Mentor(s):

**Lauren Nehilla**

**Michael Grigsby**

Valerie Leake

Posttraumatic Stress Disorder (PTSD) remains a concern for military personnel, as the number of service members with PTSD continues to rise. The present study examined Resilience and Extraversion as personal characteristic resources of the Conservation of Resources (COR) theory, and their impact on psychological distress in military personnel. COR (COR; Hobfoll, 1989) has been found to be a reliable framework for interpreting psychological and traumatic stress (Hobfoll & Ford, 2000). COR postulates that individuals are inclined to preserve, protect, and procure resources, and that individuals feel threatened when they believe their resources are endangered (Hobfoll, 1989; 2001). Resources are anything a person values (Hobfoll, 1989). Personal resources are characteristics unique to the individual (Hobfoll, 1989). Resources are likely to bolster an individual's resource base, which improves one's ability to cope with the psychological and physiological demands of a traumatic event (Hobfoll, 1991). Hope, optimism, and positive feelings about oneself have been found to act as buffers against losses associated with traumatic stress (Hobfoll, 2001). Perceived sense of control and the ability to communicate well have been identified as personal characteristic resources (Hobfoll, 2001). These factors have been associated with lower PTSD symptom severity (Connor-Smith & Flachsbart, 2007), and comprise the personality traits of Extraversion (John & Srivastava, 1999) and Resilience (Schok et al., 2010). It is hypothesized that Extraversion and Resilience will predict lower PTSD symptom severity. Approximately 200 U.S. military personnel will be recruited through Amazon Mechanical Turk (MTurk). Data collection is ongoing, and expected to be complete by late March 2017.

**Psychology Poster Session I**  
**5:30-6:30 PM Heth 014**

**Fecal Microbiota Transplantation: Implications in Alcohol Use**

**Rebecca Cain**

Faculty Mentor(s):

Dayna Hayes

According to a recent survey over half of the adults the United States are current alcohol users. Alcohol use is thought to alter the intestinal microbiota and increase the permeability of the intestinal epithelial barrier in a way that elicits a gut-mediated inflammatory response. This inflammatory response is associated with heightened levels of alcohol craving. Fecal microbiota transplantation (FMT) has been shown to successfully reestablish a balanced, healthy gut microbiota in patients with gastrointestinal disorders. FMT may restore the damaged microbiota in alcohol users, prevent gut-mediated inflammation, and ultimately reduce alcohol cravings. In the present study, alcohol use will be modeled in male, Sprague-Dawley rats through the use of a drinking in the dark paradigm. This paradigm has been shown to induce significant levels of alcohol consumption. Then, following a course of omeprazole to increase bacterial survival in the stomach, rats will receive a FMT containing either donor fecal matter or their own. Subsequently, rats will be given a two-bottle choice paradigm with both water and 10% alcohol solution to determine their preference for the alcohol solution as a measure of alcohol craving. Results will be analyzed using a 2 (Alcohol: exposed or not) x 2 (FMT: self or donor) factorial ANOVA. It is expected that alcohol craving levels in alcohol-exposed rats who received donor FMT will be significantly lower than in rats who received self-FMT, but there will be no difference in alcohol craving in the among the groups of animals who were not initially exposed to alcohol.

**Does Conscientiousness Moderate Pluralistic Ignorance in Academic Cheating?**

**Breanna Boyd**

**Katiana Ford**

Faculty Mentor(s):

**Logan Barr**

Jeffery Aspelmeier

This study investigates pluralistic ignorance in academic cheating. Specifically, this study looked at the personality trait of conscientiousness as a moderator of pluralistic ignorance. Approximately 100 students rated themselves on their comfort with academic cheating, made estimates of their peers' comfort with cheating, and completed a measure of conscientiousness. It is expected that individuals will rate themselves as less comfortable overall with cheating than other students. Also, it is expected that the discrepancy between self and other ratings will be greatest among participants who are high in conscientiousness, because participants with low conscientiousness are expected to be most comfortable with cheating.

**Psychology Poster Session I**  
**5:30-6:30 PM Heth 014**

**Mary Whiton Calkins**

**Elizabeth Cottrell**

**Ian Evans**

Faculty Mentor(s):

**Jeremiah Burkhart**

Thomas Pierce

From a historical perspective, psychology has been viewed as a substantially male-dominated field of study. Often overlooked, however, is the role of influential women in psychology. One of the most prominent women was the psychologist and philosopher Mary Whiton Calkins. Despite never being officially acknowledged for completing her doctoral degree, Calkins led an illustrious career and contributed significantly to the field, including her service as the first female president of the American Psychological Association in 1905. Calkins was taught by and worked closely with some of the most recognized names in psychology, such as William James, “the Father of American Psychology.” In her professional career, her research was cited with approval from the likes of Sigmund Freud, among others. The overlooking of her accomplishments illustrates the level of systemic misogyny against women around the turn of the 20th century. Because of this many are caught unaware of her numerous contributions to the field, such as her advocacy for her theory of self-psychology and successfully establishing the first psychological research laboratory in an undergraduate institution in the United States at Wellesley College. Perhaps the most important aspect of her legacy is the path she paved for women in psychology and academia. This lasting influence has guided a shift, consistent with the values of Counseling Psychology, specifically in the area of social justice.

**NSSI as a Moderating Variable Between Emotion Regulation Difficulty and PTSD**

**Lauren Nehilla**

Faculty Mentor(s):

Jenessa Steele

Non-suicidal self-harm (NSSI) is the deliberate self-mutilation of one’s own body without any suicidal intent. Though this behavior appears to go against the human tendency to seek pleasure and avoid pain, its use is associated with Briere and Gil’s (1998) Tension Reduction Theory. This theory proposes that behaviors, even those that are seemingly maladaptive, serve some function that reinforces the behavior. NSSI is primarily utilized as a method of emotion regulation. This regulation can be a result of a neurobiological basis, such as the release of endogenous opioids, or by meeting cognitive psychosocial needs, such as attention. This implies that similarly to how NSSI relieves feelings of physical pain with analgesia and euphoria, it could also potentially have the same effect on emotional pain, thus ending or at the very least modulating the negative emotional state. Frequency of traumatic experiences and symptoms is also a reliable predictor of self-injury frequency (Smith et al., 2013). Due to this, NSSI is commonly implicated as a means of coping with trauma symptoms, such as those seen in Post-Traumatic Stress Disorder (PTSD), by directing attention away from more intrusive symptoms (i.e. disturbing recollections) (McKenzie & Gross, 2014). This not only provides another dimension to the current model of reasoning why some people engage in deliberate self-harm, but also demonstrates the necessity of examining the potential for NSSI, as a moderator variable, to strengthen the relationship between emotion regulation difficulties and PTSD.

**Psychology Poster Session I**  
**5:30-6:30 PM Heth 014**

**Pop Culture or Historical Fact? The Intersection of TV's "Black Mirror" and Neurosurgery for Treatment of Epilepsy**

**Kamille Harris**

Faculty Mentor(s):

**Alyson Faires**

Thomas Pierce

Wilder Penfield (1891-1976), once known as “the greatest living Canadian,” was an American neurosurgeon who investigated epileptic seizures’ relationship to the brain. His interest in brain activity led to the discovery that stimulation in the temporal lobes elicited distinct memory responses, implying that electrical brain stimulation could induce retrieval of complex memories. Penfield’s research inspired scientists to investigate and develop their own theories of how the human brain stores memories. According to Penfield, a stream of consciousness existed from birth to death, and activation of areas in the cortex provided access to these recorded experiences. Penfield’s conceptualization was never adopted; his ideas lie in stark contrast to modern theories of memory, despite a lack of contradictory evidence against them. While Penfield is credited with being one of the first individuals to connect electrical brain stimulation with memory retrieval, his hypothesis regarding the mechanism behind this phenomenon is predominately ignored. In 2011, the Netflix sensation *Black Mirror* premiered “The Entire History of You” episode, which depicts a world where people with memory implants are able to replay any of their experiences at any time, both privately and projected for others to view. While a work of fiction, the parallels between *Black Mirror* and Penfield’s research provide viewers with an opportunity to imagine the future of a society in which Penfield’s theories of memory have become reality.

**Pro-social Behavior and Gratitude Expression: A Comparison of Obligatory and Nonobligatory Services in Multiple Social Contexts.**

**Angie Austin**

Faculty Mentor(s):

Nicole Iannone

The expression of gratitude as a pro-social behavior has long been encouraged through socialization early in life development and seen by some as a moral virtue of those who express it. Gratitude expression is given when a person or patron receives a service from a benefactor for some service of value, whether through altruistic or obligatory purpose, showing gratefulness for the service or act provided to them. Past literature findings have explored the lasting effects of gratitude expression on a provider to increase future pro-social service by the provider, as an evolutionary mechanism to strengthen social bonds and increase survival, and the lasting effects that embracing gratitude in everyday life can have on health, subjective well-being, and life satisfaction of the gratitude expresser. However, current literature has not addressed if expression of gratitude varies in the type of service provided. Further research is needed to examine if gratitude expression varies between the type of service provided - an altruistic act or as an obligatory service provided. This study will add to existing literature by examining frequency of gratitude verbal expression to a provider in two social contexts: altruistic service and obligatory service, and the implications results may play on gratitude within different social contexts.

**Psychology Poster Session I**  
**5:30-6:30 PM            Heth 014**

**Responses to Disrespect in Young Adults and Older Adults**

**Amanda Chappell**

Faculty Mentor(s):

Jenessa Steele

Disrespectful actions have many negative repercussions, as disrespect can foster hostility, prompt violence, and negatively impact relationships. Emotional responses to disrespect tend to be negative, although more research is needed to investigate overall reactions to disrespectful experiences across the lifespan. This study will investigate how different age groups respond to different types of disrespect. In the current study, young and older adult participants will complete a narrative task about a certain type of disrespect (betrayal or ignored) that they experienced in the past. The participants will also report their emotional response, perceived intentionality, and perceived deservingness of that particular disrespectful encounter. Young adults are expected to respond more negatively to betrayal disrespect than ignored disrespect, but older adults are expected to respond more negatively to ignored disrespect than betrayal disrespect. Learning more about reactions to disrespect can have implications for a variety of settings, including in schools, at home, and within healthcare settings.

**Safety in a Social Context: A Mixed-Methods Examination of the Social and Psychological Determinants of Safety**

**Caelan King**

Faculty Mentor(s):

Stirling Barfield

Allison Wisecup

The Student, Teacher, Administrator, Retention, Resilience (STARR) team at Radford University is an interdisciplinary research team whose focus is to examine mental and physical health trends on our campus. Using students' responses from the 2013 and 2016 National College Health Assessment (NCHA), the STARR team identified several worrisome trends. Specifically, we noticed significant changes in students' feeling of safety on and off-campus. Students reported feeling less safe on and off-campus both during the day and at night. The STARR team conducted a qualitative study to further explore students' feelings regarding safety. The current investigation brings these qualitative findings and multiple sources of quantitative survey data together to assess the relationship between social cues and settings. I am particularly interested to see whether participants' perceptions of safety are a reflection of the external social context or a result of their internal and perceived community distress.

**Psychology Poster Session I**  
**5:30-6:30 PM Heth 014**

**The Impact of Cellphone Use**

**Rebecca Wiegmann**

Faculty Mentor(s):

Nicole Iannone

In this projected study the researcher will assess the relationship satisfaction with one's cellphone has with a variety of factors. The purpose of the study is to assess the variety of relationships cellphone satisfaction has on facets of life and with individual differences. This includes individual factors such as extraversion and conscientiousness, self-esteem, life satisfaction, and the relationship attachment style. In addition, this study will examine the process of transactive memory with an individual and their cellphone. Transactive memory is a theory developed by Daniel Wegener detailing the process of relying on another for knowledge and skills outside of the person's domain. A questionnaire was developed to assess the participants' reliance on their cellphone for information and cues as an extended memory source. Stronger transactive memory is anticipated to predict higher levels in cellphone satisfaction. The researcher anticipates that there will be a positive correlation between cellphone satisfaction and the extraversion, conscientiousness, and life satisfaction measures. The researcher also predicted a negative correlation between cellphone satisfaction with self-esteem and attachment anxiety. The current findings are still pending, as data is still in the process of being collected.

**The Moderating Effect of Workplace Spirituality on the Relationship Between Locus of Control and Workplace Stress**

**Melanie Vandyke**

Faculty Mentor(s): Jenessa Steele

**Alan Berry**

Benjamin Biermeier-Hanson

A person's locus of control is a broadly defined concept that describes their beliefs as to why things happen to them. Previous research into locus of control in the workplace found its external dimension to be positively related with the perception of stress while at the same time being a stronger predictor of it than constructs such as social support. The present study follows this by seeking to examine how workplace spirituality moderates the relationship between locus of control and job stress. In collecting data, this study used a questionnaire with measures for locus of control, workplace spirituality, and job stress. The survey was put online to use snowball sampling as the primary form of participant gathering. The Modified Work Locus of Control Scale (Wolfgang & Gupchup, 1997), the Spirituality at Work Scale (Duchon & Plowman, 2005), and the Stress in General Scale (Stanton et al., 2001) were all included in the survey. Drawing on similar studies related to the topic, we hypothesized that an internal locus of control would predict lower levels of job stress, an external locus of control would predict higher levels of job stress, higher levels of reported workplace spirituality would predict lower job stress, and that workplace spirituality would significantly moderate the relationship between locus of control and job stress due to similar paradigms in place between the two predictive variables such as self-worth and personal values

**Psychology Poster Session I**  
**5:30-6:30 PM                      Heth 014**

**The Role of Mindfulness in Learning**

**Lesli Taylor**

Faculty Mentor(s):

Jenessa Steele

Mindfulness studies have gained popularity in the last twenty years. The recent popularity has been mostly due to the surge in the use of mindfulness-based interventions in therapeutic settings. In addition to being used in a clinical setting, mindfulness interventions have also been used in the classroom at all age levels. Mindfulness is a meditation practiced based on purposeful, directed, attention in the present moment in a nonjudgmental manner (Choi, Saville, & Derakshan, 2016). Many studies have presented competing definitions of mindfulness; however, there are two branches which are often emphasized: nonjudgement and complete focus on the present moment (Choi, Saville, & Derakshan, 2016). This complete focus on the present moment lends itself to better ability to attend. Although there are many studies on mindfulness, there is a lack of literature on the effect of mindfulness on people's ability to regulate their learning. The results of a study conducted by Choi, Saville, & Derakshan in 2016 suggested that if mindfulness is practiced in conjunction with working memory training, then there is an increase of performance on cognitive tasks. In the current proposed research, it is hypothesized that participants whom undergo a mindfulness-based treatment will be better able to attend to material at encoding, leading to better scores on a final test. It is also hypothesized that participants who engaged in the mindfulness intervention will be better able to make more accurate judgements of learning than those participants who did not engage in mindfulness.

Keywords: Mindfulness, Learning, Study Skills

**The Role of Perceived Organizational Support on the Relationship Between Emotional Labor and Counterproductive Work Behaviors**

**Michaela Setzer**

**Hediye Uyguner**

Faculty Mentor(s):

**Tori Sheets**

Benjamin Biermeier-Hanson      Jenessa Steele

The main purpose of this study is to further research the relationship between emotional labor and counterproductive work behaviors (CWBs). The literature reveals that there is a strong relationship between these two constructs (Bechtoldt, Welk, Hartig, & Zapf, 2007). Previous research has assessed different variables that may influence this relationship. Emotional intelligence (Jung & Hoon, 2012) and personality (Raman et al., 2016) have been found to be significant moderators. There is also a positive relationship between POS and deep acting, a form of emotional labor (Mishra, 2013). In addition, there are several theories that support this relationship, social exchange theory (Eisenberger, Huntington, Hutchison, & Sowa, 1986), conservation of resources theory (Hobfoll, 1989) and the attribution theory (Raman, Sambasivan, & Kumar, 2016). Based on the information presented, it is predicted that the relationship between emotional labor and CWBs will be moderated by POS. Increased POS will reduce CWBs and decreased POS will increase CWBs. A questionnaire was developed to assess this moderated relationship. The data for this study is still being collected through Qualtrics and findings will be presented.

**Psychology Poster Session II**  
**7:00-8:00 PM          Heth 014**

**A Comparison of Non-pharmacological Techniques in the Treatment of Dementia: A Proposal**

**Rachel Scott**

Faculty Mentor(s):

Jenessa Steele

Major Neurocognitive Disorder, more commonly known as dementia, is a disorder that affects 1-30% of individuals age 65-85 (American Psychiatric Association, 2013, p. 608). The consequences of dementia impact numerous domains including cognitive, behavioral, and emotional functioning. These domains are altered in such a way that it decreases the general quality of life for the individual and increases caregiver burden. Studies have shown drastic increases in depression, anxiety, and aggression in older individuals with dementia (Cerejeira et al., 2012; Cipriani, Vedovello, Nuti, & Di Fiorino, 2010). These emotional changes often result in behaviors that are considered negative or maladaptive. One popular theory (the need-driven, dementia-compromised behavior (NDB) model) holds that maladaptive behaviors are the result of needs not being properly met and negative behaviors result as a response (Kovach, Noonan, Schlidt, & Wells, 2005). The most common first-line of treatment is pharmacological interventions, though numerous studies have found that such treatments have consequences that do not outweigh their benefits (Cerejeira et al., 2012; Sadowsky & Galvin, 2012). Instead, many clinicians have been using increasing amounts of non-pharmacological treatments. Generally, these treatments have been found to increase the quality of life for the dementia-sufferer and caregivers. However, studies have mixed results as to whether they are effective in treating dementia. The current study aims to compare the efficacy of two non-pharmacological treatments, recreation therapy and dementia-focused cognitive behavioral therapy, with an emphasis on the NDB model in treating the outcomes of mild to major dementia.

**Psychology Poster Session II**  
**7:00-8:00 PM            Heth 014**

**Does Severity Moderate Pluralistic Ignorance for Revenge Norms?**

**Katelyn Brown**

**Alexa Barnett**

**Shermaine Garland**

Faculty Mentor(s):

Jeffery Aspelmier

The present study investigates students' comfort with revenge in friendships and whether these attitudes show a pattern of pluralistic ignorance. This study also tested whether pluralistic ignorance was moderated by the severity of revenge. Participants were 100 undergraduate students from Radford University who were at least 17 years of age. Participants were presented with brief scenario's depicting three different types of revenge: mild revenge involved verbal insults, moderate revenge involved spreading rumors, and severe revenge involved physical assault All participants rated their own attitudes about each type of revenge and provided estimates for the attitudes that the average student at Radford University would hold. In the mild revenge condition, it was expected that participants would report being less comfortable with revenge than the average student, but that overall both self and average-student ratings would be higher than in any of the other conditions. In the moderate revenge condition, it was also anticipated that participants would report being as comfortable with revenge as the average student. In the severe revenge condition, it was anticipated that participants report being less comfortable with revenge than the average student, but self-ratings would be lower than those found in any of the other conditions.

**Psychology Poster Session II**  
**7:00-8:00 PM          Heth 014**

**Effects of NMDA Antagonist MK-801 on Object Location Recognition and Exploratory Ability in Rodents**

**Hanna Martin**

**Miranda Holland**

Faculty Mentor(s):

**Jessica Meetre**

**Ray Lundy**

Pamela Jackson

This study demonstrates how an NMDA antagonist, MK-801, has an effect on a rodent's cognitive functioning, primarily focusing on object location recognition, spatial movement, and exploration tasks. A total of 40 Long-Evans rats, 20 males and 20 females, were used to compare male and female cognitive functioning abilities after being injected with MK-801 or a control substance. The Object Location Recognition (OLR) test is comprised of three trials; during each trial, two, 3-dimensional objects are strategically placed on the cheeseboard testing apparatus (Gilbert & Kesner, 2002), and rats' are then observed interacting with them. On the third trial, one object is moved to a new location on the cheeseboard. Object location recognition is determined by the ratio of time the rat spent examining the moved object, where an increased amount of time exploring the object indicates recognition of spatial movement (Ennaceur & Delacour, 1988). Distance traveled on the cheeseboard, sniffing the objects, as well as the rat rearing on its back legs and sniffing the air, characterizes measures of exploratory activity (Ennaceur & Delacour, 1988). Computer tracking software (AnyMaze) recorded the rats during testing, measuring the surface area covered, as well as accurately timing the rats in three designated zones, plus the amount of time interacting with the objects. The findings are expected to show that MK-801 injections for rats will significantly impair cognitive functioning, specifically object location recognition and explorative mobility (Ahmadi et al., 2010), and that this effect will be stronger in the female rats.

**Psychology Poster Session II**  
**7:00-8:00 PM          Heth 014**

**Gender Differences: Behavioral Variations Between Male and Female Rats Injected with MK-801**

**Monica Lewis**  
**Sa'mone Moore**  
Faculty Mentor(s):

**Jalisha McEachern**  
**Deanna Cashel**  
Pamela Jackson

This study looked at the difference between male and female rats and the hallucinogenic drug MK-801. We have chosen to study this drug because it is known to cause cognitive dysfunctions and neurotoxicity. The behavioral tasks studied were social interaction and object location recognition. The subjects were 20 male and 20 female Long Evans rats. There were two groups in this study. One group being the experiment group that were administered .06 mg/kg of MK-801. The other group being the control group that were administered 0 mg/kg of Saline. The subjects were semi-randomly assigned to Drug or Vehicle group. Each rat was placed on an open-field apparatus that was used during each experiment. A computer program, AnyMaze, was used to track each of the rats. For the social interaction task, there was another, unfamiliar rat in a cage that was placed in the middle of the maze. We then tracked what sections of the maze the rat spent the most time in for 10 minutes. We wanted to see if the female rats would be less social than the males, or vice versa. On the last task, we examined drug effects on the ability to recognize when an object changed locations. For two back-to-back trials, the objects were placed in the same spot and for the third trial, we placed one of the objects in a different location to see if the rat would recognize the move. We assessed whether female rats recognized the move more often than the male rats. It was hypothesized that the rats that were injected with MK-801 would be less social and fail to recognize spatial changes.

**How Mesmerizing is Hypnosis?**

**Courtney Kalmanson**  
Faculty Mentor(s):

**Rachel Dotson**  
Thomas Pierce

This paper explores the early history of hypnosis, including its original uses, and key historical figures. Hypnosis began with Franz Anton Mesmer (1734-1815) in the 18th century. Mesmer's theory began with the idea of internal magnetic forces which later became known as Mesmerism. Mesmer believed that he had "magnetic powers" that he could use to heal his patients. The idea of mesmerism lived on after Franz Mesmer. Mesmerism became very popular, and psychologists would eventually use the power of suggestion to help their patients with a wide range of problems. In this poster we describe in detail Mesmer's explanation for the effects he observed and the reception his work received from medical peers and the general public. We also describe the relationship between hypnosis, as practiced by Mesmer, and modern clinical uses of hypnosis.

**Psychology Poster Session II**  
**7:00-8:00 PM          Heth 014**

**Identifying and Addressing Growth Edges: Examining the Intersectionality of Privileged and Minority Identities**

**Elizabeth Cottrell**

Faculty Mentor(s):

Sarah Hastings

Counseling Psychologists engage in the lifelong process of exploration and reflection necessary for multicultural competence (Hook & Watkins, 2015). Sue, Arredondo, and McDavis (1992) created the tripartite conceptualization of multicultural counseling competency, which includes counselors' attitudes and beliefs, knowledge, and skills in working with diverse clients and their partners. The first component of multicultural competence, the counselor's own attitudes and beliefs, requires the counselor to engage in reflection and exploration of their own identities, beliefs, and biases. However, examining one's own identities as discrete and separate categories fails to consider the impact of intersectionality. Intersectionality theory strives to understand how perspectives are shaped by the multiplicity of identities, some privileged, and others oppressed, while also considering the dynamics and interactions of those identities. Shields (2008) argued that from an intersectionality perspective, identities mutually constitute, reinforce, and naturalize one another. Thus, it is important for counselors to consider how their own identities intersect, as it can help us explore the biases that we all hold. The Ethical Principles of Psychologists and Code of Conduct (APA, 2016) charges clinicians to not only be aware of and respect cultural differences, but also to strive to eliminate the effect of biases on their work. This poster will provide an overview of how counselors can consider identity from an intersectionality perspective, and use that perspective to explore how privilege, power, oppression, and values create and maintain biases. Additionally, a curated list of exercises, which counselors can use to explore practitioner bias towards clients with different intersecting identities, will also be included.

**Mastering Your Emotions: Comparison of Two Emotion Regulation Strategies**

**Brittany Holdaway**

**Brittani Parr**

Faculty Mentor(s):

**Shatlyn Ayers**

Erin Kerfoot

Emotion regulation is the ability to manage and respond to emotional stimuli. Although there are several strategies, cognitive reappraisal and expressive suppression were specifically compared in the current study. The goal was to determine which strategy was more successful at reducing negative emotions. Participants were asked to complete the Positive and Negative Affect Scale (PANAS) at the beginning of the experiment to obtain a baseline measure of emotion. Next, they were then given specific instructions to either watch a film clip as they normally would (control), view the film objectively rather than focus on the emotionality of the clip (cognitively reappraisal) or do not feel or show any emotion toward the clip at all (expressive suppression). After viewing the film, participants completed another PANAS to determine whether their positive and negative emotions changed from the baseline measure. Additionally, participants were asked to rate how they felt about the main character of the film. Results will determine which strategy, if any, are successful at reducing negative emotions induced by the film and lead to more favorable opinions of the main character in the film.

**Psychology Poster Session II**  
**7:00-8:00 PM          Heth 014**

**Perceived Organizational Support and Turnover Intention Moderated by Person  
Organization Fit**

**Mitchell Camerano**

Faculty Mentor(s):

**Ashley Sprinkle**

Jenessa Steele

Ben Biermeier-Hanson

Our study looks to build upon the previous research which has linked perceived organizational support and turnover intention. Specifically, we look to build this relationship by introducing person organization fit as a moderator of the link between perceived organizational support and turnover intention. Operationally defined, perceived organizational support refers to an employees' perception of the extent to which their organization values the contributions they make and cares about their well-being (Eisenberger, Huntington, Hutchinson, & Sowa, 1986). Turnover intention can be defined as whether or not employees voluntarily intend to leave the position in an organization or company they are employed by (Dawley,, Houghton, , & Bucklew, 2010). Understanding what leads to turnover intention is necessary to lowering turnover which can be very costly to businesses. Broadly defined, and as will be defined in our study, P-O fit is "the compatibility between individuals and organizations" (Kristof, A., 1996, pg.3). Kristof long-term consequences of P-O fit were found to positively influence work attitudes, stress, prosocial behavior, work performance and intentions to quit and turnover (1996). Data collection will be done through surveys that contain scales for turnover intention, person organization fit and perceived organizational support. We intend to contribute findings of this undefined relationship to the literature to reduce turnover intentions and create novel and useful information for businesses to be more cost-effective and appealing to applicants.

**Personality, Workaholism, and Burnout: A Moderated Mediation**

**Robert Wellman**

Faculty Mentor(s):

**Hau Tuang**

Ben Biermeier-Hanson

Jenessa Steele

There is extensive research on burnout and its antecedents (Swider & Zimmerman, 2010). This study focuses on the relationship between personality and workaholism and how they interact to predict burnout. Specifically, in terms of moderation and mediation. Although there is extensive research on this topic, the results are not yet conclusive regarding strength and direction, or the path. In regard to personality, conscientiousness and neuroticism have been found to be related to workaholism. Neuroticism is positively related to workaholism, whereas conscientiousness has been found to be positively related to some factors of workaholism, but the direction is not as clear (Souckova, Vaculik, & Prochazka, 2014). Neuroticism and conscientiousness consistently predict burnout, positively and negatively, respectively (Azeem, 2013). Participants are gathered from social media outlets, using a snowball method, and assessed on their personality, workaholic traits, and their level of burnout. The measures the current study used were the big five IPIP personality scale (neuroticism and conscientiousness), the IPIP workaholism subscale, and the Oldenburg Burnout Inventory. The study proposes that the relationship between personality traits, neuroticism, and burnout is mediated by workaholism. In addition, conscientiousness would moderate the relationship between neuroticism and workaholism, among workers.

**Psychology Poster Session II**  
**7:00-8:00 PM          Heth 014**

**Pluralistic Ignorance and Revenge in Relationships**

**Sara Hinkle**

**Samantha Lamp**

**Thomas Moses**

Faculty Mentor(s):

Jeffery Aspelmeier

This study investigates pluralistic ignorance within social norms for seeking revenge in adult romantic relationships. The level of comfort with revenge in adult romantic relationships will be examined by asking participants to report their own level of comfort and to estimate the level of comfort the average person feels. The study will also investigate whether severity of revenge moderates pluralistic ignorance in perceptions of revenge norms. Approximately 100 Radford University undergraduate students recruited from SONA are expected to complete a survey of 32 questions created on Qualtrics. In exchange for completing the survey, they could possibly get extra credit from their classes. Participants were given three different scenarios involving one member of a couple seeking revenge against the other member. Three levels of revenge were depicted: the lowest level of revenge is verbal, the moderate level is property damage, and the highest level of revenge is physical assault. This study is a 2 (target: self vs. average person) x 3 (severity: low, moderate, high) within subjects design. It was expected that the highest level of severity will produce the highest level of pluralistic ignorance. At the moderate level of revenge, a slight reduction in pluralistic ignorance is expected, compared to the more severe condition. The lowest level of severity is predicted to show the smallest level of pluralistic ignorance. Across the three levels of severity, self-comfort ratings are not expected to change, and the ratings of the average person's comfort with revenge are expected to increase as the severity of revenge goes up.

**Psychology Poster Session II**  
**7:00-8:00 PM            Heth 014**

**Pluralistic Ignorance in Revenge and Friendship**

**Katelyn Brown**

**Alexa Barnett**

**Shermaine Garland**

Faculty Mentor(s):

Jeffery Aspelmier

The proposed study focused on students' comfort levels regarding revenge in friendships and whether these levels showed a pattern of pluralistic ignorance. All participants were exposed to the same treatment where they rated themselves and others (college peers) on how likely they would participate in different types of revenge (Independent variable). Comfort levels with revenge (Dependent variable) was measured using a seven-point numerical rating scale (1 = Very Uncomfortable, 7 = Very Comfortable). It was expected that pluralistic ignorance for revenge norms would be moderated by severity of revenge, a within subject variable with three levels: mild = hurtful words, moderate = gossiping, and severe = physical assaults or breaking personal items. The study represented a within-subjects design because all participants were exposed to the same survey. It was anticipated that the results would show that participants would rate themselves lower than the average student on comfort levels for mild revenge, but that overall both self and average student ratings would be higher than any of the other conditions. It was also anticipated that participants would rate themselves evenly with the average student on comfort levels for moderate revenge. Lastly, it was anticipated that the results would show that the comfort level of extreme revenge for the individual student would be lower compared to the levels of comfort for the average college student. Also, it was anticipated that self-comfort levels will decrease when the severity of revenge increases. Additionally, average college students' comfort levels were expected to be highest when the severity of revenge was mild. It was expected the levels would be equal when the severity of revenge was moderate or severe.

**Political Attitudes Moderate Pluralistic Ignorance within Ethnic Attitudes**

**Amber Daubenspeck**

**Jasmine Sandozz**

**Chyanna Jones**

Faculty Mentor(s):

Jeffery Aspelmeier

This study investigates pluralistic ignorance in individuals' ethnic attitudes and the influence of political affiliation. Participants were 100 undergraduate Radford University students 17 years or older that were recruited through the Psychology Department's participant pool. The Modern Racism Scale (MRS: McCohanay, 1986) was used to measure racial attitudes. Participants completed the MRS once to report their own attitudes. They also completed the MRS to reflect what they thought the attitudes of the average Radford University student were. It was expected that there would be significant differences in the pluralistic ignorance for racial attitudes reported among participants of different political affiliations. Liberal participants were expected to rate themselves significantly lower on the Modern Racism Scale than they would rate others. Conservative participants, especially those who voted for Donald Trump in the last election, were expected endorse Modern Racism and believe that other would endorse Modern Racism as well.

**Psychology Poster Session II**  
**7:00-8:00 PM          Heth 014**

**Politically Out-of-the Loop: Feelings of Exclusion between In and Out-Groups.**

**Charles Woods**

Faculty Mentor(s):

**Jacob Sowder**

Nicole Iannone

Previous literature has found that feeling out of the loop can create feelings of exclusion or partial ostracism (Jones, Carter-Sowell, Kelly, & Williams, 2009). Researchers have also examined the effect being out of the loop with popular culture and how excluded an individual feels (Iannone, Kelly, & Williams, in press). However, the current study plans to see if being out of the loop with pop culture from an ingroup will make people feel worse than being out of the loop with pop culture from an outgroup. Currently, researchers are using a 2 (participant's political orientation: Conservative v Liberal) x 2 (group status: in-group v out-group) x 2 (level of familiarity: familiar v unfamiliar) between-subjects design to find the effect of ingroups and outgroups on feeling out of the loop. Radford Undergraduate students were initially pilot tested to rate familiarity with all stimuli before being used to test any exclusion effect. When a participant began the study, they are asked which political group they identify with and randomly shown pictures of either liberal or conservative politicians that are either familiar or unfamiliar. The results should show that people feel worse when they are out of the loop from their ingroup rather than their outgroup.

**Quantitative Analysis of Continuously Recorded EEG**

**Meredith King**

**Kyle Macintosh**

**Cassandra Homick**

Faculty Mentor(s):

**Nicole Ray**

**Dorneya Halatai**

Thomas Pierce

This presentation provides a brief overview of the use of electroencephalography (EEG) to investigate brain activity, including a brief description of the source of electrical potentials in the cortex. We also present three techniques for quantifying changes in EEG activity over time. First, we describe the use of spectral analysis to determine the degree to which each frequency that could contribute to a complex EEG waveform is actually present in the data. Second we present examples of time-frequency analyses conducted on data from our lab which show how the frequency characteristics of an EEG wave change over periods of time ranging from several seconds to 12 minutes. Third, we show how principal components analysis can be used to identify groupings of electrode locations whose EEG signals are synchronized with each other. We use data collected in our lab to illustrate the use of these techniques to study fluctuations in a student's ability to maintain attention on instructional material presented in an online format.

**Psychology Poster Session II**  
**7:00-8:00 PM          Heth 014**

**Rats' Exposure to Stress in Adolescence and Adult Alcohol Consumption**

**Gabriel Medley**

Faculty Mentor(s):

Jenessa Steele

Abuse of alcohol is a prominent problem in the United States. According to the Substance Abuse and Mental Health Services Administration (2015), 26.9% of people, 18 and older, reported they engaged in binge drinking in the past month while 7% reported heavy alcohol use, which is defined as binge drinking five or more days in the past month. The remaining question is what factors contribute to these undesirable drinking habits. Studies have observed the effects of stress and anxiety in rats on alcohol consumption by researching early maternal separation and adult housing conditions (e.g., Wolffgramm, 1990; Berardo, Fabio, & Pautassi, 2016). Berardo et al. also found environmental enrichment in adolescent rats increased the consumption of alcohol in young adulthood. This research proposal seeks to identify whether living conditions that elicit stress and/or anxiety in adolescent rats will be predictive of alcohol consumption in adult life. Rats will be randomly assigned to one of three living conditions at the beginning of adolescence: group housing, standard single housing, or solitary stainless steel housing. The rats will then be placed into the standard single housing condition once they reach adulthood. The rats will be given access to a 10% and 20% ethanol solution and will be monitored daily on alcohol consumption. I will be observing the effects of the stressful housing condition, solitary stainless steel housing, on alcohol consumption and preference to observe if stress elicited by the housing condition in adolescence has an effect on consumption and preference in adulthood. My hypothesis is rats in the stressful housing condition will consume more alcohol and have a preference for the solution with a higher ethanol concentration.

**Safety Somatization: A Mixed-Methods Examination of the Physiological and Psychological Determinants of Safety**

**Emmaleigh Mondell**

Faculty Mentor(s):

Stirling Barfield

Allison Wisecup

The Student, Teacher, Administrator, Retention, Resilience (STARR) team at Radford University is an interdisciplinary research team whose focus is to examine mental and physical health trends on our campus. Using students' responses from the 2013 and 2016 National College Health Assessment (NCHA), the STARR team identified several worrisome trends. Specifically, we noticed significant changes in students' feeling of safety on and off-campus. Students reported feeling less safe on and off-campus both during the day and at night. The STARR team conducted a qualitative study to further explore students' feelings regarding safety. The current investigation brings these qualitative findings and multiple sources of quantitative survey data together to assess the relationship between physiological and psychological determinates of safety. I am particularly interested to see whether participants' physiological manifestation of symptoms is associated with individuals' perceptions of campus safety or results from their internal and perceived community distress.

**Psychology Poster Session II**  
**7:00-8:00 PM          Heth 014**

**Self-Compassion: A Potential Mediator Between Mindfulness and Stress**

**Rebecca Cain**

Faculty Mentor(s):

Benjamin Biermeier-Hanson

Mindfulness, attending to the present moment in an open and inviting way, has been linked to a number of positive psychological outcomes, including decreased stress levels and increased ability to cope with stressful situations. Since this link was established, researchers have shown that training individuals in mindfulness techniques can lead to stress reduction in a wide range of settings. As mindfulness based stress reduction techniques and interventions become increasingly popular, it is important to explore potential factors that may be involved in, or explain, the relationship between mindfulness and stress. One potential mediator is self-compassion, a related construct which involves being sympathetic and understanding toward oneself in times of failure or suffering. People with high levels of self-compassion are more likely to reframe their failures as learning opportunities and find them less stressful than individuals with lower levels of self-compassion. Additionally, a recent study by Birnie, Speca, and Carlson found that mindfulness based stress reduction interventions were associated with increased levels of self-compassion. Since self-compassion is correlated with lower levels of stress and higher levels of mindfulness, self-compassion may play an intermediary role between mindfulness and stress. To test this potential pathway, a survey containing the Mindfulness Attention Awareness Scale, the Perceived Stress Scale, and the Self-Compassion Scale will be distributed via snowball sampling to participants over the age of 18. The results of this study are expected to reaffirm the relationships between these variables and indicate self-compassion as a mediator of the relationship between mindfulness and stress.

**Psychology Poster Session II**  
**7:00-8:00 PM          Heth 014**

**The Effect of an Hallucinogenic Drug (MK-801) on Activity Levels in Rats**

**Melissa McKeldin**

**Kyra Johnson**

Faculty Mentor(s):

**Rachael Harasink**

**Hannah Parrish**

Pamela Jackson

The current project examined the drug MK-801, also known as dizocilpine “a drug with similar effects to the street drug PCP - and the effect it had on rats’ activity level in open-field, social interaction, and object location recognition tasks. The apparatus used for these tasks is known as a cheeseboard, and was designed by Kesner (Gilbert & Kesner, 2002). Open field tests were conducted by placing the rats at one end of the board and having them maneuver freely during one ten-minute trial, monitoring how much they traveled. During the social interaction test, a conspecific rat was put into a basket in the center of the cheeseboard. The target rat was also placed on the board for 10 minutes. The level of interaction between the target rat and the conspecific rat was tracked during this time. An object recognition task was conducted by running three five-minute trials. The first two trials used two objects that remained in the same place, and on the third trial one of the objects was moved to a different location. Researchers tracked rats’ attention to the new as well as the original object location. We used 40 Long Evans; 20 males and 20 females, all of which were bred in the lab. On the open field test and social interaction task, half the rats were injected with 0.1 or 0.6 mg/kg of MK-801 or saline. For object recognition, half the rats were injected with 0.06 mg/kg and half with saline. The results will provide a much needed comparison between males and females which is important because chronic MK-801 or PCP in rats is used as a model for schizophrenia.

**Psychology Poster Session II**  
**7:00-8:00 PM          Heth 014**

**The Effects of Animal-Researcher Interactions on Corticotropin-Releasing Factor in Adolescent and Adult Rats**

**Camille Hamway**

Faculty Mentor(s):

Dayna Hayes

Sarah Redmond

The human body has adapted a stress response system, known as the Hypothalamic-Pituitary-Adrenal (HPA) axis, which effectively confronts short-term stressors then efficiently returns the body to homeostasis (Hillard, Beatka, & Sarvaideo, 2016). However, this system can become over activated under extreme or prolonged stressful situations, leading to chronic dysregulation and negative health outcomes (Stalder et al., 2017). Rodents possess a similar stress response axis that can potentially be triggered by typical human interaction in laboratory settings. The nature of this human-rodent interaction produces an often-overlooked confounding variable that might be incredibly stressful to the rats (Yin, Guven, & Dietis, 2016). Furthermore, adolescent animals might be even more severely impacted by these interactions as they are still developing and as such are much more vulnerable to insult (McCormick, Green, & Simone). In order to investigate the effects of these essential human-rodent interactions, adolescent and adult female rats were exposed to varying conditions of animal-researcher interaction. The groups consisted of rats that were actively tickled (for details see Burgdorf & Panksepp, 2001), otherwise played with, or gently restrained by the researchers for 2 minutes per day every other day for three weeks. For the adult study, there was also a minimally handled group. Brain tissue was extracted and stained for corticotropin-releasing factor (CRF) as it is released from the hypothalamus in response to stress (Quadros, Macedo, Domingues, & Favoretto, 2016). Results from this study could lead to potential changes in animal research across a multitude of disciplines.

**The Effects Of Source Similarity On Political Persuasion**

**Tyler Grossheim**

Faculty Mentor(s):

Nicole Iannone

There are several common methods of persuasion used in political outreach. These are, at their core, forms of persuasive advertising, merely for people and not products. The present study will seek to analyze a possible moderating factor to this process, source similarity. Specifically, we will be investigating similarity based on gender, age, and a combination of both to test participants reactions to mock political candidates. This will be achieved through a mock political flier, followed by a short survey. The measure will be perceived favorability of the candidate, and a rating of the advertisement itself. It is predicted that those matched under both conditions will yield higher favorability ratings than those matched under either individual condition.

**Psychology Poster Session II**  
**7:00-8:00 PM          Heth 014**

**The Ganzfeld Experiment**

**Charles Woods**

**Rebecca Cain**

Faculty Mentor(s):

**Rebecca Wiegmann**

Thomas Pierce

Extrasensory perception (ESP) has been researched for many years using many different techniques. One method that has been used is the ganzfeld technique. The theory behind techniques, like the ganzfeld experiment, is that everyone may be capable of experiencing ESPs, but these perceptions get drowned out by the constant experience of normal stimuli (Bem, 1993). By inducing sensory deprivation, the ganzfeld experiment is thought to increase individual's ability to experience their ESPs (Scott, 1975). The ganzfeld experiment included two participants, a "receiver" and a "sender" placed in two separate rooms. It investigates ESP by putting the "receiver" in a state of sensory deprivation and encouraging the "sender" to focus on a target stimulus. If successful, the "receiver" is expected to be able to correctly select the target stimulus based solely on their own experiences during the period of sensory deprivation. The ganzfeld experiment, and later adaptations, produced effects that suggested the existence of ESPs, but raised many methodological concerns (Bem & Honorton, 1994). While the ganzfeld experiment lost popularity in the late 1900's, its latest known use in ESP research was in the early 2010's (Marcusson-Clavertz & Cardena, 2011). The induction of ESP via the ganzfeld experiment though never disproven, has been heavily criticized. Many of the recent publications on this topic feature conflicting retrospective meta-analyses, perpetuating the controversy surrounding the ganzfeld experiment (Storm, Trissoldi, & Di Risio, 2010). Thus, until a large-scale, methodologically sound study is conducted, the legitimacy of the ganzfeld experiment and the findings it has produced will remain controvertible.

**The Role of Metacognition in Test Potentiated Learning**

**Marissa Momchilov**

Faculty Mentor(s):

**Lesli Taylor**

Kathleen Arnold

Attempting to retrieve recently studied material enhances subsequent learning, a phenomenon called test-potentiated learning (Arnold & McDermott, 2013). The mechanisms underlying this effect are not well understood, but one hypothesis is that prior tests enhance learners' metacognitive knowledge, which then allows them to study more effectively. That is, testing gives learners a better understanding of their own knowledge. In two studies and one planned experiment, we explore this hypothesis. In Experiment 1, differences in study behavior were measured as a function of prior tests, with results indicating that when learners took more tests before studying, they spent more time studying items that they did not know. Experiment 2, found that this result was not simply due to a better understanding of which items were recalled on the prior test, suggesting that this change in study behavior is due to some other mechanism. A planned third experiment will explore whether this change in study behavior is due to a different aspect of metacognition. Specifically, it will explore whether prior tests change learner's judgments of learning, or the degree to which they judge how well they have learned each item.

**Scholar Citizen Initiative Showcase**  
**2:30-4:00 PM                      Heth 043**

**Realization and Development of Leadership Skills and Strengths**

**Justin Trever**

Faculty Mentor(s):

Tay Keong Tan

The research will delve into the different ways in which apprentice leaders grow and develop over time to become stronger leaders and more skillful at exercising authority. The study will examine the ways leaders persevere and continue to grow in times of struggles, using global leaders like Nelson Mandela as a case studies. It will synthesize the research on the strategies and tactics that leaders use to help others realize and develop their skills. The intended outcome of the research is to develop practical approaches for aspiring leaders to apply to their own lives to develop their leadership skills.

**How to Negotiate Across a Deep Political Chasm: Leadership Strategies for Managing Conflicts in the American Congress**

**Ivan Thirion Romo**

Faculty Mentor(s):

Tay Keong Tan

The presentation is on new and effective leadership practices and negotiation strategies to manage interpersonal and ideological conflict in the Congressional politics. Negotiation and conflict management are critical to finding sustainable solutions to public policy problem in legislative politics. The United States Congress, in recent years, has been mired in gridlock and deep divisions that prevented the smooth functioning of the legislative process and eroded its credibility in the eyes of the American public. The leadership strategies of this study were taken from different scholarly and peer-reviewed sources, including award-winning leadership strategies from 'Getting to Yes' by Roger Fisher and William Ury, and 'Crucial Conversations' by Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler. It will apply the frameworks and strategies of these classics of Leadership Studies on how to manage conflict, build consensus and heal divisions in the American Congress.

**Scholar Citizen Initiative Showcase**  
**2:30-4:00 PM                      Heth 043**

**WAY beyond the classroom: Postcards from the Arctic Circle, RU Geophysics Research Expedition**

*RU Arctic Geophysics Research Group*

**Hunter Brandon**

**Quinn Brock**

**Ryan Fry**

**Michael Hess**

**Rory McDaniel**

**Mark Meadows**

Faculty Mentor(s):

Rhett Herman

During this time they will focus on the process of this type of “beyond the classroom” experience. Students will discuss how this opportunity helped them growth both personally and professionally from prepping for their first immersive research project in the field, to unique process of prepping for and traveling to the Arctic, to engaging with the local scientific and community members that live there, to trouble-shooting and continuing research progress, even when your best laid plans fall to waste, to discussing the impact of these research findings on the broader Arctic ecosystem, local communities included, to how these young researchers now see themselves having accomplished this immersive Arctic geophysics research expedition. What have the learned about themselves and how has this helped prepare them for their future career goals.

**Scholar Citizen Initiative Showcase**  
**ePortfolio**  
**4:00-6:00 PM                      Heth 043**

The Scholar-Citizen ePortfolio Showcase provides a forum for students enrolled in the Scholar-Citizen Initiative to share their experiences in honing the critical skills necessary to empower them to be conscious, creative, and responsible professionals in their field and their communities. The ePortfolio serves as an authentic display of a student's accomplishments, highlighting their academic, personal, and professional advancement in areas of community service, scholarship, and extracurricular involvement. Presentation of a Scholar-Citizen ePortfolio is a graduation requirement for those seeking Scholar-Citizen or Scholar-Citizen Fellow graduation distinction. Once conferred, the distinction is noted on the student’s academic transcript and signifies excellence in applying disciplinary knowledge to address the challenges confronting our local, national, and global communities.

**Luis Arias**

**Meredith Brubaker**

**Nicole Diambra**

**Morgan Fielding**

**Ashley Haynes**

**Alyssa Holland**

**Eileen Lagos**

**Abigail Malmborg**

**Cassidy McRorie**

**Kaitlyn Reeves**

**Ivan Thirion-Romo**

**Production Technology Showcase**  
**6:00-7:30 PM**      **Bonnie Auditorium**

**Animal Shelter Provides Companionship - News Package**

**Stephen Mills**

Faculty Mentor(s):

**Devin Stubbs**

West Bowers

The Montgomery County Animal Care and Adoption Center is the hub for all things animals in The New River Valley. Adoption fees are low, allowing ample opportunities for people to adopt pets while also staying within their financial budgets. After receiving a much needed remodel, the facility is up-to-date and modern. This gives the building a very inviting feeling, which bodes well for scouting volunteers to help care for the animals. By simply signing up and going to a training session, people are able to give their time and love instead of adopting, if they are not able to. Sheltering both cats and dogs, the facility stays true to their no euthanizing policy. Though this may lead to some crowded kennels and cages, the shelter ultimately gets the majority of their animals adopted. For some animals, being chosen comes a little easier. Animals are able to be "sponsored" by outside charities and foster parents. This means that the animal's fee for the neuter or spade has been paid for by the sponsor, the adoption fee being the only thing left to pay. These outside forces are able to assist the shelter even more in finding homes for the animals. Upon visiting the shelter after filming this package, there was a significantly lower number of animals. The number of animals adopted has increased immensely, providing them with loving owners and homes. The purpose of this news package was to inform the public about the amazing operation at hand. People who are looking to adopt, should head to The Montgomery County Animal Care and Adoption Center and find their forever furry friend!

**LED Light Bulb Infomercial**

**Jack Scott**

Faculty Mentor(s):

Matthew Turner

Most people may not realize just how much money can be saved on their electricity bill by changes their light bulbs out for more efficient ones. LED light bulbs also last much longer than any other light bulbs, so it is quite beneficial to spend a few dollars to buy some for your home. Though the structure and overall theme of the commercial may seem silly and satirical, all the information is true. This commercial was made in a way that I could still express my style of humor while also serving as a good way to inform others of the benefits of using LED light bulbs. I chose to structure this commercial more like an infomercial because I knew that I would enjoy the production process and have a bit more freedom with how I wanted to create it. This commercial contains some of the primary tropes that are present in most infomercials, which are used to both inform the viewer of the product, but also to keep them entertained and interested. It is my hope that the viewers of this commercial will not simply take it as just entertainment but will also take into consideration the benefits that come by switching their incandescent or fluorescent light bulbs with LED light bulbs.

**Production Technology Showcase**  
**6:00-7:30 PM**      **Bonnie Auditorium**

**NPHC Documentary**

**Nehemiah Bester**

Faculty Mentor(s):

West Bowers

At the University of Radford, there are many Greek Life Communities. One that stands out among the rest is the National Pan Hellenic Council or NPHC. It is within this council that one would find the Divine Nine, a historical group of predominately Black Fraternities and Sororities. Alpha Phi Alpha. Alpha Kappa Alpha, Kappa Alpha Psi, Omega Psi Phi, Delta Sigma Theta, Phi Beta Sigma, Zeta Phi Beta, Sigma Gamma Rho and Iota Phi Theta. This short documentary was made to explore these organizations on the campus of Radford. Their issues, stereotypes, culture and roles these greek organizations play within the African American community.

**Radford Foundry Documentary**

**Ramsey Cole**

Faculty Mentor(s):

West Bowers

While living and working in Radford as a student and a pizza delivery driver for the past four and a half years, I have driven past the closed down foundry on West Main Street too many times to not know what it was. What did it produce? What was the history of it? Did its closing effect the economy or community itself? How did it close? I decided to set out on a mission to find answers and produced a short documentary on my findings for other people who have the same questions.

**The Search**

**Kirk Payne**

Faculty Mentor(s):

West Bowers

**Tolls: A News Package Project**

**Sabriya McKoy**

Faculty Mentor(s): Kevin Bowers

**Why Radford: A Multitrack Audio Project**

**Tanis Enos**

Faculty Mentor(s):

**Nicole Owens**

West Bowers

**Arctic Geophysics Oral Session**  
**6:00-9:00 PM Planetarium**

**A Homemade Galvanic Electrical Resistivity Array - Same Results for a Fraction of the Cost**

**Michael Hess**

Faculty Mentor(s):

**Quinn Brock**

Rhett Herman

A compact electrical resistivity array has been designed and constructed from scratch by researchers at Radford University. This "micro resistivity array" works by passing a signal into the ice and measuring how well the signal returns to the surface. Based on how well the signal returns to the surface, we can begin to make assumptions about the composition of the sub surface. The array was constructed using an Arduino microcontroller, 4 multiplexers, and 16 relays. This device was deployed on the arctic sea ice in Barrow, AK to test the its reliability in obtaining usable data under extreme conditions. After two failed attempts and some trouble-shooting, we were finally able to get a good set of data to analyze. The data seems promising and looks to correlate well with what we see from other data collection methods as well as straightforward drilling. This unique design has obtained data that compares favorably to professional arrays costing well over 100 times more than this equipment.

**Barrow, Alaska 2018**

**Ryan Fry**

Faculty Mentor(s):

**Chris Mattson**

Rhett Herman

This trip was centered around how to measure the thickness of sea ice through multiple new methods. We attempted to use an Ohm mapper in two different ways to create a rough image of the ice and water below. We used two electrical resistivity arrays, one commercial version that is more suited for looking deeper than was needed as well as a version we made here at Radford. Finally, we used a large array of temperature probes to try and find a correlation between ice thickness and the temperature of the ice and the layers of air just above it. The later required us to design and construct a "cart" that could carry all said probes as well as the necessary electronics to both run them and store the data. Another experiment we decided to run was a seismic test to measure the movement of the ice to see if there was anything we could learn from that. By the end of the trip we had collected data with most of these experiments and the next few groups will go into each topic in more depth.

**Arctic Geophysics Oral Session**  
**6:00-9:00 PM      Planetarium**

**Finite Difference Model of Sea Ice**

**Andre Shannon**

Faculty Mentor(s):

**Rachel Myers**

Rhett Herman

Our goal was to create a model of the varying temperatures throughout the ice in the hopes of being able to use it to predict the depth of the ice using surface temperatures. This is a difficult task due to the layer of “slush” found between the solid ice and the seawater. This layer is a mixture of ice and water, making it difficult to map the thermal conductivity in that area. We used the formula  $P/A=k(dT/dz)$  as the basis for our model, with P representing power, A representing area, k representing thermal conductivity, dT representing the difference in temperature, and dz representing the thickness. We experimented with different approaches using Microsoft Excel. Our first model used the flux of heat in and out of the ice to plot the relationship between temperature and various heat coefficients. We then used the relationship found from this model to develop a way to alter k-values to represent the slush layer. We designed our model to represent the estimated temperatures at different internal points in the vertical direction using the k-value of water right before it starts to freeze, the k-value of ice, and estimates of the ice temperature. We started with an extremely simplified linear model of the temperatures. The resultant k values (k representing thermal conductivity) the model yielded seemed to follow a logarithmic pattern. After that, we used the iterative functions of Excel to design a model composed of twelve temperature layers and the data that was collected on ice surface temperatures during our research.

**From Cart to C.A.R.T.T. - Compact Arctic Research Tech Transport**

**Ryan Fry**

Faculty Mentor(s):

**Connor Parks**

Rhett Herman

The cart was designed to be able to hold all of our equipment for measuring the temperature of both the ice and the air above it. It had to carry a couple of rows of Dallas temperature probes as well as three Melexis IR sensors. Originally the cart was a simple device that could do all of the above while also able to be deconstructed and brought to Alaska in a relatively small package. The design went through multiple phases and eventually evolved into the CARTT, which was far more suited for the environment in Barrow, Alaska. This design was a carryable device that one person would be strapped into with the Melexis on the front and the Dallas probes on the back. Future plans for improvement include methods to stabilize the CARTT as the wear walks as well as possibly using more of the T-slotted aluminum for the frame.

**Arctic Geophysics Oral Session**  
**6:00-9:00 PM      Planetarium**

**Initial Analysis of Barrow 2018 Temperature Data On/Above the Arctic Sea Ice**

**Rory McDaniel**

Faculty Mentor(s):

**Trevor Tidwell**

Rhett Herman

Ice thickness data is traditionally collected by drilling through the ice and measuring directly - this isn't viable when trying to monitor the condition of the ice sheets overall, as millions of points would need to be drilled each year for a reasonable image. We are attempting to find a correlation between ice surface temperature and ice thickness to allow for rapid, cost effective mapping. We believe that a lower surface temperature will correlate with thicker ice and vice versa. We discuss the data collected by our custom-built CARTT, the capabilities of CARTT's sensors, and the conditions in which we collected data.

**OhmMapper Capacitive Coupled Electrical Resistivity Surveys - Two Methods and their Results on Arctic Sea Ice**

**Mark Meadows**

Faculty Mentor(s):

Rhett Herman

The OhmMapper is a capacitive coupled resistivity array that has been used in the past to obtain an electrical cross-section of the arctic sea ice. These cross sections have been previously used with mixed results to study the thickness of the sea ice without having to resort to drilling. In this talk we will discuss both the use of the OhmMapper in its traditional method of use, as well as a new technique developed here at Radford University, the so-called "expanding dipole-dipole" method of Vertical Electrical Sounding (VES). We will discuss the two methods, along with their advantages and disadvantages in determining arctic sea ice thickness (i.e. find the depth of the ice/water boundary). We will present results from both methods. We will show the results of three expanding dipole-dipole surveys and how those ice thickness determinations correlate exceptionally well with thicknesses obtained directly from drilling through the ice.

**Seismic Studies of the Arctic Sea Ice**

**Connor Parks**

Faculty Mentor(s):

**Hunter Brandon**

Rhett Herman

We have designed a small battery-powered device for measuring vibrations through the use of an ADXL345 triple-axis accelerometer. The ADXL345 is the same accelerometer technology that is used in many devices such as your cell phone, airplanes, industrial machinery, and many other locations where one must know how vibrations and rotations affect the equipment. We will discuss the design of the monitors as well as our deployment of these monitors on the arctic sea ice. We will show the data recorded by these boxes, and how these data allow us to determine not only the magnitudes of the vibrations, but also the frequencies of the vibrations. We will discuss data obtained from the boxes both on the sea ice as well as from various locations around the University (e.g. next to roads, in hallways, etc.).

**Geospatial Science Poster Session**  
**2:00-3:00 PM**      **CS Main Street Lobby**

**A Three-Site Climate Comparison of Quercus alba in Virginia**

**Joseph Spriggs**

Faculty Mentor(s):

Stockton Maxwell

Richard Roth

Dendrochronology is the science of dating annual growth of tree-rings and determining the biotic and abiotic variables that control growth. Climate variables like precipitation, air temperature, and drought account for a large part of radial (or ring width) tree growth in seasonal climates. Understanding how these variables affect tree growth can help us predict what will happen in the future as climate change continues. The purpose of this research is to analyze the relationship between annual tree growth and climate of three Quercus alba L. (White Oak) old growth sites across the ridge and valley region of Virginia. The three sites are statistically tested for similar climactic signals. RStudio, dlpR, and Treeclim will be used in this study for chronology filtering, standardization, and climate correlations. Two published articles are used as a basis of comparison on two spatial scales, one in the southern Appalachians and the other covering the broad scale of Quercus alba's biogeographical extent, will be used for comparison. Any ecological disturbances if found will be noted and compared to other studies in the region. The results may assist wildlife and forestry managers to understand what factors controlled tree growth in the past in order to predict future trends.

**An Analysis of Solar Insolation Models Derived from Different Terrain Surfaces**

**Hudson Chase**

Faculty Mentor(s):

Andrew Foy

Richard Roth

The increasing use of airborne LiDAR for a myriad of applications and analyses provides precise and useful information regarding landscape and building forms. However, the financial cost of acquiring the data and limited availability makes Digital Elevation Models (DEM) a more commonly used terrain surface in GIS applications. Modeling solar insolation is an example of a common GIS application using terrain surfaces. The objective of this research is to compare solar insolation models that are derived from different terrain surfaces to determine if the models are significantly different from each other. The study area is downtown Alpharetta, Georgia. This study is important because if solar insolation estimates are statistically different between the 1-Arc second, 1/3-Arc second, and LiDAR models then there are implications to the implementation of GIS applications when utilizing various resolution DEMs and LiDAR datasets. Derived sample data needed for an ANOVA test was aggregated by building footprints in the study area. The results of this research show the differentiation of these models and how they are then leveraged in practical GIS applications. This research seeks to determine whether using LiDAR for renewable energy applications is advantageous over DEMs.

**Geospatial Science Poster Session**  
2:00-3:00 PM      CS Main Street Lobby

**Analysis of Virginia Big Eared Bat Conservation Buffers**

**Cotey Bentley**

Faculty Mentor(s):

Richard Roth

Andrew Foy

*Corynorhinus townsendii virginianus* is a species of endangered bat that is endemic to a few locations in Southwest Virginia and a handful of other states. Because they are a protected species, wildlife managers have created forested buffers around entrances of caves they are known to inhabit. However, the condition of these buffers has not been studied. The purpose of this research is to analyze and determine if the Virginia Big Eared bat's protective forest buffer zone is being maintained or if there is any sign of anthropogenic disturbance or encroachment. The study area will be the Jefferson National Forest and cave buffers will be analyzed by using Geographic Information Systems, Remotely Sensed Aerial photography and spatial statistics. The analysis is expected to show that there is significant human encroachment and disturbances that may affect this species and its habitat. The Virginia Big Eared bat is an umbrella species and plays a significant role in conservation; continued protection not only will prove to be beneficial for the *Corynorhinus townsendii virginianus* but also for any other cave dwelling species of bats, amphibians and potential spread of disease such as White Nose Syndrome. This study will assist wildlife managers in conserving this important species.

**Dendrochronology: The Gateway To The Past**

**Siobhan Bowles**

Faculty Mentor(s):

Stockton Maxwell

Dendrochronology, or tree-ring analysis, can tell us a lot about the past environment of a geographical area. Working with the Radford University Tree Ring Lab, I sampled old-growth white oak (*Quercus alba*) trees near Mountain Lake, Virginia and brought the samples back to the lab. The samples were prepared by surfacing with a belt sander and polishing with fine sandpaper. Next, the tree cores were scanned in high resolution (2400 dpi). We used a computer program called CooRecorder to measure the width of each annual tree ring. The tree ring measurements were then visually and statistically crossdated to ensure that each tree core was accurately dated. We determined the approximate year of establishment and analyzed the growth rates of individual trees. We found that trees established in the late 1500s but the diameter of each tree varied because the trees did not grow at the same rate. Based on the data, we can draw conclusions about past climatic and environmental changes that affect the growth of forests.

**Geospatial Science Poster Session**  
**2:00-3:00 PM**      **CS Main Street Lobby**

**Examining the Spatio-Temporal Distribution of Crime Near Silver Line Metro Stations in Fairfax County, Virginia**

**Andrew McGowan**

Faculty Mentor(s):

Andrew Foy

Richard Roth

The Washington Metropolitan Area Transit Authority began Phase I operation of the Silverline Metro in July of 2014. This new Silver Line included new stations in Fairfax, Virginia and citizens were concerned about increases in crime. The purpose of this research is to determine if there is a relationship between crimes in the areas surrounding these new stations. By using hot spot analysis, this research will determine if there are any changes in crime in areas surrounding by determining the spatio-temporal distribution using crime data from January 2011 to December 2017. A statistical analysis of this information will provide insight into whether or not these new stations have created an increase in crime to the area, putting property and people at risk. These findings prove important because it will provide an understanding of whether or not there has been an increase or change in crime patterns to the area.

**Google Maps vs. Apple Maps**

**Bryce Grimes**

Faculty Mentor(s):

Andrew Foy

Richard Roth

The use of the GPS receivers in mobile phones for navigation is very popular. People are increasingly relying on mobile device navigation systems that utilize various apps instead of traditional GPS receivers. It is important to know if there are differences in the accuracy of the directions from these different apps. The purpose of this research is to identify which app navigation system is most accurate. In this study the accuracy of Google Maps and Apple Maps was analyzed in the New River Valley, VA. This research could help people and companies decide which system they want to use to save time and money. If a company like UPS could save one mile a day on their routes, thousands of dollars would be saved daily. Many people have issues with the accuracy of mobile device navigation systems, which is important since these applications are solely relied on for transportation. 30 random destinations were tested using Apple Maps and Google Maps. Drive time, drive distance, geocoded location and GPS location of these destinations were analyzed in JMP and ArcGIS to look for statistically significant differences. A map was produced showing the differences between geocoded location and GPS location. The results of this research compares accuracy and reliability of Google Maps and Apple Maps, and will hopefully inform people on how best to navigate.

**Geospatial Science Poster Session**  
2:00-3:00 PM      CS Main Street Lobby

**Investigating Differences in the Spatial Temporal Pattern of Flooding in the Different Geological Provinces of Richmond**

**Grant Michauskas**

Faculty Mentor(s):    Andrew Foy                      Richard Roth                      Charles Manyara

The unpredictability of hurricane paths in the past has led to many areas experiencing unexpected catastrophes due to a lack of preparedness. For example, there were reports of Hurricane Gaston in 2004 changing its track and heading towards Richmond, Virginia, and predictions of over 10 inches of rainfall. The magnitude and extent of the potential flooding was uncertain. The purpose of this research is to explore different flooding scenarios in Richmond. This poses an interesting challenge because the Fall Line separates Virginia's Piedmont and Coastal Plain regions, and marks a noticeable topographic change in the City, therefore flood events might be very different in the two physiographic provinces of Richmond. A geographic information system (GIS) and Hazus-MH, a flood modeling tool will be used to conduct a comparative flood modeling analysis for the two physiographic provinces. The spatial pattern of the modeled flood will be analyzed to look for differences in the spatial temporal behavior of flooding. If there are differences in how floods occur in Richmond, then specialized flood preparedness plans should be developed for the different regions.

**Land Use and Water Quality in the Chesapeake Bay**

**Thomas Napier**

Faculty Mentor(s):                                      Richard Roth

The Chesapeake Bay has been affected by pollution for decades. While there are many different factors that contribute to the pollution, it is unclear how land use along the tributaries is linked to pollution. The purpose of this analysis is to analyze the spatial distribution and patterns of land use and relate that to pollution in the Chesapeake Bay and its tributaries. In this study land cover data from USGS and water quality samples from NOAA and USGS will be entered into a GIS in order to investigate the spatial relationship between the two datasets. The study area for this research includes selected Coastal Plain watersheds located in the Chesapeake Bay basin of Virginia. The data will be analyzed and manipulated using JMP software. The results of this study are expected to confirm the hypothesis that agriculture is not the main land use responsible for pollution in the Chesapeake Bay watershed. This study should add to our understanding to which type of land use is responsible for the damage done to the Bay.

**Geospatial Science Poster Session**  
**2:00-3:00 PM**      **CS Main Street Lobby**

**Measuring the Accuracy of Consumer-Grade UAS-Collected Data Compared to Traditional Ground Surveyed Data**

**Colby Ryan**

Faculty Mentor(s):    Andrew Foy                      Richard Roth                      Skip Watts

Unmanned Aerial Systems (UAS) are increasingly used in the geosciences yet accuracy of data collected with low cost consumer-grade systems is not well studied. The purpose of this research is to determine the positional accuracy of consumer-grade Unmanned Aerial System (UAS)-collected point data compared to traditional ground surveyed point data collected using a total station, in order to assess UAS's viability as a replacement for traditional surveying methods. Using the National Standard for Spatial Data Accuracy (NSSDA) method for testing vertical and horizontal positional accuracy, 20 check points (with X, Y, Z values) at the same well-defined locations will be gathered using each data-collection platform and compared to a digitized layer of 20 check points also from the same locations. Root-mean-square-errors will be calculated for both datasets and horizontal and vertical accuracies at the 95% confidence level reported. It is hypothesized that the results of my research will show that UAS-collected point data is only slightly less accurate than its traditionally collected counterpart. Consumer-grade UAS's could be a viable and cost-effective replacement for traditional ground surveying using a total station in certain situations. Through this research, consumer-grade UAS users will better understand the relative level of accuracy that their UAS is capable of collecting.

**Predicting Potential Urban Fires In Radford And Mitigating These Hazard's**

**Levi Dollarhite**

Faculty Mentor(s):                                      Andrew Foy                      Richard Roth

Fire risk is a concern to homeowners and emergency officials in Radford, Virginia, as in every city. This study examines how we can better predict and prevent fire damage within the City of Radford. A fire risk calculating method is applied to previous fire incidences in order to develop a predictive model for assessing fire risk in different areas within the City of Radford. Factors that contribute to fire hazard risks like the type of building material, proximity to fire hydrants, and arrival times for fire officials will be incorporated into the analysis to assess potential fire damages in different areas. A map will be generated from this analysis to show predicted areas of elevated fire risk results will be used to generate possible solutions to help mitigate fire hazards in high-risk clusters. This research will generate a better understanding of fire prediction in the City of Radford and provide technical support for urban fire management.

**Geospatial Science Poster Session**  
**2:00-3:00 PM**      **CS Main Street Lobby**

**Predictive Surfaces of Crime in Virginia Beach Neighborhoods**

**John Miller**

Faculty Mentor(s):

Richard Roth

Andrew Foy

Predictive crime modeling can be an effective way to reduce crime in neighborhoods. The purpose of this research is to use Risk Terrain Modeling to retrospectively predict crime in the city of Virginia Beach. This will allow citizens to see geographic representations of crime and could assist law enforcement officials in preventing crime. Geocoding, Optimized Hot Spot analysis and other predictive modeling were used to create a Risk Terrain Model. Creating a Risk Terrain Model, will future crimes and hot spots around Virginia Beach. The analysis runs through ArcMap, along with the different spatial analyst tools it provides. Randomly selected neighborhoods around the city give statistical evidence on crime distribution and occurrence after spatial analysis runs. GIS technology allows different ways to portray crime occurrences around the area such as a density map and an optimized hot spot map to show where crime is most dense. Portraying crime around Virginia Beach in an understandable way will give locals the safety they needs from nearby crimes.

**Radford University Recycling Inventory and Outdoor Receptacle Placement**

**Robert Arcuri**

Faculty Mentor(s):

Richard Roth

Radford University is in the process of getting outdoor recycling bins on campus. The purpose of this research is to determine the most optimal locations for recycling bins in order for them to be effectively used. Students survey responses paired with data collected from trash cans around campus will give a detailed idea of what people think about recycling at Radford. Compiling this data will give the university a better understanding for what is being thrown away to influence recycling efforts in the future. At several points throughout the semester, at carefully picked times, a small team of individuals will venture out to collect data from trashcans in order to understand the percentage of recyclable contents present. The trash cans will be picked at random to remove any chance of bias towards the study results. Three classification types will be given to better understand the volume of trash at each bin location. Classifying each trash bin with a relative fullness will allow for easy comparison and analysis between bins at the end of this study. The other component of this project involves surveying students about where they would like to see outdoor recycling bins placed, their current recycling behaviors, and if campus culture might change as a result of these bins being installed. A heat map analysis will be created to show the best locations for outdoor recycling bins compared to the assumptions of the students surveyed as a final product.

**Geospatial Science Poster Session**  
**2:00-3:00 PM CS Main Street Lobby**

**Seasonality of Stressors Leading to Coral Reef Bleaching**

**Jake Hill**

Faculty Mentor(s):

Richard Roth

Andrew Foy

Coral bleaching has decimated reef populations over the recent decades and is a threat to marine biodiversity in many parts of the world. The main driver of bleaching is stress from rising sea temperatures. The objective of this study is to determine if seasonal variations in SST and salinity stressors contributes to coral bleaching. Fifty different reefs from around the world will be chosen randomly, and their seasonal salinity and SST anomaly data from the last five years will be recorded. Data will be arrayed in scatterplot matrices to allow visual identification of linear correlations between seasons. After examination of the scatterplots, one-way analysis of variation (ANOVA) will be conducted to determine if there are statistically significant differences between the datasets. These findings will then be analyzed and interpreted to see which season, if any, has the highest levels of SST anomalies and salinity content in relation to coral reef bleaching events. It is hoped that the identification of seasonal influences on coral bleaching will aid in mitigation efforts.

**Spatial Analysis of Anthropogenic Disturbances on Banded Waterfowl Counts**

**Jack Fraim**

Faculty Mentor(s):

Andrew Foy

Richard Roth

Migrating waterfowl tend to avoid areas where there are anthropogenic disturbances, which include hunters, roads, populated areas, etc. It has long been suspected that waterfowl will avoid areas where there are stationary duck blinds, but this logic is counterintuitive because duck blinds are typically located in good hunting areas. In addition, there have been few scientific studies analyzing the spatial pattern of banded bird counts. The purpose of this study is to determine if the density and proximity of stationary duck blinds has an effect on banded bird counts. Other geographic factors such as roads, population density, land cover and duck blind type will also be investigated as predictors of waterfowl density. The study area is Back Bay in Virginia Beach, VA. The geographic location of banded waterfowl was used in a weighted linear model to predict waterfowl density. This GIS model will be useful for both duck conservation efforts and for sustainable hunting practices.

**Geospatial Science Poster Session**  
2:00-3:00 PM      CS Main Street Lobby

**Traffic Volume as a Spatial Predictor of Traffic Accidents in Radford, Virginia**

**Ezekial Jeansonne-Moore**

Faculty Mentor(s):

Andrew Foy

Richard Roth

Every year millions of traffic accident take place, some causing injury and death. Researchers have developed numerous models to try and predict where these accidents will occur so that steps can be taken to avoid accidents. Traffic volume is a frequently used predictor in models based around Poisson regression. This method has proved to be successful, but lacks in the ability to predict accidents at a small scale, and more specifically in a spatially explicit manner. The purpose of this research is to analyze traffic volume within the City of Radford and determine if traffic volume is a spatially robust predictor of traffic accidents for this area. Accident and volume data was downloaded as GIS layers from the Virginia Department of Transportation. Traffic volume was tested within a Poisson regression model to determine whether it had a spatial relationship to observed accidents, or if variables such as time of day and road condition had a much stronger association. It was hypothesized that when used in a Poisson regression model, traffic volume is a predictor of accidents within the City of Radford. However, does it help in identifying the spatial locations of accidents? The results from this study could allow the identification of problem streets in the city and allow an estimation of future accidents if changes to traffic flow, pattern or other spatial characteristic change.

**Using GIS to Analyze Patterns of Opioid Misuse in Adolescents (Age 15-24)**

**Alexandra Clickner**

Faculty Mentor(s):

Andrew Foy

Richard Roth

Opioid misuse and addiction has become a major problem over the last 10 years, especially for adolescents in Virginia. In 2012 the state recognized opioid addiction as a problem, and by 2016 opioid addiction became a public health emergency. Adolescents (age 15-24) are at greatest risk for developing an opioid misuse problem. From 2012 to 2016 almost 2000 incidents of adolescent opioid use resulted in hospitalization. 665 of the 2000 incidents resulted in death. Many studies have been done to figure out the reasons behind the misuse, but there have not been many studies that focus on the spatial distribution of opioid incidents and adolescents. The purpose of this study is to determine geographic factors that contribute to opioid misuse. This study uses geographic information systems (GIS) to determine the spatial pattern and distribution of opioid misuse and to determine potential factors driving the problem in the state of Virginia. Proximity to a metropolitan area, interstates and public high schools, as well as demographics, like race or income, are potential variables of interest. Using ArcGIS tools and JMP, spatial and statistical analyses will be conducted. These tools will be used to generate a model that spatially identifies opioid hospitalization risk. This study will be helpful for anyone who is interested in opioid misuse, especially in adolescents. This information can be used for promoting awareness of the opioid epidemic and will provide a geographical representation of the spatial pattern of opioid misuse.

**Geospatial Science Poster Session**  
**2:00-3:00 PM**      **CS Main Street Lobby**

**Utilizing Remote Sensing Technologies to Analyze Distribution of Phragmites Australis**

**Kyle Walker**

Faculty Mentor(s):

Richard Roth

Andrew Foy

Invasive species *Phragmites Australis* has posed significant issues on ecosystems and wildlife in Virginia's wetlands by outcompeting native species, lowering biodiversity, and causing habitat loss. The purpose of this study is to determine if remote sensing can accurately measure the spatial distribution of *Phragmites Australis* in Virginia's wetlands. In order to reduce the spread of phragmites identifying strands accurately must first be completed. To identify strands of phragmites aerial imagery of the Northwest and North Landing Rivers will be processed in Erdas Imagine 2016 using vegetation indices. Images of the growing season from August 2011 to September 2011 will be used and area of *Phragmites Australis* will be identified during that season. Significance between the remotely sensed data and data from 2011 from Department of Conservation and Recreation will be calculated to analyze if the remotely sensed area of phragmites is accurate. This will then allow for a range of phragmites for the 2017 season to be created using remotely sensed data. The results from this study can be used to identify problem areas of phragmites for consideration for management.

**Virginia Deer-Vehicle Collision Analysis**

**Daniel Lee**

Faculty Mentor(s):

Andrew Foy

Causes of deer-vehicle collisions (DVCs) have been analyzed in other studies around the country, but little is known about 56,000 DVC's that have occurred annually since 2007 in the state of Virginia. This deer-vehicle collision analysis is meant to examine and identify key variables that contribute to DVC's in an effort to help better the understanding of where and why they occur. It would be greatly beneficial to identify any preventable measures that could lower the number of DVC's. The results from the model will provide knowledge on spatial variable effects on DVCs. Variables from other DVC studies that are assumed to be key determining factors, like, time of day, population density, type of roadway, and proximity to pasture/farmland will be incorporated into a model using Ordinary-Least Squares regression in ArcGIS. The model focuses on DVC crash locations in Virginia. It was hypothesized that the time of day, road speed limit, population density, and the proximity to pasture/farmland would be statistically significant predicting factors in the prediction of DVCs. The analysis is important because the model generated may help incentivize changes to roadways that can help mitigate the number of DVCs in Virginia, save lives, and lower insurance cost.

**Geospatial Science Poster Session**  
2:00-3:00 PM CS Main Street Lobby

**Water Quality and Impervious Land Cover in Selected Chesapeake Bay Subwatersheds**  
**Cody Beeler**

Faculty Mentor(s):

Richard Roth

Andrew Foy

Impaired waters are water bodies or segments that are not supportive of the fishable and swimmable goals of the Clean Water Act. Leading pollutants found in impaired waters include fine sediments, bacteria, and metals, which can be detrimental to surrounding marine communities. The objective of this research is to discover if there is any significant difference between watersheds of impaired and non-impaired waters in the Chesapeake Bay region of Virginia with respect to the amount of impervious surface in those watersheds. Using data provided by USGS, EPA, EROS and the DEQ, five impaired and five non-impaired sub-watersheds will be analyzed to find if there is any significant difference in terms of each sub-watershed's impervious surface percentage. A statistical analysis will be performed and a map will be generated using ArcMap to display the impaired waters as well as the waters not impaired over-layed onto an impervious surface layer. This study will generate a better understanding of the relationship between imperviousness, associated with urbanization, and impairment status. Localities may find this research useful in their efforts to reduce storm water pollution from urbanized areas.

**Anthropological and Forensic Sciences Poster Session**  
3:15-4:15 PM CS Main Street Lobby

**Changes in overall health and well-being of Americans temporarily living in the Peruvian Amazon**

**Aubree Marshall**

Faculty Mentor(s):

Cassady Urista

Jason Davis

Much research has been done on the long-term adaptive consequences of migration; however, less attention has been focused on short-term health effects of traveling. When traveling, people experience new environments and new microbiomes that affect the individual's health. While this travel might be short-lived, there may be longer-term consequences to this activity. What happens to an individual's immune response and vital signs when they are introduced to a new environment? How might this impact immigration patterns and spread of disease across native and immigrant populations? This research examined the physiological changes that a group of 29 individuals experienced while living in the Peruvian Amazon for three weeks. The variables examined in this analysis were diet, activity, heart rate, blood pressure, weight, body temperature, blood sugar, and heterophil/lymphocyte ratio. These variables were measured departure, several times during travel and after their return to the United States. All collected data was analyzed using ANOVA and PCA. Initial results suggest no adverse health effects induced by travel, and in fact, overall health markers either altered healthier levels and/or maintained at a healthy level during travel. This may be due to increased physical activity and a healthier diet during the travel, or an underlying beneficial effect of travel to new places.

**Anthropological and Forensic Sciences Poster Session**

3:15-4:15 PM

CS Main Street Lobby

**How Experimental Research in Forensic Archaeology Informs Archaeological Practice:  
Differentiating Perimortem Fracture From Postmortem Breakage****Marta Paulson**

Faculty Mentor(s):

Donna Boyd

Cliff Boyd

Often perceived as a highly specialized and peripheral subfield of archaeology, forensic archaeology contributes to our understanding of not only forensic anthropology and forensic science, but also traditional archaeological practice. Forensic archaeologists' extensive knowledge of postmortem taphonomic effects on material objects has led to more precise interpretations of postmortem interval, environmental (including scavenger-induced) scattering and alteration of human remains, and site formation processes. Experimental taphonomic research has formed the core of these advances in site interpretation, particularly through its focus on differentiating perimortem (at or around the time of death) from postmortem events. This concept is illustrated through RU Forensic Science Institute (RUFISI) research aimed at differentiating perimortem bone fracture from postmortem breakage. A sample of 300 *Sus scrofa* ribs underwent controlled Blunt Force Trauma in the RUFISI at known periodic perimortem and postmortem intervals, ranging from 0 to 112 days of environmental exposure. Resulting rib fractures were analyzed macroscopically and microscopically to define signature fracture morphology across time periods. These results allow differentiation of perimortem fracture versus postmortem breakage and inform period of exposure and contextual history of field remains. Forensic archaeology research can therefore play an integral role in interpretations of traditional archaeological method and theory.

**How Experimental Research in Forensic Archaeology Informs Archaeological Practice:  
Differentiating Perimortem Fracture From Postmortem Breakage****Marta Paulson**

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**Anthropological and Forensic Sciences Poster Session**

3:15-4:15 PM

CS Main Street Lobby

**The Effects of Fiber Layers on Sharp Force Trauma Signatures on Bone****Jackson Clayton**

Faculty Mentor(s):

Donna Boyd

Cliff Boyd

Sharp force trauma accounted for 1,064 of the homicides in the U. S. in 2016, according to the Federal Bureau of Investigations (2016). Previous research on sharp force trauma on unclothed samples of bone has led to differentiation of sharp force tool classes (e.g., serrated vs. non-serrated knives, axes, and saws). However, the influence of clothing and other fibers on knife wound characteristics has not been fully investigated. The purpose of this study is to determine the effect of fiber material on sharp force trauma signatures on bone. It is hypothesized that variability in fabric layers and types will create different sharp force trauma impressions on bone. More specifically, if the different fabric layers are increased, then there will be fewer distinctions between serrated and straight-edged knives because of the resistance of the fabrics, but there will be some distinction between serrated and straight-edged knives. Serrated and straight-edged knives of different lengths will be used via a guided-drop device on 3 of *Sus scrofa* rib samples wrapped in layers of both cotton and a cotton-polyester blend. Bone samples will be extracted through maceration and analyzed macroscopically and microscopically (at 50x). Signatures of sharp force trauma effects on bone will be compiled and compared across fabric groups. This research is important because it may enhance identification of sharp force tool class in traumatized human remains that are clothed.

Reference: Murder by state, types of weapons (2016). Uniform Crime Reporting. Retrieved from <https://ucr.fbi.gov/crime-in-the-u.s/2016/crime-in-the-u.s.-2016/tables/table-12/table-12.xls>

**The Effect of Clothing Type on Human Decomposition and Postmortem Interval****Pearl Moore**

Faculty Mentor(s):

Donna Boyd

Cliff Boyd

An important goal of Forensic anthropology is the determination of Time Since Death (TSD) for a human decedent. Estimation of TSD requires a knowledge of decomposition and the many factors that can affect decomposition. While prior studies have explored the effect of clothing on decomposition, the influence of how clothing type affects the rate of decomposition has not been explored. The goal of this project is to determine if different types of fabric will result in different rates of decomposition, and therefore TSD estimations. Seven racks of ribs of *Sus scrofa* were used for this study. Three racks were covered in denim fabric, three were covered in cotton fabric, and one control rack was not covered. All the racks were placed in an outdoor environment and were protected from scavenging. They were then allowed to decompose over a period of three weeks. Status of decomposition was monitored regularly and measured aspects such as Accumulated Degree Days and Decomposition Total Body Score. Because fabrics such as cotton have porous fiber structures that make it more accessible to liquids, it is hypothesized that decomposition will proceed faster with cotton versus that of the durable and tightly woven fibers of denim. Important insight of the effect of differential variables on TSD estimation in forensic deaths investigations is offered through this research.

**Anthropological and Forensic Sciences Poster Session**  
**3:15-4:15 PM CS Main Street Lobby**

**The Influence of Sharp Force Trauma on Human Decomposition**

**Erin Dimino**

Faculty Mentor(s):

Donna Boyd

Robert Sheehy

In forensic science, evaluation of decomposition stage of a human corpse is critical for determination of Time Since Death (TSD) or Postmortem Interval (PMI). One of the least studied variables is the influence of penetrative (sharp force) trauma. It has been suggested that the presence of perimortem penetrative trauma accelerates the rate of decomposition (Micozzi 1991). The objective of this research is to examine the effect of perimortem sharp force trauma on rates of decomposition. It is hypothesized that the presence of sharp force trauma in human decedents accelerates decomposition. Over the span of this research project, 30 to 60 specimens of *Rattus norvegicus* will undergo full decomposition in outdoor environments protected from scavenging by placement in a wire cage, divided up into two distinct samples: Sample 1 consists of 15 to 30 *Rattus norvegicus* with inflicted penetrative trauma. Sample 2 consists of 15 to 30 *Rattus norvegicus* without inflicted penetrative trauma. Samples will be monitored at regular intervals to record the rate of decomposition of each. Data collected will include measures of Accumulated Degree Days and Decomposition Total Body Score (TBS) according to Megyesi et al (2005), as well as observations of external ambient temperature, humidity, and rainfall. Through this investigation, a more accurate definition of PMI in a forensic death investigation, particularly in cases involving trauma, will be possible.

References Megyesi MS, Nawrocki SP, Haskell NH. Using accumulated degree-days to estimate the postmortem interval from decomposed human remains. *J Forensic Sci* 2005;50(3):618-26.

Micozzi MS. Postmortem change in human and animal remains: a systematic approach. Springfield, IL: Charles C Thomas Pub Ltd, 1991.

**Anthropological and Forensic Sciences Poster Session**  
**3:15-4:15 PM CS Main Street Lobby**

**The Influence of Three-Layered Cranial Architecture Development on Non-Accidental Pediatric Cranial Blunt Force Trauma Outcomes**

**Kimber Cheek**

Faculty Mentor(s):

Donna Boyd

Cliff Boyd

Development of three-layered (diploe, inner and outer table) bone in the juvenile cranium has important consequences for pediatric Blunt Force Trauma (BFT) outcomes; however, the timing of this development is unknown. Macroscopic and microscopic metric and morphological comparisons of juvenile crania from the Scheuer collection ranging in age from perinatal to 17 years chronicle the ontogenetic development and spatial and temporal variability in the emergence of a mature cranial architecture. Results indicate the absence of a three-layered cranial architecture until 4 - 6 months of age, when initial development of diploe combined with differentiation of inner and outer tables can be noted in the posterior parietal/superior occipital. By 9 - 12 months, this has expanded to include other buttressed areas of the frontal and occipital crest and pterion. Development of the three-layered structure lags behind at fontanelles and sutures as well as lateral vault walls. A more mature (adult) cranial architecture pattern is not seen until age 8. These data are used to topographically map cortical and diploic thickness variability across the growing cranium. Interdigitation of clinical forensic case fracture locations with these mapped cranial fracture high-risk BFT impact regions across the growing juvenile cranium shows a concordance, supporting the hypothesis that absence or lesser development of a three-layered architecture in very young subadults leaves their cranial bones thin and vulnerable to the effects of BFT. These results have important applications for pediatric BFT cranial trauma prevention.

**Anthropological and Forensic Sciences Poster Session**  
3:15-4:15 PM CS Main Street Lobby

**Exploration of Using Technology and Pattern Recognition Algorithms to Improve Driver Habits**

**Lauren Rose**

Faculty Mentor(s):

Hwajung Lee

Driver error and general unsafe driving is a major factor in vehicle-related injuries, deaths, and property damages. Internet of things technology can be used to improve driver's road skills regarding vehicle maneuvering, decision-making, and fuel efficiency. A mobile application can collect data from sensors within the user's smartphone, vehicle onboard diagnostics, and wearable tech and transfer the data to an online server. Then, the server will assess the driving habits by processing the data through a pattern recognition algorithm in order to identify hazardous driving behaviors, and corrective action suggestions will be sent back to the application. The algorithm at the server will be calibrated to a set standard, as determined by a study of Department of Motor Vehicle and Department of Transportation guidelines. Although some previous research projects have been conducted, to the best of our knowledge, all of them attempt to monitor and improve driving habits using only one data source. By integrating three different sources of data, the driver picture can be more complete, thus the driver improvement monitoring and suggestions will be more meaningful, accurate, and useful. Thus, in this research, we propose a solution involving the best approach to collect and analyze sensor data from multiple inputs, including an exploration of different pattern recognition algorithms to establish which will result in the most effective driver improvement software.

\*This poster will not be presented.

**Biology Poster Session I**  
**4:30-5:30 PM CS Main Street Lobby**

**Analyzing floral proteins to better understand modeling and simulation**

**Megan Calvanese**

Faculty Mentor(s):

Tara Phelps-Durr

Visualizing the three-dimensional (3D) structure of molecules and their interactions is critical to helping understand how the 3D structure of a protein determines its function. In this project, we generated 3D computational models of normal and mutant individual floral regulator proteins. We also generated models of the complexes that regulate floral development and predicted how incorporating a mutant protein into the structure would affect the ability of the complex to function. In Radford University's Genetics or Development Biology courses we use these models to predict how introducing a mutation in a protein region impacts the 3D structure and function of that protein. In my Independent Research course, we clone the genes of the computationally modeled proteins (if the 3D protein model is unknown) and work to verify the computational models of the proteins. These hands-on modeling activities help in understanding how mutations at the DNA level result in mutant phenotypes and help acquire the basic knowledge needed to understand molecular biology experiments. The computational 3D models can be examined with computationally modeling software, but can also be 3D printed to help visualize 3D images with software. This project emphasizes how modeling and simulation, one of the Vision and Change Core Competencies, can be incorporated into basic scientific research.

**A Comparative Study of Stress Levels Based on Physical Activity**

**Layne BiBuono**

**Adam Weikel**

**Whitney Clowser**

**Taylor Greenway**

Faculty Mentor(s):

**Amanda Blair**

**Kayla Hiatt**

**Alyssa Porterfield**

Sarah Redmond

The goal of this research is to determine if the type of exercise and the duration of that exercise has an effect on stress levels. This study examines IgA which is an antibody found in mucosal surfaces, which increases as your stress increases. We collected saliva samples from Radford University students in the Student Wellness and Recreation Center. After the samples were collected, an ELISA test was run to determine IgA levels. We hypothesize that there is a significant difference in stress levels based on social versus individual exercise.

**Biology Poster Session I**  
**4:30-5:30 PM CS Main Street Lobby**

**Alkaloid Extraction, Isolation, & Identification****Cole Faulkner**

Faculty Mentor(s):

Gary Coté

Cindy Burkhardt

Alkaloids are naturally occurring nitrogen-containing organic compounds that function as toxic, chemical defense molecules in plants. Common alkaloids such as cocaine, caffeine, and nicotine have psychotropic effects on humans. The purpose of this research is to identify the alkaloids in *Dieffenbachia picta* (dumb cane), if they are present, and to see if there is a correlation within tissues between the presence of alkaloids and calcium oxalate crystals. We extracted powdered samples of dumb cane leaves, spathes, and male and female flowers with methanol solvent, and tested for alkaloids using gas chromatography / mass spectrometry (GC-MS). Our method was validated by detecting nicotine in samples of tobacco and skrzyp (horsetail) tea, and caffeine in ground coffee. Since no conclusive studies have been done on alkaloids in dumb cane, we are searching for alkaloids described from Araceae, the plant family that includes *Dieffenbachia*, such as coniine, nicotine, and anabasin.

**Are bird-window collisions related to the proximity to and density of roads at Radford University?****Harry Russell****Nolen Miller**

Faculty Mentor(s):

**Samantha Jones**

Karen Powers

A significant source of mortality for avian species is colliding into windows. Estimates range from 300 million to 1 billion birds every year in the United States alone. In order to reduce fatalities caused by window collisions and to suggest building modifications on Radford University's campus, we must first understand factors influencing collision. Previous studies report that bird-window collisions are affected by the height of buildings, the amount of surface area taken up by window space, and distance to natural and man-made corridors. Our study focuses on this last metric of man-made corridors. Specifically, we documented bird-window collisions at 15 buildings on Radford University's campus all ranging in size and surrounding vegetation. We surveyed each building twice daily, during a consistent time frame, searching for bird carcasses and feathers. We then compared bird collision locations to the minimum distance to surrounding roads and road density within a 200-m buffer. We will compare these distances and densities to an equal number of random points on-campus. We believe that buildings closer to the road and with higher road densities will have lower incidents of bird-window collisions than those points are further from these roads. This is because most birds appear to avoid roads due to traffic volume and light, edge effects, and the overall physical impediment they cause. Results of this study will be present in light of recent data collection and analysis.

**Biology Poster Session I**  
**4:30-5:30 PM CS Main Street Lobby**

**Collection and Analysis of Human Salivary IgA to Understand Physiological Effect of Stress on the Student Athlete**

**Claire Dundon**

Faculty Mentor(s):

Sarah Redmond

When experiencing stress, the human immune system produces certain levels of the antibody Immunoglobulin A, which correlates to immune system strength and function. Isolated from subjects' saliva, varying degrees of concentration indicate physiological stress levels. This study focused specifically on samples from student athletes in and out of season. Saliva was collected noninvasively and anonymously before and after various sporting events. The samples were run through ELISA (enzyme-linked immunosorbent assay) to detect antibody levels. We expect to find that athletes not in season have a lower stress levels compared to those in season. IgA levels will be elevated, thus linking higher stress levels to being an athlete in season.

**Do Bird-Window Collisions Increase As Campus Buildings' Window Area Increase?**

**Lindsey Lee**

**Kristen Pitchke**

Faculty Mentor(s):

**Kristopher Moore**

Karen Powers

Bird window collisions (BWCs) kill up to one billion birds every year in the United States. At Radford University, many of the buildings constructed within the last decade incorporated in their design large, expansive windows. A long-term project that began across multiple universities in 2013 is attempting to understand the pattern and severity of BWCs to the landscape structure and how it impedes the movement of birds. In February 2018, we began a project to compare the number of bird window collisions to the size of the windows on 15 buildings on Radford University's campus. We hypothesized that there will be more BWCs on buildings with a greater window surface area than buildings with a smaller window surface area. This will be determined by comparing the window areas of buildings with bird strikes to the window surface areas of buildings with no bird strikes. Bird-search methods include walking around 15 buildings twice per day. Data collection includes GPS location of where the evidence of the bird strike was found, the building where it occurred, and the window area for that building. There will also be identification of species based on the evidence/remnants of our fallen feathered friends. Results will be discussed in light of recent analyses.

**Biology Poster Session I**  
4:30-5:30 PM CS Main Street Lobby

**Does Nest Stage Impact Parental Defense Behaviors of Eastern Bluebirds (*Sialia sialis*) and Tree Swallows (*Tachycineta bicolor*)?**

**Nolen Miller**

Faculty Mentor(s):

**Layne Dibuono**

Sarah Foltz

Life histories are the strategies species' use to survive, and encompass species' life stages and traits, particularly those that influence reproduction. Breeding is an important life history stage. How much a parent invests in raising and defending offspring directly impacts their individual fitness. The purpose of this study is to determine if parental investment in eastern bluebirds (*Sialia sialis*) and tree swallows (*Tachycineta bicolor*) changes depending on the age and stage of nestlings. We predicted that parents would protect older nests more because they had already invested more energy in these broods. Between March and August, nest boxes located in Bisset and Selu were checked weekly and their nest stages were recorded including the number of eggs and nestlings in the nest. We recorded alarm calls and counted flights, dives, and beak clicks from the parents at each nest. We found that bluebird parental aggression increases with nest stage, but tree swallow parental aggression does not. When both nest stages were analyzed together, we found that tree swallows are more aggressive than bluebirds towards potential nest predators overall. One possible explanation for this difference is the shorter breeding season for tree swallows and the fact that this species usually only has one nest per season. Bluebirds have a longer breeding season and have two or more nests, which might explain their reduced protectiveness in the early stages.

**Exploring Biodiversity of the Selu Conservancy by using DNA Barcoding**

**Andy King**

**Hailey McArdle**

Faculty Mentor(s):

**Courtney Harmon**

**Mallory McKnight**

Bob Sheehy

The tool of DNA barcoding allows for identifying known and unknown species of most taxa in a geographic area. In barcoding samples of invertebrates from Selu Conservancy, we aim to expand our knowledge of biodiversity in this local habitat of Radford, VA. After collecting four samples of invertebrates, we will extract DNA from a small portion of each sample and amplify the mitochondrial CO1 genes through PCR. After sequencing these genes, we will compare them to online databases for phylogenetic identification. Our original results and conclusions will be reported on this poster, including species taxonomic names of our samples, genetic variation, and a geographic distribution of the sample species. By detailing the biodiversity of Selu, this research will increase our understanding of the local environment and hopefully the library of DNA barcodes for global use as well.

**Biology Poster Session I**  
**4:30-5:30 PM CS Main Street Lobby**

**Exploring the Invertebrate Diversity of Selu using DNA Barcoding.**

**Abby Jones**

**Wendy Marshall**

Faculty Mentor(s):

**Jenny Davis**

**Katelyn Bowden**

Bob Sheehy

For the purposes of our BIOL 231 DNA barcoding project, we collected insect samples from Radford University's Selu Conservancy located in the Appalachian region of Southwest Virginia. The purpose of this project was to gain a better understanding of insects at Selu and to contribute to a growing collective database. We used various collection techniques, such as pitfall and malaise traps, to capture invertebrates. Following collection, we used the Polymerase Chain Reaction to isolate and amplify each insect's mitochondrial encoded cytochrome C oxidase 1 (CO1) gene. It was then analyzed by gel electrophoresis and DNA sequencing to better compare our gene samples to the worldwide DNA database. Here we report on our findings from the DNA analysis. This research is environmentally significant to species conservation and recognizing different factors that contribute to the interrelatedness of species in the transition woods biome of the Appalachian Mountains.

**Invertebrates of Selu**

**Kyra Quinerly**

**Makayla Agee**

Faculty Mentor(s):

**Jena Alley**

**Sophia Schroeder**

Bob Sheehy

Animals at Selu include Mammals, Amphibians, Reptiles, Birds, and invertebrates. With the exception of the invertebrate animals, diversity is fairly well understood. However, the invertebrate population has been largely unexplored. Biologists use DNA Barcoding to understand how animals have migrated from their origins, how genetic diversity varies between different areas, and hypothesize on what factors could have caused them to migrate. We collected invertebrates using traps to gauge the genetic diversity of invertebrates at Selu. In order to identify invertebrates, we ran DNA Barcoding. We followed up by logging it into a database to identify the invertebrate. We discovered invertebrates, which may be unique and not yet documented at the Selu Conservancy. This could help future students know what wildlife resides at Selu.

**Biology Poster Session I**  
4:30-5:30 PM      CS Main Street Lobby

**Investigating the Relationship Between Vegetation Metrics and Bird-Window Collisions on Radford University's Campus**

**Kristy Clark**

**Laura Soares**

Faculty Mentor(s):

**Karissa Aly**

**Giovanni Ruiz**

Karen Powers

Recent studies have shown that window collisions are the highest contributing factor to bird fatalities in the United States. Ongoing university studies across the country, initiated by multiple colleges in 2013, have collectively demonstrated that the window area and nearby vegetation are primary factors in bird-window collisions. The ongoing modernization of Radford University, in conjunction with its location near a river and diversity of vegetation, has raised concern over our campus's impact on the bird community. In February 2018, we began investigating how Radford University's campus is impacting the bird population, choosing 15 buildings to study based on various sizes, window areas, vegetation densities, and distances from known migratory pathways, such as the New River. Our group specifically focused on the relationship between bird-window collisions and vegetation metrics. We are currently surveying 15 buildings on campus twice a day in search of evidence of bird-window collisions. We will compare bird-window-collision patterns to building-specific vegetation metrics: the Levin's index of vertical diversity and total vegetation volume (TVV). We expect to find a higher rate of window collisions around the buildings on campus with more vertical diversity of vegetation compared to those with little vertical diversity and we expect to find a higher rate of window collisions around the buildings with a higher TVV compared to those with lower TVV. Results will be discussed in light of recent analysis.

**Biology Poster Session I**  
**4:30-5:30 PM CS Main Street Lobby**

**Recycling Education Methods and Success Rates on Radford University's Campus**

**D'Avianna Love**

Faculty Mentor(s):

Josh Nease

Christine Small

Radford University Offices of Sustainability and Residential Life will be teaming together to bring recycling education to Radford University residential halls. The goal of recycling education programs is to increase recycling in the university resident halls and help Radford University reach its goal of carbon neutrality. Former University President Penelope Kyle pledged that Radford University would reach its goal of carbon neutrality by 2040. Estimates from 2018 indicate that Radford University recycles about 50% of all recyclable products, up from the around 30% rate four years ago. This and constructing new buildings to LEED standards and be LEED certified have resulted in Radford University being named in the world by The Princeton Review for eight consecutive years. Scoring a 90 out of 99 on their sustainability scale. The Office of Sustainability has access to data on how much each residential hall recycles, measured in pound per-student, both clean and contaminated. This data will be tracked to see if that increases, stays the same, or decreases after recycling education programs where students are shown what, where, and how to recycle on campus. This will be compared with previous years of data on recycling rates in University residential halls when only passive signage was used to educate residents or no education at all. Our current efforts focus on Radford University residential life students because most are first or second year students. The hope is that, recycling will become a habit and these students will continue to do so even when they move off campus.

**Relation Between Bird-Window Collisions and the New River, Virginia**

**Makayla Beckner**

**Brilynn Duke**

Faculty Mentor(s):

**Breann Mullen**

**Genesis Daniels**

Karen Powers

As urbanization continues to make a larger footprint on the landscape, we have and will continue to document impacts on wildlife. With urbanization, the number of buildings - with particular attention to window surface area and number - have increased on the landscape. With these changes come increases in documented bird-window collisions. This is especially concerning as Radford University's campus continues to expand in terms of building height and window area. A collaborative effort between numerous universities, we began a long-term project studying the patterns of bird-window collisions in relation to landscape structures such as buildings and the vegetation surrounding them. In February 2018, we initiated a project to investigate the relationship between bird-window collision points and their proximity to the New River, a major flyway for migratory birds. We hypothesized that more bird-window collisions will occur at the buildings that are closer to the New River. We are currently surveying 15 campus buildings daily for the presence of bird carcasses. We are using ArcMap 10.4 to determine the minimum distance between the GPS coordinates of the collision site and the river. We will compare our data to randomly-selected points on campus to determine if distance to river does relate to collisions. Results will be discussed in light of recent analyses.

**Biology Poster Session I**  
4:30-5:30 PM      CS Main Street Lobby

**Relationship of Bird-Window Collision Rates to the Concentration of Food Sources Across Campus**

**Neil McDonald**

**Nicole Jones**

Faculty Mentor(s):

**Rachel Champan**

**Bradley Jonnes**

Karen Powers

Birds' annual mortality from building collision is estimated in the billions worldwide. This concerning number is partly due to the highly-reflective glass windows that modern buildings exhibit. In 2013, multiple universities started bird-window collision studies to better understand the negative impacts of campus windows on bird populations. We seek to continue this project in our research, and we focus on access to food resources near each building. In February 2018, we hypothesized that a greater density of trash cans and bird feeders around buildings would result in a higher rate of bird-strike points that can be mapped geospatially using ArcMap10.4. Our bird search methods involved walking 2 loops per day around 15 buildings on the Radford University campus. We recorded our GPS coordinates for food locations using a mobile application, UTM Geo Map. In ArcMap, we plan to estimate the density of these food locations within a 50-m radius around each strike point. We will then compare these densities to an equal number of randomly-selected points around the same buildings. We hypothesize that strike-points would have a greater density near numerous food sources that have been geolocated than random non-strike points. Results will be discussed in light of recent analyses.

**Student Experiences in Fire Ecology: A Follow-Up Assessment of an Experiential Learning Course**

**Codie Gleason**

Faculty Mentor(s):

**Ryley Harris**

Karen Powers

In spring of 2017, Dr. Karen Powers taught a biology course on Fire Ecology. As a component of the course, we students planned and executed a prescribed burn on research grassland at the Selu Conservancy, a natural area preserve maintained by Radford University, in Montgomery County, Virginia. As students, we collaborated and reviewed class material and scientific literature in order to construct a proper fire implementation strategy. Throughout the course, we students were asked to demonstrate and apply practical knowledge and skills in order to successfully carry out assignments. The experiential component of the course provided insights and wisdom that would not have been attainable in a typical classroom environment. Classes like this are critical to the proper development of young biologists and other professionals. As a follow-up to the class, all students enrolled in the course (excluding ourselves) were contacted, and sought feedback on the practicality of the class and perceived value to their career goals. Here, we present our thoughts on this experiential learning course and share survey data generated from the opinions of fellow classmates.

**Biology Poster Session I**  
**4:30-5:30 PM CS Main Street Lobby**

**Studying Invertebrate Biodiversity of Selu using DNA Barcoding**

**Sarah Cushing**

**Bailey Mitchell**

**Patrick Barton**

Faculty Mentor(s):

**Erin Dimino**

**Blake Allred**

**John Baines**

Bob Sheehy

This research project was conducted using six different invertebrates found at the Selu Conservatory of Radford University. The goal of this study was to take DNA samples of each organism and compare these samples among a large database of DNA and DNA barcoding to identify the genus, family, or species of the organism. We collected six invertebrate specimens and assessed their taxonomic position using DNA barcoding. The results obtained by this study include detailed information about invertebrates mostly native to Virginia. These invertebrates are very small species that have built ecosystems in Selu and work together to develop a healthy environment for themselves and other organisms living in this area. The species found differentiate in size, color, and taxonomic name. By analyzing the DNA sequences of the species, we provided updated information about the species currently living in this area of Virginia.

**The Isolation of Calcium Oxalate Crystals from Plant Tissues**

**Matias Paulina**

Faculty Mentor(s):

Gary Coté

Crystals of calcium oxalate are found in many plants. The crystals are thought to protect from herbivores, although other roles have been proposed. Many different crystal forms have been reported from all vegetative tissues of the common houseplant *Dieffenbachia seguine*. The most common crystals found in *Dieffenbachia* are druses, which are conglomerations of radiating spikes and wedges. Raphides, long, thin, grooved crystals, are also common. We have developed a new procedure to isolate crystals from *Dieffenbachia* tissues. The tissue cell walls are enzymatically digested, and the resulting soup is filtered to remove undigested tissue. Crystals are isolated by centrifugation, washed repeatedly with water and then ethanol, and suspended in ethanol. The suspension is pipetted onto a stub and the ethanol is allowed to evaporate, leaving the crystals attached to the stub and ready for sputter coating and scanning electron microscopy. Using this procedure we isolated very long raphides, which were not previously isolated, perhaps because they are fragile. We also discovered a crystal in *Dieffenbachia* leaves previously only known from pollen, the prism, which, in leaves, is very small, around 1-5  $\mu\text{m}$ , and relatively rare. Using this method to isolate crystals from leaf edges and more central tissues, we confirmed earlier findings that druses are more concentrated along the edges. We are currently attempting to verify that all crystals are calcium oxalate.

**Biology Poster Session I**  
**4:30-5:30 PM CS Main Street Lobby**

**The PASSER Project: Use of a Computerized Feeding Device for Ethological Investigations of New World Primates**

**Conner Philson**

Faculty Mentor(s): Jason Davis Andrew Ray Cassady Urista

Traditional methodology of ethological research fails to collect data on a majority of occurring events due to time limitations of the researcher. Integrating micro-computing into ethology provides a novel method to collect detailed, multi-modal data sets, 24/7/365, thus overcoming many of these limitations. Though this requires a substantial investment of time and technical ability, it offers the benefit of long-term, relatively low-cost, minimally invasive data collection, with limited person-hour investments. Here we describe the development and initial results of the “primate variation” of the PASSER Project (Programmable Automated System for Songbird Ecological Research), and its application to the study of primate feeding behaviors in the Madre de Dios Region of the Peruvian Amazon. In their simplest practice, PASSER feeders allow automated data collection of feeding activity, alongside a variety of environmental metrics (i.e. photos or video, temperature, humidity and time). This allows us to conduct both rapid and long-term surveys of species diversity, as well as studies of behavior-environment interactions for those species. Three feeders were deployed for a two week span inland of the Las Piedras River in the Peruvian Amazon. Feeders saw overall low primate activity, however the most activity was seen in the unit active for the longest time, showing that extending the active time of these feeders will yield activity. We also saw heavy night activity. Subsequently, next generation feeders will include infrared cameras to capture this activity. We discuss ongoing implementations and future directions for this type of work.

**The Prevalence of Lyme’s Disease in Dogs in South West Virginia: An Internship at Riverside Veterinary Clinic in Radford Virginia**

**Haley Burger**

Faculty Mentor(s): Karen Powers

Since August 2017, I have been working with Riverside Veterinary Clinic to gain practical skills in companion animal health care. During my internship I performed many laboratory techniques to assist with animal consultations. This opportunity allowed me to observe the importance of vaccine maintenance, good oral hygiene, and practical procedures in animal care. I also learned about zoonoses, some of which can be transferable to humans. One such illness is Lyme disease. Through my internship, I independently researched what time of year that Lyme was most frequently diagnosed and trends in pre-Lyme vaccinations and other owner preventive efforts, and Lyme-positive cases. In my poster, I present 5 case studies encountered in the clinic, coupled with my findings on Lyme disease trends.

**Biology Poster Session I**  
**4:30-5:30 PM CS Main Street Lobby**

**The Retrieval and Species Identification of Plethodons in the New River Valley**

**Emily Hasen**

Faculty Mentor(s):

Bob Sheehy

The identification of Plethodon species in the Virginia may be confusing and difficult base on morphological characteristics. A viable alternative to morphological identification is the use of DNA Barcoding. This approach requires the isolation of DNA and, therefore, it is important for us to extract DNA from captured Plethodons and determine which species are in the area. Currently, DNA extraction in Plethodons is done by removing the tips of their tails. However, invasive sampling techniques such as tail snipping may have detrimental effects on the salamander. Therefore, we have chosen new methods of non-invasive DNA extraction that will leave a much smaller impact than the currently accepted method. The salamanders will go through the treatment of brushing and swabbing their backs with histological swabs in order to collect cells for DNA extraction. The DNA will then be observed through the process of DNA barcoding. CAPS/dCAPS approaches will be used as well to find sequences that may have polymorphisms that are not within conventional restriction sites. When successful, the DNA will be compared to DNA databases, and the species can be determined. The DNA barcoding will be instrumental in identifying which Plethodon species have been collected because many species have similar characteristics that make them hard to distinguish primarily on morphological characteristics.

**Using DNA Barcoding to Understand Invertebrate Diversity of the Selu Conservancy**

**Aubree Marshall**

**Allanah Cross**

Faculty Mentor(s):

**Austin Barker**

**Sir Nottingham**

Bob Sheehy

For the Genetics, Evolution, and Development class at Radford University, students are collecting invertebrates from Selu Conservancy in order to gather information through PCR and DNA barcoding. All data that will be collected will be contributed to iBOLD, or the International Bar Code of Life Database. This database is available to the public and will help others learn more about Selu Conservancy. A combination of different traps were used, including the pitfall trap and sheet trap. These helped collect a variety of insects. From here, DNA was isolated from these insects and a section of the mitochondrially encoded COI gene was amplified and sequenced. After this, we compared the sequences found to COI sequences in the DNA Database at the National Center for Biological Information and the DNA barcode database at iBOLD so information could be determined about the taxonomy of the insect, track the variation of the DNA sequence at this taxonomic level, and gain some information of the geographic distribution of the barcode information of each insect. The significance of this research was to gather more information about the insect population of the region because it has not been thoroughly studied.

**Biology Oral Session I**  
**5:00-6:15 PM CS M073**

**Tibial Torsion and Metatarsal Robusticity in Modern and Fossil Humans**

**Mckenzie Schrank**

**Jessica Wollmann**

**Aubree Marshall**

Faculty Mentor(s):

Laura Gruss

The angle of torsion of the tibia (twisting about its long axis) is partly responsible for the typical slightly toed-out angle of foot during walking in modern humans. A 1.8 million-year-old *Homo erectus* skeleton from Dmanisi, Georgia, has an unusually low tibial torsion angle, suggesting that its foot was pointed more directly forward. The same individual also had a pattern of metatarsal (MT) robusticity that contrasts with modern humans, with the middle MTs being relatively stronger compared to the medial (big toe side) ones. Pontzer et al. (2010) proposed that the two features are related: Dmanisi's tibial torsion and foot placement led to more stresses placed on the middle of the foot, as opposed to along the medial side in modern humans. Our research tests this hypothesis in two ways, by examining the effects of tibial torsion on skeletal morphology as well as locomotor stresses in modern humans. We have collected osteometric data from the Terry Skeletal Collection at the Smithsonian Institution. For each of 40 individuals we measured tibial torsion angle and took x-rays of the MTs of the same limb in order to measure their cortical bone thickness. We are analyzing this data to test the hypothesis that a lower degree of tibial torsion is related to greater robusticity of the middle MTs. We are also undertaking an experimental test of Pontzer's hypothesis. We will measure tibial torsion in a sample of living subjects, and then use a pressure mat to measure the distribution of pressure under their MTs during walking. The data collected in these studies will allow us to test the proposed relationship between tibial morphology and locomotor biomechanics, and will have applications to both early human fossils and modern clinical biomechanics questions.

**Effects of Nonylphenol on Behavior, Development, and Morphology of *Gambusia holbrooki***

**Dharmindra Dulal**

**Sara O'Brien**

Faculty Mentor(s):

Sara O'Brien

Endocrine disrupting chemicals (EDCs) are synthetically produced chemicals that interfere with naturally produced hormones by inhibiting or exciting the normal functions of the endocrine system. Nonylphenol (NP) has been associated with high mortality and lifelong abnormalities, but is currently under-studied (Tanaka & Grizzle, 2002). NP is an estrogen mimic and has been used for the production of plastics, pesticides, and cleaning products (detergents). As a result of Increase in production of NP, the safety limit of NP,  $7.0 \hat{1}/4g/l$ , in the aquatic system is often breached (EPA, 2010, p.4). Previous studied on Virginian rivers have demonstrated that more than 10% of rivers across Virginia has exceeded  $10 \hat{1}/4g/l$  of NP (Ackermann et. al., 2002, p.204). Reduced hatching rates, inhibition of oogenesis in females and testicular tissues in males, hormonal imbalance, and behavioral abnormalities have been documented (Schwaiger et. al., 2002, p.182). Our project, using the *Gambusia holbrooki* (mosquitofish) model, explored sub-lethal effects of high (500 ppb), medium (100 ppb) and low (10 ppb) ecologically relevant doses of NP. Here we elucidate the impact of NP exposure on fish morphology, development, and behavior.

**Biology Oral Session I**  
**5:00-6:15 PM CS M073**

**Effects of Royal Jelly in Combination With Juvenile Hormone Agonists in *Gromphadorhina portentosa***

**Taylor Hawkins**

**Rachel Short**

Faculty Mentor(s):

**Aubree Marshall**

**Kelly Chandler**

Jason Davis

Royal Jelly (RJ) is a complex mixture of hormones and nutrients secreted by honeybees to induce growth and reproductive capability in the queen bee. Juvenile Hormone (JH) suppresses maturation and prevents larvae from developing into adults across a variety of arthropodal taxa. These two hormones can have drastically different effects on the development and reproductive success in fruit flies (*Drosophila melanogaster*). During the fall of 2017, we conducted a set of preliminary studies exploring the effects of RJ in combination with JH in fruit flies to determine the mechanisms and modalities by which they interact, and to identify how RJ and JH contribute to mortality and reproduction. Results suggest that the combined effects of JH and RJ reduce mortality in fruit flies relative to JH alone some, diverging substantially from previous explanations of their functions. Currently, we are replicating this study in Madagascar hissing cockroaches (*Gromphadorhina portentosa*) to compare the effects of RJ and JH across taxa. This research also extends beyond the laboratory, as “Roachzilla”, the large sterile cockroaches that result from treatment with RJ in combination with JH, serve as an important outreach tool. As such, this project is used to both increase our understanding of RJ and JH and to increase public knowledge of insects and endocrine physiology.

**Investigating the Effects of Juvenile Hormone and Royal Jelly on *Lasiadora parahybana***

**Drew Wolford**

Faculty Mentor(s):

Jason Davis

Contrary to popular belief, spiders are not insects but rather arachnids. While these two classes are vastly different, as invertebrates they seem to utilize similar hormones in regulation of their growth and development. Specifically, both insects and arachnids produce what is known as juvenile hormone (JH). JH is a hormone that arthropods produce in high quantities during their juvenile life history stages and which functions to maintain juvenile characteristics such as sterility. When cockroaches receive both JH and another hormone known as royal jelly (RJ), they exhibit mixed sexual trait development. Secondary sex features develop, but internal sexual differentiation is lacking, thus they remain sterile. Cockroaches that receive both JH and RJ grew up to 95% larger and developed substantial alterations in their exoskeletal shape. In my study, I am currently examining the impact of JH and RJ on the physiology, morphology, and behavior in the salmon pink bird-eating tarantula (*Lasiadora parahybana*). Exploring these questions is important because they not only bring insight to arachnids, but more also elucidate the complex evolutionary history of when RJ first evolved among invertebrates and how RJ and JH interact across taxa. Given that invertebrate endocrinology is a vastly understudied field of biology, advancements to our knowledge will benefit not only members of this specific field, but also the entire biology community as a whole.

**Biology Oral Session I**  
5:00-6:15 PM      CS M073

**Investigating Feeding Profiles of Passerine Birds**

**Conner Philson**

Faculty Mentor(s):    Jason Davis                      Andrew Ray                      Sarah Foltz

Integrating microcomputing into ecobehavioral field research is a novel mechanism for the collection of detailed multi-modal data sets. By automating data collection, we can conduct a wide range of ethological studies on passerine birds. Here we describe our use of the Programmable Automated System for Songbird Ecological Research (PASSER) Project, and its “smart feeder”. Since September 2017, PASSER feeders have captured environmental and behavioral metrics of avian feeding behaviors in Southwest Virginia. The subsequent data set contained 20,000 feeding events across 12 species at two sites as of January 15th, 2018. With this data, we investigated the environment-behavior interactions, intraspecific and interspecific interactions, and effects of anthropogenic disturbances on local avifauna. We have identified how varying microhabitat conditions (temperature and humidity) influence feeding patterns across species on varying spatiotemporal gradients. Additionally, we have identified trends in “uncommon event”, such as aggressive displacement behaviors, and effects of extreme weather. Our continued data collection at established and novel locations allows us to better understand the complexity of feeding profiles of passerine birds. Additionally, we will layout future directions for the PASSER Project, entailing genetic algorithms, nesting and reproductive behaviors, and induced neophobia.

**Biology Oral Session II**  
6:30-7:45 PM      CS M073

**A Study of Antimicrobial Activity of Sangre de Drago**

**Kendalyn Hersh**

Faculty Mentor(s):                      Joyce Caughron                      Jason Davis

This research explores our knowledge of the antimicrobial properties of the sap of *Croton lechleri* (commonly known as Sangre de Drago), a tree that grows in the upper Amazon. Sangre de Drago is frequently used by the indigenous population as a remedy for common skin infections. A study in Peru demonstrated Sangre de Drago’s ability to kill randomly sampled skin microbiota. We purchased sap from a street market in Puerto Maldonado, Peru over several consecutive years for study. We found that the sap has activity against gram-positive bacteria, that it has an ability to kill gram-positive bacteria compared to that of several commercially available antiseptic agents, that there is a positive correlation between size of zone of inhibition and dosage, and that there is a trend in activity of sap based on its age. The most recent focus of this research has been studying whether the sap is bactericidal or bacteriostatic, and whether or not resistance can develop to the sap over time. Our interest in Sangre de Drago is greatly influenced by its natural antimicrobial characteristics that are similar to antibiotics used to treat gram-positive bacterial infections.

**Biology Oral Session II**  
**6:30-7:45 PM                      CS M073**

**The Passer Project: Inducing Neophobia Through Presented Stimuli via A Computer Enabled Feeder**

**Tyler Samuels**

Faculty Mentor(s):

**Jason Davis**

With changing seasons comes new abiotic and biotic factors that affect bird behavioral and physiological profiles. Identifying relationships between neophobia and stress in different species of birds through the seasons, and through introduced stimuli, can indicate the variation of stress levels under these conditions. By displaying stimuli to an individual bird during a feeding event at a PASSER smart feeder, we can observe how behavioral responses are altered throughout the changing seasons. We hypothesize that birds' responses to these induced neophobic stimuli will vary in relation to both seasonal and variable weather conditions. This study uses a computer-enabled automated feeding device equipped with a monitor that displays a variety of images when birds approach the feeder. Images include a variety of stimuli, including common predators, conspecifics, heterospecifics, and novel stimuli. Though these presentations of stimuli induced varying levels of neophobic responses, responses were still correlated to the abiotic and biotic conditions at the time of display. We monitor behavioral responses via recorded video collected by the feeders. To determine the level of response under all presented stimuli, we measure the length of feeding event, noises produced by the bird, and signs of defense before flight. This data shows how birds' behaviors are alerted and if abiotic and biotic factors matter. In this poster, we will describe our methods and results, and discuss implications of our findings and techniques for future studies.

**Dogs and Owls and Pigs, Oh My!**

**Emily Brammer**

Faculty Mentor(s):

**Karen Powers**

Veterinary science is a field that not only helps companion animals but also indirectly advances human health. A number of human diseases and parasites originate in companion animals and can be transmitted to us. Hillview Veterinary Clinic is one of the only animal clinics in central Indiana that treats exotics, wildlife, companion pets and farm animals. The clinic also pairs with the Indiana Raptor Center to give veterinary care to help rehabilitate birds of prey. During the summer of 2017, I interned at the clinic for 200 hours. My responsibilities included feeding animals, filling prescriptions, restraining animals, setting up laboratory analyses, and preparing tools for surgery. I was able to follow doctors into appointments, view surgeries, x-rays, ultrasounds, physical therapy, and witness administration of medications, nerve blocks and more. Here, I present on approximately 12 cases, from typical check-ins to odd and rare conditions. This internship has given me new skills and experiences in the veterinary field that I will continue to use through my career.

**Biology Oral Session II**  
**6:30-7:45 PM CS M073**

**Modulation of vegetative growth by frass derivatives from Madagascar Hissing Cockroaches (*Gromphadorhina portentosa*)**

**Luis Arias**

Faculty Mentor(s):

**Alex Atwood**

Jason Davis

Recent research in the Radford Ecophysiology lab has shown that frass from Madagascar hissing cockroaches (*Gromphadorhina portentosa*) has similar chemical characteristics to organic fertilizers. Specifically, infrared spectroscopy demonstrated that frass contains functional groups similar to those found in both synthetic fertilizers and cow manure. In the current project, we set out to determine if frass from Madagascar hissing cockroaches modulated growth of *Raphanus raphanistrum*, *Solanum lycopersicum* and *Lactuca sativa* under a variety of treatment conditions and dilutions. Growth trials of three-week increments were conducted under controlled conditions. Resulting growth was analyzed based on both overall plant size and relative growth of subcomponents (roots, stem, leaves) across and within species and concentrations gradients. Results suggest that in moderate to high concentrations, frass was fatal to plants, causing an inhibition of growth, however, this inhibition varied across plant species. In contrast, low concentrations, below or comparable to that used in commercial fertilizer produced a significant increase in plant growth across multiple metrics. Here, we discuss these results, as well their implications both for natural plant-insect interactions and in agriculture.

**Biology Oral Session II**  
**6:30-7:45 PM CS M073**

**Vespa Amino Acid Mixture (VAAM) Enhances Electron and Proton Transport in Mitochondria and Leads to Excessive Reactive Oxygen Production**

**Attia Mohamed**

**Kristy Clark**

**Adam Weikel**

Faculty Mentor(s):

**Samuel Stowers**

**Marisa Dameron**

**Emilie Colon**

Sarah Redmond

Vespa amino acid mixture (VAAM) is a synthetic blend of amino acids, which has been proven to increase rates of aerobic cellular metabolism by increasing net ATP production in various eukaryotes. The mechanism through which VAAM acts is unknown; our work suggests that VAAM augments the proton motive force. In order to evaluate the effects of VAAM on mitochondrial metabolism, we measured the levels of reactive oxygen species, relative NAD<sup>+</sup>/NADH levels, caspase activation, mitochondrial membrane integrity, and ATP levels in yeast (*Saccharomyces cerevisiae*) with differing doses of VAAM at multiple time points. The levels of reactive oxygen species increased within five minutes of the exposure to the lowest dose of VAAM (0.003%, 1% of the recommended dose) and time points beyond five minutes yielded toxic levels and activation of caspase. This was also demonstrated with NAD<sup>+</sup>/NADH levels, higher levels of NAD<sup>+</sup> were observed in the VAAM treated cells, indicating an increase in entry of electrons into the transport chain, leading to increased ATP production. We attempted to counteract the actions of VAAM by adding Î±-tocopherol (an antioxidant) and 2,4-dinitrophenol (DNP, a proton motive force uncoupler) to VAAM treatments separately. The antioxidants reduced the production of reactive oxygen species slightly, and did not significantly lower the production of ATP. Surprisingly, DNP, was successful in prolonging the lives of cells in VAAM treatment. This taken in account with the increase in ATP production leads us to believe that VAAM facilitates electron transport leading to enhanced coupling with the activity of ATP synthase.

**Biology Poster Session II**  
**7:30-8:30 PM**      **CS Main Street Lobby**

**Assessment of Invertebrate Biodiversity at the Selu Conservancy**

**Laneigh Jones**

**Stephen Ruppert**

Faculty Mentor(s):

**Shanell Piercy**

**Bekah Shupe**

Bob Sheehy

Biodiversity is important because the species richness of an area helps to better understand the ecosystem. DNA Barcoding helps to eliminate the lack of knowledge concerning multicellular eukaryote taxonomy and identification by giving each species a unique and distinguishable “barcode”. The Selu Conservancy in Radford, Virginia is mainly a deciduous forest with invertebrate populations that has yet been identified. The purpose of this study was to find a diversity of various invertebrates and to place their DNA into a DNA Barcoding database. Multiple invertebrates were collected from the Selu Conservancy. Our invertebrates were identified by comparing their CO1 gene sequence to the CO1 gene sequences of invertebrates in a DNA Barcoding database. We anticipated finding invertebrates that were previously unknown to inhabit the Selu Conservancy or the New River Valley.

**Biodiversity Inventory of Selu Conservancy Using Data Analysis**

**Ellen Agyemang**

**TJ Weatherford**

Faculty Mentor(s):

**Robert Agliam**

Bob Sheehy

DNA barcoding is used to identify organisms by comparing a sequence of their genome to a DNA database. The three main goals are; the identification of a species, the diagnosis of a new species, and to provide molecular Operational Taxonomic Units (mOTUs) for ecological & biodiversity studies (Edward 2011). The overall goal of this project has been to identify all of the species found at Selu and to map their distribution across the property. Students will collect invertebrate specimens using beating nets or pan traps from the Selu Conservancy and record their geographic location as well as habitat type. Each group will be collecting one invertebrate per person. For each sample, we will be isolating DNA to amplify a section of the mitochondrially encoded COI gene. If the amplification is successful we will have the above amplicon sequenced. Following amplification, we'll compare our sequence to the DNA Database and the DNA barcode database to determine; the taxonomic name of the organism, variation of DNA sequence at the taxonomic level to which we can identify the sample, and some indication of the geographic distribution of barcode information for this organism. The significance of this project is to determine the biodiversity as well as the diagnosis of new and developing species within Selu Conservancy.

**Biology Poster Session II**  
**7:30-8:30 PM CS Main Street Lobby**

**Calcium Oxalate Concentration in Deciduous Leaves**

**Christopher Smith**

Faculty Mentor(s):

Gary Coté

Microscopic intracellular crystals of calcium oxalate are produced throughout the plant kingdom. These crystals are thought to defend against herbivory, but other roles have also been suggested, including that they sequester calcium from cell walls during controlled breakdown of plant tissues. One case of such controlled breakdown is the abscission of spent leaves and floral parts, in which a layer of cells with weakened walls is formed. In Dr. Coté's laboratory, we have found that, in several species of autumn-deciduous trees, distal petiole tips, adjacent to the point of abscission, showed dramatic increases in calcium oxalate over the summer into autumn, consistent with a role of crystals in preparing the petioles for abscission. White basswood, *T. americana* var. *heterophylla* (Malvaceae), in particular, showed an abrupt increase in petiolar oxalate in the weeks just prior to abscission. We are examining the petioles of two additional members of the Malvaceae, *Tilia americana* var. *americana* (American basswood) and *Hibiscus syriacus* (rose of Sharon). To conserve assay enzymes, we have adapted the oxalate assay to use microtiter plates, and have measured a standard curve for oxalate using this adaptation.

**Carcinogenic VOC Detection By Means of Oscillatory Tongue Flicks in Snakes**

**Joseph Escobar**

Faculty Mentor(s):

Matthew Close

Snakes and lizards predominantly rely on their sense of smell to seek out prey by a behavior referred to as tongue-flicking—a mechanism by which the tongue is used to collect odorants from airborne moisture particles, which are then transferred to the vomeronasal organ for sensory transduction. Recent studies suggest that specific directions of tongue-flicks can detect both volatile and nonvolatile odorants. Simple downward extensions (SDE) of the tongue are thought to be associated with non-volatile odors while the presence of volatile cues is expected to be correlated with oscillatory tongue flicks. As the ever-growing field of Oncology continues to make advancements, volatile organic compounds (VOCs) at high concentrations have been viewed as probable carcinogens in both animals and humans alike, yet these VOCs vary in different types of cancers. Tumor cells have been found to release distinct VOCs that can be detected through breath, blood and urine samples which may lead to an alternative noninvasive method of cancer detection. My study will focus on a snake's ability to detect several volatile odors pertaining to tumor cells found in mouse urine. Snake behavior will be observed through the use of high-speed cameras in order to 1) determine whether snakes avoid urine containing high VOCs (associated with cancers) and 2) compare the tongue flicking behaviors of snakes presented with normal or high VOC urine. My research will hopefully broaden our knowledge of both the snake sensory systems as well as provide a novel, non-invasive method of cancer detection.

**Biology Poster Session II**  
**6:30-7:30 PM CS Main Street Lobby**

**Computational Modeling of the AS1/AS2 Complex**

**Tayler Lewis**

Faculty Mentor(s):

Tara Phelps-Durr

ASYMMETRIC LEAVES 1 and 2 (AS1 and 2) are plant proteins that encode DNA binding proteins know as transcription factors. AS1 and AS2 control how KNOX genes are expressed in leaf development. The KNOX genes encode homeodomain proteins essential for maintaining the shoot apical meristem (SAM), a population of undifferentiated cells that produce lateral organs and stem tissues, and carpel development. However, as leaves develop from the SAM the KNOX must be turned off and this silencing maintained throughout leaf development. In wild type plants, AS1 is expressed throughout the cotyledons, while AS2 is expressed on the adaxial side of the cotyledons. These expression patterns of AS1 and AS2 are required for maintaining the silencing of the Knotted1-like Homeobox (KNOX) genes during leaf development. Mutations in *inas1* cause leaves to be wrinkled and curled under, leaving the petioles shorter. Mutations in *as2* results in wrinkled leaves as well, however, the petioles on the plant are still visible. In both of these mutants, the structure of the developing leaves is caused by the reactivation of the KNOX genes in the leaf tissue. The AS1 and AS2 proteins are known to physically interact, however, it is unclear exactly what regions of the proteins physically make contact. The goals of my research project were to 1) computationally model AS1 and AS2, 2) computationally model the AS1 and AS2 protein interaction, and 3) clone AS1 and AS2 so that the computational models can ultimately be verified. The results of this undergraduate research project include a cloned AS1 gene in the incorrect orientation, along with computationally generated models of AS1 and AS2 that will be verified with later research.

**Biology Poster Session II**  
**6:30-7:30 PM CS Main Street Lobby**

**Detection Efficiency of the Allegheny Woodrat (*Neotoma magister*) in Virginia**

**Makayla Beckner**

Faculty Mentor(s):

Karen Powers

The Allegheny woodrat (*Neotoma magister*) has shown significant decline in population size and narrowed population distribution since 1928. Declines have been attributed to constrained habitat requirements specific to high elevation rocky outcrops. The rough terrain limits the ability of researchers to access these isolated habitat fragments, resulting in low detection rates and high costs of effort. We launched a collaborative effort between Radford University, Virginia Department of Game and Inland Fisheries and the Virginia Tech U.S. Geological Survey Cooperative Unit in an effort to gather data at new and historical woodrat sites across Virginia. Collectively, we paired remote-sensing cameras and tomahawk traps at 31 sites from May through October of 2017. We estimated probability of detection and site occupancy using package *unmarked* in Program R. The aim of this study was to compare detection efficiency between trapping methods to determine the most efficient method of detection for the species in challenging research environments. Results to be presented.

**Biology Poster Session II**  
**7:30-8:30 PM CS Main Street Lobby**

**Good Food, Good Mood: Evaluating the Effect of Food Consumption on Perceived Stress and IgA Levels**

**Abby Jones**

**Alexander Holder**

Faculty Mentor(s):

**Danielle Cyburt**

**Katelynn Webb**

Sarah Redmond

The purpose of this research is to evaluate levels of IgA in saliva samples taken from individuals on Radford University's campus entering and exiting dining halls. IgA is an immunoglobulin associated with stress levels that can be easily isolated from human saliva. Prior to providing a saliva sample, each participant is given a survey that assesses perceived stress levels. To avoid contamination of the samples, participants are asked to rinse their mouths with water. When stress levels are high, we would expect to find small amounts of IgA in a sample. We hypothesize that stress will be lower after a meal because happiness and food are highly correlated. We predict that our results will show lower IgA levels before food consumption and higher IgA levels after food consumption. Samples will be analyzed using an ELISA test.

**Identification of Invertebrates of the Selu Conservancy using DNA Barcoding**

**Emily Hansen**

**Eliot Alford**

**Tristan Owens**

Faculty Mentor(s):

**Keyon Clanton**

**Ashley Lucas**

Bob Sheehy

We, the Biology 231 class at Radford University, will be using DNA barcoding to identify invertebrate species in the Selu area. By referencing major DNA databases such as iBOLD and the gene bank at NCBI we will be able to correctly classify the organisms we find and in doing so we will be able to contribute our findings to these ever-expanding knowledge banks. The progress being made in the DNA barcoding industry contributes to our understanding of organisms' evolutionary pathways, which can be applied to many areas such as genetic sequencing or conservation attempts. The techniques we will employ include collection of invertebrates using a variety of capturing techniques, PCR, and finally, restriction mapping. To do this, the DNA will be isolated and a section of the mitochondrial encoded COI gene will be amplified and cross-referenced with DNA databases. Should we find any DNA barcodes that don't match we will contribute our findings to the databases.

**Biology Poster Session II**  
**7:30-8:30 PM**      **CS Main Street Lobby**

**Inflammatory cytokines down-regulate CYP4F enzyme expression and function in human liver cells**

**Clay Branscom**

Faculty Mentor(s):

**Austin Dean**

Peter Christmas

Cytochrome P450s (CYPs) are a superfamily of enzymes that metabolize lipid substrates. Members of the 4F subfamily (CYP4Fs) are thought to play a role in the regulation of inflammation because they inactivate or generate lipids that function as inflammatory mediators. Identification of physiologically relevant substrates of CYP4Fs, and identification of signals that up- or down-regulate CYP4F gene expression, are important goals in the search for therapeutic targets in inflammatory disease. We used a human liver cell line (HepaRG) to determine baseline expression of CYP4F enzymes, and to search for agents that modulate expression. Stimulation of HepaRG cells with the cytokines interleukin 1 (IL-1), tumor necrosis factor (TNF), or interleukin 6 (IL-6), resulted in a significant down-regulation of CYP4F2 and CYP4F3 expression. The most potent cytokine was IL-1 which stimulated a 100-fold decrease in expression of both enzymes at concentrations as low as 1 ng/ml. The best-characterized substrate of CYP4F2 and CYP4F3 is a pro-inflammatory lipid mediator called leukotriene B4 (LTB4), which is inactivated to produce 20-hydroxy LTB4. We speculate that cytokine-mediated down-regulation of these enzymes is a mechanism to sustain high levels of LTB4 activity during the initiation and amplification of an inflammatory response. We are currently performing experiments to test our prediction that IL-1 mediated down-regulation of CYP4F2 and -4F3 will be associated with increased levels of LTB4 in HepaRG cells.

**Investigating the Impacts of Environmental Changes on Appalachian Herpetofauna**

**Tia Thompson**

Faculty Mentor(s):

Matthew Close

Sara O'Brien

The Appalachian Mountains' diverse topography, elevation, and climate have resulted in a broad range of microhabitats and diverse plant and animal communities. A large portion of the Appalachians have also been altered by the results of human land-use practices such as deforestation due to logging and coal mining. While this region is considered a biodiversity "hotspot" for some herpetological species, most long-term wildlife conservation research has focused on vertebrates such as mammals and birds, leaving a shortage of information on how this environmental stress is impacting the bioregion's abundant and in some cases endemic reptile and amphibian species. In Spring 2018, we will begin a long-term course-based study seeking to better describe the ecophysiological impacts of biotic and abiotic environmental factors on regional herpetofauna. Specifically, we will build on the framework of an existing field-based course, Appalachian Herpetology, and begin sampling the stress hormone corticosterone in populations of snakes, salamanders, turtles, frogs, and toads across each of the three physiographic provinces of Appalachia (Blue Ridge, Ridge and Valley, and Appalachian Plateau). Our data will contribute to a longitudinal dataset that can be supplemented annually by the class participants. This student-generated database will give future courses and independent researchers the opportunity to investigate and better predict stress response in terrestrial and aquatic herpetofauna depending on environmental conditions through time and across a wide geographic range.

**Biology Poster Session II**

7:30-8:30 PM

CS Main Street Lobby

**Stress Levels Between Nursing Students and Biology Students****Luis Arias****Erin Morehart****Lindsey Lee****Becca Stamm****Sierra Noble****Emilie Colon**

Faculty Mentor(s):

Sarah Redmond

Stress is a psychological response induced by environmental factors. During stressful periods, hormones in chemical messenger signals are produced to either increase or reduce response to stress. Immunoglobulin A (IgA) is an antibody produced on mucosal surfaces which can easily be analyzed via saliva samples. Once stress is induced, IgA levels decrease due to the body allocating resources to the stress response. In this project, IgA levels were analyzed among upper biology and nursing undergraduates at Radford University to identify their stress levels. Voluntary saliva samples were collected based on the courses students were currently enrolled in. Surveys were given to identify individual's perceived stress levels due to different variations of difficulties in the last 24 hours. Saliva samples and surveys remained anonymous for the safety of the individuals. After samples were collected, an Enzyme-Linked Immunosorbent Assay (ELISA) was conducted to measure the antibody concentration. IgA and stress levels are inversely related. Low concentrations of IgA indicate high levels of stress, while high levels of IgA signify low stress. Expected results should indicate there are no significant differences in IgA concentrations between nursing and biology students. These findings are expected due to similar academic courses, such as human anatomy and microbiology.

**Biology Poster Session II**  
**7:30-8:30 PM CS Main Street Lobby**

**Survival and Metabolic Function of Escherichia coli After Exposure to Vespa Amino Acid Mixture (VAAM)**

**Emilie Colon**

Faculty Mentor(s):

Sarah Redmond

Metabolic pathways reduce and oxidize organic molecules to produce ATP. Aerobic respiration occurs in the plasma membrane by the electron transport chain, which oxidized a series of molecules to initiate an electrochemical gradient. The anaerobic pathway does not require oxygen for metabolism; energy is converted by glycolysis and fermentation. Vespa amino acid mixture (VAAM) is a protein substance derived from the saliva of *Vespa mandarinia*. This mixture is known to cause an extreme increase in cellular metabolism, particularly in the proton motive force. Previous research found that the pH of cauliflower mitochondrial isolates at 0.3%, 0.03%, or 0.003% VAAM was directly associated with the electron transport chain increasing ATP production. *E. coli* can metabolize by using both respiration pathways, but VAAM only impacts the aerobic pathway. To identify the effects of VAAM on prokaryotic organisms, *E. coli* was exposed with three different concentrations of VAAM (0.3%, 0.03%, 0.003%), cultured for 20 and 45 minutes at 37°C. The bacteria was then plated on agar and incubated for approximately 24 hours and the average number of surviving colonies was analyzed relative to VAAM concentration. Based on the statistical analysis there was no significant relationship between VAAM and survival of *E. coli*. This indicates that the VAAM concentrations has minimal impact on the electron transport chain activity and therefore maintains the proton motive force. Since *E. coli* are facultative anaerobes they can alternate metabolic pathways, possibly changing the outcome of VAAM exposure.

**Biology Poster Session II**  
**7:30-8:30 PM CS Main Street Lobby**

**The Effects of Diet on the Evolution of Salivary Alpha-Amylase**

**McKenzie Schrank**

Faculty Mentor(s):

Jason Davis

Cassidy Urista

The enzyme alpha-amylase is one of the digestive enzymes responsible for breaking down dietary starch. Its production is controlled in part by the number of copies of AMY1 genes an individual possesses. Previous research has suggested that alpha-amylase production is related to the amount of starch in the traditional diet of the culture, and is therefore, culturally variable. This research examines the evolutionary effects of alpha-amylase and diet. 25 Peruvians and 17 North Americans were studied, and each participant provided both a dietary survey and 1-3 ml of saliva. In addition, North Americans provided salivary samples both while on their normal diet and after several weeks of exclusively Peruvian-typical diet. Saliva was analyzed for alpha-amylase via ELISA for variations both between cultures and in North Americans before and after dietary change. Analysis of dietary surveys suggest that the modern Peruvians have a higher starch diet than those from North America. It was expected that the levels of amylase would vary between the cultures; with higher levels in Peruvians. However, no significant differences were found in optic density of amylase between populations. Since the relationship between amylase production and population has been argued to be related to population-level adaptation and not individual diet, we did not expect, nor did we find, differences in the North American samples. This suggests that any differences in the traditional diets of these groups was in types of dietary starch and not amount of dietary starch, and therefore evolutionary invisible.

**Biology Poster Session II**  
**7:30-8:30 PM CS Main Street Lobby**

**The Computational Modeling and Analysis of the TCP4 and AS2 Proteins**

**Kyanna Jenkins**

Faculty Mentor(s):

Tara Phelps-Durr

During early development, it is crucial for undifferentiated cells to differentiate into the various cell types that function in fully developed organisms. In plants, cells can switch between de-differentiated and redifferentiated states indicating that regulation of early development genes is flexible. In the mustard plant, *Arabidopsis*, *Asymmetric leaves 2 (AS2)*, encodes a transcription factor protein that is required for normal leaf development. As a transcription factor, AS2 controls how other genes are expressed. Mutations in AS2 cause leaf malformations due to the fact that some cells remain undifferentiated. These results indicate that the normal function of AS2 is to repress the expression of genes that promote differentiation. AS2 is known to interact with another transcription factor, *Family Transcription Factor 4 (TCP4)* a member of a large family of transcription factors known to be important for development. The goal of our research is to understand how TCP4 binds to AS2 and regulates gene expression during development. Computational modeling was used to determine the 3-D structure of TCP4 and model how TCP4 physically interacts with AS2 to control gene expression. The 3-D structure of TCP4 was obtained by submitting the amino acid sequence of TCP4 to I-TASSER, a molecular modeling program. The 3-D model was evaluated in another molecular modeling program known as ICM-Pro. To verify the 3-D models, we will clone the TCP4 and AS2 genes and express them in *E. coli*. Ultimately, the proteins will be isolated from *E. coli* and the protein structures will be experimentally determined. This work will provide basic knowledge about how TCP4 and AS2 transcription factors regulate gene expression and control cellular differentiation.

**Biology Poster Session II**  
**7:30-8:30 PM**      **CS Main Street Lobby**

**The Fang and the Oral Papillae: A Snake Evolution Love Story**

**Kirsty de Wit**

Faculty Mentor(s):

Matthew Close

Fangs are modified teeth that evolved in at least three snake families to deliver venom during prey capture. The evolution of the oral mucosa likely coincided with fang evolution, but to date few studies of snake mouths have investigated variation in the snake oral mucosa. Although anatomical studies identified gustatory and tactile sense organs on oral papillae within the oral mucosa of various snake species and hypothesized the role these structures play in prey capture and ingestion, more recent inquiries into snake sensory systems have focused primarily on olfaction, vision, and thermoreception. To determine whether sensory papillae vary with the evolution of the venom delivery systems in snakes, we seek to answer the following: 1) Do the number and concentration of papillae vary across snake species specifically in regard to tooth evolution in snakes and similarly 2) Do the structure and composition of papillae vary across snake species? Our preliminary results indicate that there appears to be little variation in terms of the ultrastructure of these sensory papillae, there is variation in number and distribution of papillae across snake taxa. Specifically, snakes with proteroglyphous fangs were more similar to snakes that were aglyphous and ophisthogyphous, and contained lower densities of papillae per tooth. However, they had greater total numbers of papillae, than solenoglyphous snakes. This may suggest that the evolution of the venom delivery system in solenoglyphous snakes (vipers) may have also required a rearrangement of the sensory structures associated with the tooth for more precise fang placement.

**The Impacts of Exercise on IgA as a Marker of Stress**

**Shane Bryant**

**Camille Hamway**

**Arana McAllister**

Faculty Mentor(s):

**Katelyn Bowden**

**Lindsey Graham**

Sarah Redmond

Past studies have shown that exercise has an impact on an individual's psychological feelings of stress and physiological markers of stress. IgA, an immunoglobulin secreted by mucosal membranes, can be a marker of physiological stress on an individual. The goal of this study is to examine differences in IgA levels among Radford University students performing different types of exercise for varying lengths of time. Stress suppresses the immune response; hence, lower IgA levels are correlated to higher stress levels. Saliva acts as a reservoir of IgA; therefore, by taking saliva samples from students working out in the Student Recreation Facility on campus, we were able to test student's IgA levels to study stress. Participants completed a survey to self-report the type of exercise performed: cardio, weight training, both, or other types and the duration. Saliva will be tested with an ELISA kit to measure the amount of IgA in the sample. Results from the ELISA and survey will be compared to explore the effects of varying exercise on levels of stress. We predict that more consistent, longer periods of exercise at higher intensity will elicit a lower stress response in individuals marked by lower levels of IgA.

**Biology Poster Session II**  
**7:30-8:30 PM**      **CS Main Street Lobby**

**The Isolation of Calcium Oxalate Crystals from Plant Tissues**

**Matias Paulina**

Faculty Mentor(s):

Gary Côté

Crystals of calcium oxalate are found in many plants. The crystals are thought to protect from herbivores, although other roles have been proposed. Many different crystal forms have been reported from all vegetative tissues of the common houseplant *Dieffenbachia seguine*. The most common crystals found in *Dieffenbachia* are druses, which are conglomerations of radiating spikes and wedges. Raphides, long, thin, grooved crystals, are also common. We have developed a new procedure to isolate crystals from *Dieffenbachia* tissues. The tissue cell walls are enzymatically digested, and the resulting soup is filtered to remove undigested tissue. Crystals are isolated by centrifugation, washed repeatedly with water and then ethanol, and suspended in ethanol. The suspension is pipetted onto a stub and the ethanol is allowed to evaporate, leaving the crystals attached to the stub and ready for sputter coating and scanning electron microscopy. Using this procedure we isolated very long raphides, which were not previously isolated, perhaps because they are fragile. We also discovered a crystal in *Dieffenbachia* leaves previously only known from pollen, the prism, which, in leaves, is very small, around 1-5  $\mu\text{m}$ , and relatively rare. Using this method to isolate crystals from leaf edges and more central tissues, we confirmed earlier findings that druses are more concentrated along the edges. We are currently attempting to verify that all crystals are calcium oxalate.

**Thermoreception in colubrids: does it play a role in detecting suitable prey?**

**Carley Shears**

Faculty Mentor(s):

Matthew Close

Thermoreception is a sense that helps organisms detect changes in temperature and adjust physiologically and/or behaviorally. While general thermoreception is common among single- and multi-cellular organisms, some species have developed special organs that allow them to detect the size, distance and direction of a heat source, including prey. Thermoreception has been well-studied in species of snakes such as vipers and boas, but not so much in species of snakes that lack large, distinct pit organs. My research project focuses on colubrid snakes, a family of snakes in which pit organs are either drastically reduced or entirely absent, and seeks to determine if thermoreception plays a role in locating and capturing suitable prey. Specifically, I will measure the thermoreceptive behaviors of rat snakes (*Pateriophis* sp.) using a y-maze choice design. Snakes will be presented with hot, cold or no prey (control) and their behaviors will be recorded and analyzed. The broader goals of this study are to enhance our knowledge of both snake sensory systems and the evolution/diversity of sensory systems in vertebrate animals.

**Biology Poster Session II**  
**7:30-8:30 PM**      **CS Main Street Lobby**

**Use of DNA barcoding to study invertebrate diversity of the Selu Conservancy, Radford, Virginia**

**Hanna Reed**

**Blake Allred**

Faculty Mentor(s):

**Adam Allen**

**Mallie Giampodaro**

Bob Sheehy

The Selu Conservancy is a large piece of land that was obtained by Radford University in 1989 and is believed to contain numerous unique species within the relatively small area. In this field study, unknown invertebrate species were collected from the Selu Conservancy and compared to determine how similar the individuals were within a species to other species across the world by using DNA barcoding. When the specimens were collected, their geographic location and habitat data was recorded. DNA was extracted from each specimen and a short fragment of the mitochondrially encoded COI gene was amplified through Polymerase Chain Reaction (PCR). The fragment of the gene of interest's base sequence was determined and entered into the International Bar Code of Life Database to determine the narrowest possible taxonomic position. The specimen DNA sequences were compared to the database to investigate the identification of the organisms. Once the organisms were identified, comparisons were made between the DNA sequence variation of the collected specimens and other individuals of the same species across different geographical areas. The analysis also provided some indication of geographical barcode information for the organisms. Finally, a phylogenetic tree was constructed of the collected specimens and other closely related organisms to observe the evolution of the individuals as they dispersed to different regions of the globe. The data collected from this scientific research can be used to further develop future experiments in a continuing effort to identify invertebrates distinctive to the Selu Conservancy area.

**Biology Poster Session II**  
**7:30-8:30 PM**      **CS Main Street Lobby**

**Using Agent-based Modeling to Better Understand Predator-prey Interactions**

**Russell Dixon**

Faculty Mentor(s):

**Kim Reuwer**

Jeremy Wojdak

Predicting the effects of predator loss or introduction on an ecological system is challenging; one predator species can change the deadliness of another predator species through both direct and indirect mechanisms, and often in counterintuitive or nonlinear ways. Agent-based models (ABM) offer a tractable modeling approach to understanding complex interactions among multiple predators and shared prey. In agent-based models, individuals are represented explicitly in space, given simple behavioral rules, and allowed to interact. The results at a population level emerge from the actions of the individual agents. As compared with traditional equation-based modeling, ABMs offer greater extensibility and the ability to consider biological situations more mechanistically. We first replicated published equation-based simulations of multiple-predator effects on a common prey, validating our model structure. Then we extended our model to include prey size, prey growth, and size-dependent predation risk, and consider prey mortality when faced with predators having various attack rates, handling times, and prey size preferences. Ultimately, our model will be used to predict outcomes of lab experiments and explain field survey results from a real multiple predator shared prey system found in the riverine rock pool communities in the James River near Richmond, VA.

**Honey as a Potential Antimicrobial Agent**

**Tristan Smith**

Faculty Mentor(s):

Bob Sheehy

Honey has long been treated as an antimicrobial agent. Different types of honey have been purported to have different antimicrobial abilities. By using methods from three pollen extraction techniques, melissapalynology, microscopy, and acetolysis, we isolated pollen from local sample of honey to determine the preference of flower the bees like to use for nectar in honey. After the isolation of pollen was complete, microscopy was used to identify the species of flower it came from. By counting the same species of pollen over several slides, the ratio of pollen types to one another could then be determined, giving the make up of local honey in the Radford area. The second part of this experiment was to identify the cause behind honey's anti-microbial characteristics. One test was conducted with several types of growth plates where made with holes for different concentrations of sucrose and honey. Colonies of *E. coli* and *Salmonella* were grown on the plates to test effectiveness of the varied concentrations of sucrose and honey. Rings of growth or the lack of growth were measured to determine colony size and effectiveness of each concentration. If a correlation can be found between the make up of honey and the ability of honey to stop bacterial growth, medicinal scrubs and sprays could be made as a more natural substitute for anti-bacterial sprays in medical workplaces.

**Multidisciplinary Oral Session**

5:00-6:00 PM

CS M070

**Eulerian Numbers in Cryptography****Jenna Foster**

Faculty Mentor(s):

Tingyao Xiong

In 1555, Giovan Battista Bellaso introduced a recursive method to define a mapping  $f: \{k^n\} \rightarrow \{n!\}$ , where  $\{k^n\}$  is the set of all words of length  $k$  linearly ordered symbols, and  $\{n!\}$  is the set all permutations on the set  $[n]$ . In our research, we will use methods similar to Bellaso to encode random messages into binary strings and discovered that this process is promising to produce well balanced, pseudorandom binary sequences. Furthermore, ASCII codes have been widely used in communication systems. Nowadays, codes called “extended ASCII code” with broader ranges have been widely used in information transmission over network. In our research, we have shown that a more general encoding system can be established. And we have a solid evidence that our new encoding method would improve the security of information transmission with similar balance properties to (extended) ASCII characters.

**Predictive Models for Major League Baseball Free Agency****Grant Anders**

Faculty Mentor(s):

Daniel Farhat

Major League Baseball Free Agency involves the negotiation and signing of players whose contracts have expired from their current teams. There are no restrictions or salary caps on Major League Baseball free agent contracts and all the money is guaranteed. Being able to understand the factors that influence Major League Baseball free agency can help teams better understand the market and free agent signing patterns. To better understand the factors of Major League Baseball free agency, this project uses econometric predictive models to try and predict what teams the free agents sign with each year. The models are generated based on historic data and include descriptive statistics for both players and teams. These statistics provide valuation for each player as well as all 30 Major League Baseball Teams. The econometric predictive models are designed to recognize patterns between similar statistics between free agents and the teams they tend to sign with. The predictive models of this project were able to uncover what descriptive statistics had the most influence on the signing of Major League Baseball as well as the statistics that had less of an influence on the free agency market of Major League Baseball. While the predictive models of this project weren't always accurate when predicting free agent signings, they did help understand the influence of certain valuation statistics. This information will help Major League Baseball teams better understand what players they are more likely to sign and why.

**Multidisciplinary Oral Session**

5:00-6:00 PM

CS M070

**Relationship between Tree Diameter, Soil Type and Proximity to Water****Grayson Davie**

Faculty Mentor(s):

Richard Roth

Andrew Foy

Much of the original forest that once covered Appalachia has been lost; secondary- and tertiary-growth forests now dominate the region. Understanding patterns of tree growth is important for conservation and restoration efforts across Appalachia. Trees closer to water are more likely to be affected by flooding; they may also be larger from increased access to water. Soil type is also likely influenced by proximity to a water feature. This study aims to identify spatial patterns of tree growth measured by diameter at breast height (DBH) as a function of soil type and nearness to a surface water body. The study area is a 2-acre plot of forested land along Sinking Creek in Giles County, Virginia. All trees in the study area greater than 6 inches in diameter will be documented based on DBH, soil type, and location. Analysis of variation will show any significant difference between DBH, tree distance to water features, and soil type. The study is expected to show that there are relationships between DBH, proximity to a water feature, and soil type. The results of this research could aid in predicting patterns of tree growth in riparian forest reclamation areas.

**Chemistry Poster Session**

5:45-6:45 PM

CS Main Street Lobby

**Chemist Without Borders Collaboration****Leslie Molina-Arana**

Faculty Mentor(s):

Sarah Kennedy

Sierra Leone, a country in West Africa, faces tough challenges in their educational community. They are struggling to equip their classrooms, provide supplies, and they sometimes cannot afford textbooks. The students in these classes cannot complete experiments, instead they have to imagine what these experiments would be like. Both myself and my mentor, Dr. Kennedy are collaborating with Chemists without Borders to create “chem-lab-in-a-baggie kits, lab exercises and teacher training” that will be sent to the secondary schools in Sierra Leone. This will help provide the necessary tools to complete experiments. These kits are focused around green chemistry in the aspect that the kits are aimed to have the lowest amount of toxic and hazardous material as possible which will reduce the waste. The focus of the experiment we are conducting involves the implementation of kinetics. This experiment will use common household items, such as bleach and food dye, to teach these students how the rate of reaction is affected by concentration. They are watching how bleach removed the dye from the solution. This will teach the students that reactions can occur in things we use every day that we don't think about. They are also learning that diluting samples of bleach will increase the amount they have and a reaction will still occur. When the experiment is completed they will apply their textbook knowledge to create graphs and use equations with their data. These experiments will help students get the hands-on experience they need to get interested in chemistry.

**Chemistry Poster Session**

5:45-6:45 PM

CS Main Street Lobby

**Exploring Estrogenic Chemicals in Amazonian Waterways****Abigail Malmborg**

Faculty Mentor(s):

Christopher Monceaux

Though the Amazon rainforest is one of the most biodiverse regions on that planet, several species are being put at risk due to the introduction of endocrine disrupting chemicals (EDCs). EDCs are exogenous agents that have been known to impact species' physiology in various ways. Identifying chemicals that are present in rainforest watersheds is critical in understanding and assessing environmental health. This study focuses on estrogen mimics and disruptors that can be found as either natural or synthetic compounds and have the potential to alter endocrine function. Explored in this study are various locations within the Las Piedras watershed in the Peruvian Amazon to determine exposures and potencies of chemicals across disturbed gradients. Sampling ranged from main waterways with presumably high anthropogenic influence to pristine aquatic ecosystems within the jungle. Additionally, samples have been collected along the New River in efforts to offer a local comparison of aquatic health in our community. Samples were analyzed using Solid- phase extraction, HPLC, and mass spectroscopy in efforts to identify the type of disruption and sources of introduction.

**Exploring Natural Plant Sources for Potential Anti-Cancer Molecules****Dharmindra Dulal**

Faculty Mentor(s):

Christine Hermann Peter Christmas

The pharmaceutical industry spends millions to design new drugs to try treating health disorders such as cancer, but it has long been known that there is a vast resource of naturally produced chemicals in plants that remains untapped. Holy basil (*Ocimum tenifloru*) is a plant that is sacred for Hindus, which they have been using for thousands of years for different diseases, ranging from headache and bronchitis to hepatitis and ulcers. However, scientists and researchers has under-looked the importance of the holy basil; therefore, its anti-cancerous and antimicrobial effects remain highly unexplored. Thereby, in this project we isolating the active ingredients of holy basil using thin layer chromatography (TLC), gas chromatography/mass spectroscopy (GC/MS), and column chromatography. We are also using the cell culture, Kirby Bauer test, and polymerase chain reaction (PCR) to determine the effects of holy basil on the treated cancer cells and bacterial culture. Although, the initial results of GC/MS results show that there are some anti-microbial compounds, the PCR results has been hugely disappointing. However, this is a continuous research, where we have been trying to further analyze the anti-cancerous and anti-microbial properties in-depth.

**Chemistry Poster Session**  
**5:45-6:45 PM CS Main Street Lobby**

**Fractal Electrodeposition of Zinc and Copper****Rachel Jones**

Faculty Mentor(s):

George Harakas

This projects involves the study of fractal growth through the electrodeposition of metals such as zinc and copper. The electrochemical cell is constructed using low cost components to facilitate the adoption of this experiment by school's with a minimal budget for science related equipment. Computer software is used to analyze the fractal dimension of the samples as a function of voltage and solution concentration.

**HPLC Evaluation of Organic Pollutant Remediation Using Biorenewable Block Co-Polymers****Kris Moore**

Faculty Mentor(s):

**Amanda Flint**

Amy Baliya

Polymers prepared from renewable resources are promising materials for wastewater remediation. A series of triblock copolymers prepared from L-lactide and d-decalactone, two renewable co-monomers, were shown previously to remove organic pollutants from water. Specifically, these polymers removed polycyclic aromatic hydrocarbons (PAHs) and Rose Bengal from saturated aqueous solutions. UV/Vis and fluorescence spectroscopy methods were used to confirm complexation between the pollutants and the polymers. To define further the scope and limitations of the renewable block co-polymers, reverse-phase HPLC methods were developed and utilized to study polymer-assisted pollution remediation. Polymer samples were used to adsorb various environmental organic contaminants from water. The HPLC method has the advantage of improved specificity for the pollutant of interest. Pollution remediation study results and HPLC method attributes will be discussed.

**Method Development for Quantitating Stevia in Consumer Products by HPLC****Jazmin Valentine**

Faculty Mentor(s):

Cindy Burkhardt

Purified extracts of Stevia rebaudiana containing the glycosides stevioside and rebaudioside A are popular low-calorie sweeteners. High performance liquid chromatography (HPLC) is a technique used to separate species in a mixture. A method using HPLC was developed for the simultaneous identification and quantitation of the glycosides in consumer products. Experiments involving systematically changing the composition of the acetonitrile/water mobile phase were performed. The mobile phase composed of 70/30 acetonitrile/water was further used to explore the effect of flow rate on peak resolution. A set of conditions was developed that give chromatograms with high enough resolution to identify and quantitate each glycoside in consumer products.

**Chemistry Poster Session**  
**5:45-6:45 PM CS Main Street Lobby**

**Molecular Modeling of Human Beta-glucuronidase**

**Alexandra Hawks**

Faculty Mentor(s):

Kimberly Lane

$\beta$ -glucuronidase is a protein that breaks down glycosaminoglycans (GAGs) in the human body. GAGs help to form our connective tissues, and the human body is continually regenerating them. When they cannot be broken down properly, symptoms such as skeletal deformities and mental retardation occur. A deficiency in human  $\beta$ -glucuronidase results in Mucopolysaccharidosis Type VII, or Sly Syndrome, a disease associated with improper recycling of glycosaminoglycans. There are no FDA approved treatments available for this disease. There are many documented mutations associated with Sly Syndrome. We used ICM-Pro from Molsoft to model these mutations. The mutations that had the greatest negative effect on stability occurred either near the active site or the interface between two subunits. We are currently modeling the binding at the active sites, and how that affects the rest of the protein. We have also theorized that the two active sites closest to each other might work together in breaking down the glycosaminoglycans that are large enough to span the length of both of them.

**Mutational analysis of F365 interactions with key inhibitors in E. coli beta-glucuronidase**

**Michaela Atwell**

**Samathan Van Shufflin**

Faculty Mentor(s):

**Caitlin Churn**

Kimberly Lane

$\beta$ -glucuronidase is a protein made by a variety of organisms, including E. coli, a bacteria found in the intestinal tract of humans.  $\beta$ -glucuronidase catalyzes a hydrolysis reaction cleaves a glucuronide group from substrates. This enzyme has been shown to play a role in cancer and cancer treatment. CPT-11, a prodrug for SN38, is a key treatment for colon cancer by targeting the topoisomerase enzyme. In the liver, SN38 is inactivated by addition of a glucuronide group.  $\beta$ -glucuronidase in the large intestines reactivates the drug, which results in severe intestinal damage and diarrhea. Recently, a new generation of inhibitors targeting the bacterial form of  $\beta$ -glucuronidase has been discovered and shown to interact with specific residues away from the active site of the enzyme, specifically F365. Mutations are being made at the F365 position, in efforts to test the importance of these interactions. Mutations to alanine, leucine and tyrosine have been produced at the F365 position and are currently being tested for their activity and binding properties within the enzyme. The mutation to tryptophan is still in process.

**Chemistry Poster Session**  
**5:45-6:45 PM CS Main Street Lobby**

**Organic Nanosponges: Novel Block Co-Polymers Prepared from  $\alpha$ -Caprolactone and DL-Lactide Designed to Remove Organic Pollutants from Aqueous Environments**

**heidi chicas**

Faculty Mentor(s):

Amy Baliija

Water is a necessity for life. But due to improper waste disposal, the water we consume often is polluted with organic micropollutants. More effective materials to remove water contaminants are needed. Furthermore, these materials must not create a net increase in pollution throughout their lifecycle. One solution currently being investigated in the Baliija lab is a block co-polymer prepared from  $\hat{\mu}$ -caprolactone and DL-lactide, two biorenewable compounds. These block co-polymers contain a hydrophobic interior hypothesized to entrap organic pollutants and a hydrophilic periphery that is proposed to interact with an aqueous environment. This presentation will discuss the synthesis and characterization of new block co-polymers composed of  $\hat{\mu}$ -caprolactone and DL-lactide. The DL-lactide to  $\alpha$ -caprolactone ratio of the polymers were varied to examine if modifying the amount of the hydrophobic block influences how effective these polymers remove organic pollutants from water. Results of the encapsulation studies will be discussed as well as how changing the ratio of hydrophobic to hydrophilic blocks impact the chemical and physical properties of the resulting co-polymer.

**T. thermophilus Laccase and its Applications as a Green Alternative to Oxidation**

**Katelyn Johnston**

Faculty Mentor(s):

Sarah Kennedy

Laccase is an enzyme that can serve as a green alternative to oxidation reactions. It is a multicopper oxidase that catalyzes an oxidation reaction with its copper center. Due to it being a good component in oxidation reactions, as a biocatalyst, it has a wide range of applications and can be used in the manufacturing production of paper, pharmaceuticals, and food. Laccase can be found in a wide variety of different species of fungi, plants, bacteria, and animals. The majority of research has been done on fungal laccases. Recently, there has been an increase of interest in the bacterial laccases, but this topic has not been studied as often as the fungal laccase. This sparked interest in our research because bacterial expression is a cheaper alternative and more feasible in manufacturing compared to fungal laccase expression. We have designed an expression plasmid to make the bacterial *T. thermophilus* laccase protein. We chose this extremophile because of its thermostability, which would be important for oxidation reactions. The next step will be to purify the protein and to apply it to the assay in oxidizing a variety of materials and pollutants.

**Chemistry Poster Session**

5:45-6:45 PM

CS Main Street Lobby

**Temperature Dependent Self-Assembly of Dibromo-anthracene on Ag(111)****Tristan Blackwell**

Faculty Mentor(s):

**Cory Ashworth**

Shawn Huston

Scanning Tunneling Microscopy (STM) is an observational and analytical tool that is used to view the surface of conductive materials at the nanoscopic scale. STM in Ultra High Vacuum (UHV) allows for controlled surface preparation and helps ensure a clean environment for scanning. Furthermore, using cryogenic temperatures reduces their kinetic energy and thus “freeze” the molecules in place. We used the STM to examine the thin film formed when an organic molecule called 9,10-dibromoanthracene was deposited onto a flat silver surface, Ag(111). Our data seems to contradict published data from another study. In our data taken at liquid helium temperatures a hexagonal arrangement of the dibromoanthracene molecules is very clear; in some of the pictures you can even notice what seem to be bromine atoms extending out from the center carbon ring of each molecule. However, a publication from another research group shows dibromoanthracene forming lines or rows on the surface of Ag(111). This disagrees with our data which shows them forming hexagonal rings. Our hypothesis for the discrepancy is that the temperature of the silver crystal was higher during deposition for the linear structure. We are in the process of investigating this hypothesis.

**The Effect of Sly Syndrome on the Binding Sites of Beta-Glucuronidase****Samantha Powell**

Faculty Mentor(s):

Kimberly Lane

$\beta$ -glucuronidase is an enzyme that catalyze the breakdown of complex carbohydrates. Glycosaminoglycans (GAGS) are long chains of complex sugar molecules, generally found on the outer skin of the human body. GAGS are polysaccharides that are a big part of connective tissue, and because of this the human body continuously regenerates them. Unfortunately, when  $\beta$ -glucuronidase has a mutation to it, it cannot properly break down glycosaminoglycans, and there are several severe effects that occur. These effects include malformation and intellectual disabilities. The effects are caused by Sly Syndrome, otherwise known as Mucopolysaccharidosis Type VII. Currently, there is no treatment that has been approved for this disease, meaning Sly Syndrome is fatal. The purpose of this project is to research the correlation between binding sites in  $\beta$ -glucuronidase. The first semester of this research was spent growing cells, creating protein, and purifying the protein. Since  $\beta$ -glucuronidase is a protein made up of four identical binding sites, our current project is researching background information on how the mutations associated with Sly Syndrome affect the stability of  $\beta$ -glucuronidase and testing the cooperativity of binding.

**Chemistry Poster Session**

5:45-6:45 PM

CS Main Street Lobby

**Thermodynamic stability of the Isomers of the C<sub>32</sub> Fullerenes and Endohedrals****Sarah Church**

Faculty Mentor(s):

Timothy Fuhrer

Since the discovery of C<sub>60</sub> over thirty years ago, the aesthetic beauty and high symmetry of fullerene cages as well as their possible use in medicine and alternative energies have created a flurry of interest and research into fullerenes and endohedral metallofullerenes. Fullerenes smaller than C<sub>60</sub> have been particularly difficult to isolate, but the computed stability of certain isomers of C<sub>32</sub> gives hope that smaller fullerenes can be found. We present a temperature dependent, statistical mechanical study of the possible isomers of C<sub>32</sub>, K@C<sub>32</sub>, Ca@C<sub>32</sub> and Sc@C<sub>32</sub> showing which isomers of each are most stable at a range of temperatures between 298.15 K and 6000 K.

**Developing Saponification Lab for Chemists Without Borders****Philipina Oduro Sarpong****Ellen Agyemang**

Faculty Mentor(s):

**Matilda Amponsah**

Sarah Kennedy

Chemists Without Borders is a non-governmental organization whose mission is to with “solve humanitarian problems by mobilizing the resources and expertise of the global chemistry community and its networks.” This organization gives students the opportunity to be part of a research family; which has an impact in the life of students, teachers and citizens across the globe. Our main goal is to test out drafts of experiment kits to see if they work and send information to Chemists Without Borders for them to go ahead and dispatch the kits to African countries such as Sierra Leone and Ghana. Our first experiment is a saponification, also known as making soap. Before starting the experiment, we had to edit and revise the student and teacher instructions. Then, we had to make sure the appropriate apparatus and chemicals for the experiment were present. We are currently working to troubleshoot the apparatus that was not working well to improve the kit. The project enables students outside this continent to practice science and experiment on their own and gain more practices on the aspects of science being taught in their schools. With this organization chemistry has no borders; helping to make life easier for individuals outside the United States.

**Chemistry Poster Session**  
5:45-6:45 PM      CS Main Street Lobby

**In Vivo Inhibition of *S. cerevisiae*  $\alpha$ -glucosidase Validates Molecular Modeling and in Silico Inhibitor Docking Studies**

**Joshua Turner**

Faculty Mentor(s):

**River Fiedler**

Sarah Kennedy

Diabetes mellitus is a highly prevalent metabolic disorder resulting in various levels of insulin resistance. To reduce the strain of postprandial hyperglycemia, Inhibition of the enzyme  $\alpha$ -glucosidase can slow the breakdown of disaccharides in the digestive tract. Research has developed two competitive inhibitory drugs, Miglitol and Acarbose. The adverse side effects and effectiveness of these drugs leave a need for improvement. Natural substrates from plant extracts have shown to be more effective but their methods of inhibition remain unclear. We have conducted in silico docking studies on natural inhibitors whose IC<sub>50</sub> values rival current drugs. Focusing on a series of flavonoids we have located a possible allosteric pocket adjacent to the active site. We are currently completing in vitro inhibition assays on the flavonoids that computationally presented the highest binding affinity. Then, analyze the IC<sub>50</sub> values for correlations with the binding scores achieved in silico. A positive correlation will help verify the proposed binding site. From this, a putative binding site with flavonoid reactivity can be mapped.

**Geology Poster Session**  
**5:45-6:45 PM CS Main Street Lobby**

**3-D Modeling of Geological and Archaeological Samples for Online and Distance Learning**

**Michaela May**

Faculty Mentor(s):

Parvinder Sethi

Recent advances in 3-D imaging and modeling software have brought geoscience educators to a vantage point wherefrom they can now create compelling, interactive models of rocks, minerals and fossils. Today such advancements translate to easy and cost-effective production of remarkably life-like, 3-D samples that can be accessed anytime and anywhere by students with average internet download speeds. While several 3-D modeling software and hardware packages exist, we chose to work with Agisoft PhotoScan and Sketchfab to create and host 3-D models. These 3-D models consist of mineral, rock, fossil samples and archaeological artifacts. In this paper we shall present best-practices which can then be adopted and adapted by other educators to create with. We chose samples that were part of our introductory-level geology labs with the goal of allowing students to interact with samples online with a high level of realism and information via informative annotations. This paper will showcase which samples are best suited for rendering as 3-D models. We will present a basic and efficient workflow for producing these models that can be easily adopted by other users without feeling bogged-down and overwhelmed by the numerous, highly-specialized options embedded within the software. These models can then be interacted with online in a variety of ways, including zooming in and out, rotating the sample, reading text annotations, along with a zoom-enabled scale. In reality, students may not have enough time to familiarize themselves with hand samples and this 3-D online approach alleviates this problem. By giving students the ability to observe and interact with visual information, students can learn and engage from a distance. This can be vital in the development of beginner geology and archaeology courses as well as for online distance education.

**Identifying Sinkholes Using Infrared Aerial Imagery**

**James Young**

Faculty Mentor(s):

Chester Watts

As part of an undergraduate research project, the author utilized thermal and near infrared cameras, both handheld and Unmanned Aerial Vehicle (UAV)-mounted, and 3D photogrammetry, to investigate karst processes at the Selu Nature Conservancy, owned by Radford University. This research builds on previous studies undertaken 14 years ago. At that time, sinkholes were mapped using standard survey techniques and no actual openings into the ground were located. More recently, holes connecting to underground voids have opened in at least two sinkholes. With that in mind, the author used UAVs, carrying standard and infrared cameras, as well as handheld infrared cameras and a Garmin GPS system, to examine and map sinkholes in the study area. Those were then compared to existing maps. Previous research has shown that the aerial and handheld infrared cameras both reported average temperature differences between the openings and the surrounding ground for each location of about 12 degrees Celsius. This has been consistent among the openings that have been observed and investigated in the area. This research builds on previous research also conducted by the author and expands it to include the use of near infrared to determine if plant life suffers from the formation of sinkholes. The author will also perform UAV flights with thermal infrared to determine if the findings of the author's previous project are true during other times of the year.

**Geology Poster Session**  
5:45-6:45 PM      CS Main Street Lobby

**Late Ordovician Marine To Terrestrial Transition, Mountain Lake, VA**

**Alyson Meador**

Faculty Mentor(s):

Elizabeth McClellan

In Late Ordovician time (460-444 m.y. ago), global glaciation coincided with a major mass extinction event in which ~60% of marine life died out. The Reedsville Formation, a rock unit in the Valley & Ridge of VA, contains an abrupt change in fossil content and rock type from the lower to the uppermost strata, which has been interpreted to represent a transition from marine to terrestrial conditions, perhaps due to sea-level drop associated with the glaciation. A small quarry on the property of the Mountain Lake resort (Giles County, VA) exposes rocks of the Reedsville Fm. Over a short distance in the quarry, fossil-bearing limestone and shale grades upward into a sandstone-dominated sequence. Up-section in the quarry the abundance of non-calcareous sandstone beds increases, and evidence of soft-sediment deformation is observed, as well as a possible stream channel deposit. During field work, we took examples of the fossil bearing limestone at Station 1, on Doe Creek Rd. below Mountain Lake Lodge. At the quarry (Station 2), we examined similar fossil bearing layers as well as overlying sandstone and shale layers. Throughout the sequence we took rock examples from key layers. We flew the Mavic Pro UAV (drone) systematically across the outcrop to collect photo imagery of the quarry. My next objective for our research is to organize the photos and upload them on the computer, after which I will use Pix4D software to process the imagery and make a 3D model of the sedimentary strata. In addition, we will use rock saw equipment to prepare fresh surfaces on the rocks and describe the different rock types from lower and upper layers in the Reedsville Formation.

**Geology Poster Session**  
**5:45-6:45 PM CS Main Street Lobby**

**Differentiated the Undifferentiated: Mapping Complex Neoproterozoic Volcanic and Glaciogenic Stratigraphy in the Mount Rogers Area, SW VA**

**Adrienne Reeder**

**Sarah Morgan**

Faculty Mentor(s):

Elizabeth McClellan

Evidence of Cryogenian glaciation is found around the world. One such example occurred during initial rifting of Rodinia along the eastern margin of North America (present-day coordinates), which began with intracontinental rifting approximately 780-750 Ma. Evidence for this event is found in rift-related volcanic and sedimentary deposits of the Mount Rogers Formation (MRF) in SW Virginia and NW North Carolina, which is overlain by the Konnarock Formation (KF). The KF represents some of the best evidence of Neoproterozoic glaciation along this margin. The age of the KF is uncertain, only bracketed between the youngest dated rhyolite of the MRF (~750 Ma) and the overlying sandstone of the Unicoi Formation. If the age of the KF is more accurately bracketed, its relationship to the global "Snowball Earth" episodes may be determined. The purpose of our study is to better document the stratigraphic relationships and age constraints between the MRF and KF in SW VA. This region was mapped in detail by Rankin (1993), although in recent years others have revised some of his initial interpretations. On Rankin's map, the area of our research is shown simply as undifferentiated MRF. Our mapping of this area has revealed a transitional relationship between the MRF and the KF and interlayering of rhyolite and KF deposits (Mersch et al., 2014). This implies that volcanism was still occurring during glaciation. If so, the KF is conformable to the MRF, and therefore represents either a pre-"Snowball Earth" global event or a more local or regional glaciation.

**Geology Poster Session**  
**5:45-6:45 PM      CS Main Street Lobby**

**From Outcrop to Region: Revealing the Stratigraphic and Structural Framework of the Uppermost Mount Rogers Formation, SW VA, Through Detailed Outcrop Analysis**

**Sophia Rasiak**

Faculty Mentor(s):

**Adrienne Reeder**

Elizabeth McClellan

Detailed analysis of key outcrops in geological field areas can provide significant insight into the overall stratigraphy of a region. This is especially helpful in regions that lack continuous outcrop due to significant weathering and vegetative cover, as in the Blue Ridge of SW Virginia. In a study of the Mount Rogers Formation (MRF), outcrop RHR-905 is a heavily weathered, 200m long road cut on Rocky Hollow Rd., Grayson County, VA. Volcanic and sedimentary rocks of the MRF were emplaced during a rifting event, which began ~780 mya. During intracontinental rifting, a series of volcanic eruptions created pyroclastic deposits of welded and non-welded tuff, along with rhyolitic lavas and basalts. As rifting continued, coarse sediments were deposited within rift valleys to form arkose. As volcanic activity waned, these rocks were overlain by glacial deposits of the Konnarock Formation (KF). Although stratigraphic relationships are uncertain, we are analyzing contacts between the rock types in order to determine the sequence of events. The volcanic portion of the outcrop is dominated by non-welded tuff. However, welded tuff was exposed by a reverse fault. Following the welded tuff is an apparent reduction in welding intensity, resembling the upper phase of an ignimbrite sequence. The arkose overlies the tuff sequence, with a thin zone of clay-like material between. This may be evidence for high strain along the contact, so we are conducting petrographic analysis. If the arkose contains pieces of the tuff, then we know that it is younger. The dikes intruded later, but we cannot determine their relative ages as they do not intersect each other. However, dikes of similar orientation occur in the KF, so they must be younger than the glacial deposits.

**Geology Poster Session**  
**5:45-6:45 PM**      **CS Main Street Lobby**

**Scanning Electron Microscopy of Devonian Millboro Black Shale and Implications for Groundwater Pollution and Paleoenvironmental Reconstruction**

**Samantha Farmer**

Faculty Mentor(s): Parvinder Sethi

**Hunter Childers**

George Stephenson Gary Coté

Located within the Appalachian Basin, is the Devonian-aged Millboro black shale. Such shales have been extensively studied for their source-rock potential. In addition, such pyritiferous shales can pose risks via acid rock drainage (ARD). Research has shown that patterns of pyrite morphologies and concentrations can be used as proxies for bottom-water conditions during accumulation of such sediment. Here we present research of pyritization and paleoenvironment reconstruction of the Middle Devonian Millboro Shale exposed near Radford in Virginia. Five stratigraphic sections were extracted from outcrop using a portable, concrete-cutting saw. A total of 113 samples were collected and analyzed using a SEM. Specific goals of the SEM analysis included: evidence for tectonic overprinting, types of weathering and secondary mineralization and a survey of pyrite crystal morphologies, their abundance and ichnofabric indices. Results indicate that Millboro Shale is dominated by tectonically-induced fracturing with joint-sets facilitating seepage of water which in turn facilitated chemical weathering and dissolution of pyrite preferentially along crystal edges and corners. Slickensides and related stress features attest to post-depositional deformation of such shales concomitant with secondary mineralization of gypsum, calcite and quartz. Oxidation of iron is common as to be expected in an ARD scenario. SEM results show that most pyrite is octahedral and euhedral to subhedral. Such pyrite is concentrated along stratigraphically-continuous intervals on a mm-scale and laterally traceable over tens of meters. Pyrite is typically associated with infilled worm tubes and burrows, nodules, plant fragments and depauperate/stressed faunal elements. Size criteria suggest a benthic environment that was prone to fluctuations between lower dysoxic (weakly oxygenated bottom water) and anoxic (no oxygen in bottom water for extended periods of time) paleoenvironmental conditions.

**Geology Poster Session**  
**5:45-6:45 PM CS Main Street Lobby**

**Gigapan and Drone Tools: A Case Study of Rock Slope Stability Issues at Natural Bridge, Rockbridge County VA, USA.**

**Rebecca Norton**

Faculty Mentor(s): Parvinder Sethi Ryan Sincavage Skip Watts

In recent years, there have been several competing imaging technologies that have greatly expanded the palette of tools available to geoscientists to visually explore terrains. Each technique has its pros and cons, many of which are only realized after extensive field and lab testing. In this research we compare and contrast two of such methods, specifically the GigaPan and UAVs (drones), using the Natural Bridge Arch. We hope that results of our study will help community college students make informed choices regarding which imaging tool to use for their unique educational setting and geologic environment. Natural Bridge in, Rockbridge County, VA is part of a larger, ongoing investigation of rock stability a research project being conducted by Radford University with funding from VDOT. This is an important site because of a rock fall in 1997 that resulted in a fatality. Forensic investigations determined that remediation was necessary to maintain structural integrity and public safety. Engineering techniques including rock-bolting, rock-scaling and concrete containment structures were used all of which need to be monitored for natural weathering and deterioration. However, due to accessibility issues, remote-imaging methods had to be employed. Our comparison parameters include the cost of the software and hardware, accessibility for the average student, ease of use, physical danger and liability, reliability, image resolution and quality, efficiency of acquiring and operating the hardware, processing and sharing imagery, logistics, and suitability for imaging different geological terrains. As the result of these comparisons, we have determined that the GigaPan is the better option for students due to its ease of use. This technology can be easily utilized to collect field data and create lab exercises from local outcrops. We recommend GigaPan as a preferred vehicle for students to collect field data and analyze it as part of a virtual field experience.

**Geology Poster Session**  
**5:45-6:45 PM CS Main Street Lobby**

**Pyrite Mineralization in Devonian-Age Black Shale in Southwest Virginia: Implications for Acid Drainage and Paleoenvironmental Reconstruction**

**Zachary Yates**

Faculty Mentor(s):

**Hunter Childers**

Parvinder Sethi

George Stephenson

Research of pyritized black shales can be beneficial in enhancing our understanding of the ubiquitous environmental problem of Acid Rock Drainage (ARD) in SW-Virginia. The mineralogy of pyrite is such that it readily oxidizes on contact with moisture thereby causing acid runoff which can thereafter leach heavy metals from the host shales. Moreover, patterns of pyrite concentrations and morphologies can also be used as a proxy for deciphering paleoenvironmental conditions that accompanied accumulation of such clay- and organic-carbon rich sediment. In this study we present results of an ongoing investigation of ARD, pyritization and paleoenvironment reconstruction of the Middle Devonian Millboro Shale exposed near Radford in southwestern Virginia. We extracted a total of 368 cm of the Millboro Shale strata using a portable, gasoline-operated, concrete-cutting saw. Prior to the extraction of the stratigraphic column, a total of 30 pyritic nodules, pyritized worm burrows, and various other occurrences of pyrite were sampled and analyzed for their paleoenvironmental information. In lab, strata were analyzed for parameters including - patterns of lamination, ichnofabric indices (i.e. levels of bioturbation), point-counts of pyrite flecks and type of macro- and micro-sedimentary structures. Samples were also examined with a Scanning Electron Microscope (SEM) and a Z-stacking Dissecting Microscope (ZDM) for ascertaining primary and secondary crystal morphologies. Results highlight overall relationships between levels of bioturbation, erosional surfaces, pyrite distribution and events of benthic oxygenation possibly related to storm surge events in this setting of the Appalachian Basin.

**Student Choreography Showcase**  
**7:30-9:30 PM      Peters B112**

**Caroline Beard**

Faculty Mentor(s):

Deborah McLaughlin

This dance piece examines the relationship between humans and their environment. Specifically, it studies the crisis of increasing population and the resulting effects that have come with that through movement. In recent years, the population has been drawing dangerously close to the earth's carrying capacity, which is the number of people that our earth can successfully sustain without degradation to the environment. Like a large, twisted tree trunk, overpopulation has acted as the foundation that so many other environmental issues have branched from. Matters such as pollution, disease, and depleted resources have become a horrible reality for so many people; and it is only getting worse. I found inspiration for this piece when I took Geology 100: Earth Resources Natural Hazard and learned how humans are a chronic disease to the earth. Like parasites, people feed off of the planet without any compensation. In my choreographic work, small spaces, contact between the dancers, and the quality of the movement portray these environmental emergencies that so desperately need to be addressed. The dancers feel the crippling weight of each other as they attempt to cope with the environment that they themselves have created. The goal of this piece is to raise awareness to the situation humans have brought on ourselves in the hopes that we will create a place where life can be sustained for years to come.

**Zoe Couloumbis**

Faculty Mentor(s):

Deborah McLaughlin

My group piece focuses on the relationship human beings have with music and the relationships within a piece of music itself. The relationships between instruments are what create this beautiful sound that invokes our emotions while listening to it. Whether there be a positive or negative reaction to a piece of music, one still has a very natural and human response to sound, bringing back memories or creating new ones. My goal with this piece is to define each dancer individually as if they represent different instruments contributing to this body of work. I intend to edit the music with a second piece to switch the dynamics and show how the mood and emotion change as a result of that. I chose a piece of music that, personally, inspires me to move and thus motivates me to create movement and set it on others. Within rehearsal, my goal is to blend the dancers' emotions with the natural mood of the piece of music while at the same time help them express their individuality. As the choreographer, it is a matter of trial and error. What may look and feel natural to me may not apply to my dancers. I intend to study them and mold their individuality with my vision.

**Student Choreography Showcase**  
**7:30-9:30 PM          Peters B112**

**Brenna Featherston**

Faculty Mentor(s):

Deborah McLaughlin

The dynamics of family life are incredibly nuanced and strongly influenced by who is the “head” of the house. In most situations in our culture, we assume this leader of the family to be the man, or the father. This choreographic work explores the dynamics of the matriarchal influence within a family. Three women navigate the trials of family life, one woman as the central maternal figure, while the shadow of the absent patriarch lingers. The shadow figure both threatens and strengthens the bond of the women within the family as they struggle to thrive in a patriarchal society. The relationship between the three women, and their relationship with the shadow figure, call into question the traditional family model, and instead explore the dynamics with the mother being the head of the family.

**Brigitte Manga**

Faculty Mentor(s):

Deborah McLaughlin

The focus of this project is to choreograph a solo dance based off of multi-ethnic identity, and a group dance that displays the relationship between fish and their mannerisms. The solo dance exhibits two separate ethnicities from West African and Colombian cultures. The piece fuses both cultures through music and dance to present a celebration of heritage. The dancer will be wearing significant symbols and cultural clothes to express the pride in diversity. The second piece, a group dance, displays five dancers who will portray the quirkiness of fish through their interactions and movements. The dancers or the audience will be immersed in a sea of bubbles to create a sensation of being underwater. The dancers will be wearing light flowing garments, which will have water colored patterns with light pastel colors. The dance will be accompanied by underwater sounds and music scores that will help reveal images of glistening ocean water, and happy-go-lucky colorful fish. My intention for this piece is to bring a sense of joy to the audience through the lens of a mysterious but playful world.

**Student Choreography Showcase**  
**7:30-9:30 PM          Peters B112**

**Fiona Scruggs**

Faculty Mentor(s):

Deborah McLaughlin

This project of original solo choreography addresses personal experiences through the figurative lens of a music box. The movement is inspired by music box imagery, which evokes a world of naïve perfection, elegance, and innocence. However, reality and its experiences contradict the delicate twirling ease of a music box. Reality sometimes turns us on a spiraling path we never expected. Naivete becomes tinged with the dust of reality. It is then that we must stand up and decide to persevere, despite stepping outside the twirling, comfortable world of a music box. Another second creative work of original dance choreography seeks to explore the primordial question of “What guides us?” In this group piece, the four cardinal directions and the earth’s magnetic force are a metaphorical expression. Research and inspiration for movement and artistic expression primarily draws on cultural, religious, folktale interpretations of the directions’ significance, and the Plains Indians’ Medicine Wheel. The relationship of the cardinal directions to each other, as well as to humanity over time, are explored for a better understanding of how people have sought to explain the world and find direction. In a world where information is spread at incredible speeds, external factors often guide our decisions. This creates distances between humanity and societal advancement. We must listen to our internal compass for guidance. Audiences will connect their own experiences to those expressed in the choreography. This connection guides all involved to reflect upon the group piece’s main question.

**Nicole Teran**

Faculty Mentor(s):

Deborah McLaughlin

The group piece that I have choreographed features six dancers. The assignment bases this piece on the idea of a relationship and what that means to me. Instead of making this group piece about human relationships, I decided to make it about spiritual relationships. I assigned each dancer to represent a religion to have them show their differences in relation to God or a higher power. I want the audience to see what would happen if all of these different religions came together. My group piece exhibits a fight for humanity and how to coexist. My solo piece is about my dance experience and how that has changed me into the person/dancer I am today. This piece exhibits my strong hip-hop background and how my passion for dance has allowed me to discover various styles of dance. I have incorporated hip-hop, ballet, modern/contemporary, and jazz into one piece. My dance experience has always been very important to me. It has taught me so many things in life and expanded my outlook. I have become not only well rounded as a dancer but also more open-minded as a person. I intend to express my true passion for dance and my personal evolution through my choreographic work.

**Student Choreography Showcase**  
**7:30-9:30 PM      Peters B112**

**Victoria Unterberger**

Faculty Mentor(s):

Deborah McLaughlin

Relationships are a part of life everyone encounters. They range from the fond ones, to the difficult and worthy, or those that fall apart. We learn and define ourselves through interactions with others. Here are questions I am examining through dance, maybe finally putting them behind once and for all. How often do we as a society have to genuinely forgive? Not forgive someone for minor transgressions or insults, but for actions that negate personal moral codes. This is a type of forgiveness that takes effort, persistence, and is not easy for either end of the conflict to conquer or resolve. When faced with the choice of love and forgiveness, or walking away, the decision does not always seem as clear as it may sound. There will be signs that will lead you to learn things about yourself and where personal borders lie. Whether the “right” decision was made may never be concluded. I plan to explore and evaluate this internal struggle through a solo work, A New Love Language. Secondly, through group work, I ask what relationships last and which dwindle into memories we no longer want to open. How do they continue to impact our future relationships and selves? In collecting various experiences from my dancers, questions arose of sexuality, abuse, an absence of sexuality, and a discovery of oneself in relation to all around us. I am exploring how multiple mental and physical battles may make us seem so different, but really make us very alike.