VCU Poster Symposium
For Undergraduate Research and Creativity

Microfluidic Devices for the Study of Dietary Influences on Life History Traits in Caenorhabditis elegans

Michael Killege1, Stephen Banse2, Nadine Timmermyr2, Ben Blue1, and Patrick Phillips1
1 Virginia Commonwealth University, Richmond Virginia
2 University of Oregon, Eugene Oregon

Introduction
Caenorhabditis elegans

Life History Traits
Traits dedicated to survival and reproduction. Survival, health, fecundity, etc. Change in body over time may vary, some may not affect all traits through the

Diet
Influence on bacteria like

Life History Traits
Results from various life history traits including

Microfluidics

The Sorter
Allows easy sorting of worms

The Imager
- Allows for easy imaging of worms
- Labeled worms the one end
- Simplest way to use fluorescent

Future Directions

The Arena
- Allows for easy manipulation
- Labeled worms at each end
- Simplest way to use

Take Away

References

Part of VCU Research Weeks!

Wednesday April 19th, 2017
Student Commons 2nd Floor
11am—2pm  Keynote at 12pm

Questions?
Contact Herb Hill - hhill@vcu.edu - 804-828-4450
Virginia Commonwealth University
Undergraduate Research Opportunities Program
The following individuals and departments are acknowledged for their many contributions:

- John J. Ryan, Ph.D., Assoc. Vice President for Research Development, Office of Research
- Frank Macrina, Ph.D., Vice President for Research
- Herb Hill, UROP Director
- Tamara Highsmith, VCU Dining Services
- Sarah Golding, Ph.D, UR Coordinator, Biology
- Jacqueline Smith-Mason, Ph.D., Dean of Research, The Honors College
- Ms. Lisa Rufer, UROP Program Assistant
- VCU Student Research Organization
- The Honors College, Student Council
- Department of Psychology
- VCU School of Arts
- Undergraduate Research Opportunities Program (UROP)
- Gail Hackett, Ph.D, Provost
- Megan Hodge, VCU Libraries
- Karen Rader, Ph.D, Science, Technology and Society Program
- Faye Prichard, VCU Honors College
- VCU Research Week Task Force
- School of Social Work
- Mary Boyes, VCU Honors College
- Department of Chemistry
- Sarah Cunningham, Director of Research, Arts
- Rosalyn Hobson, Ph.D, School of Engineering

The posters presented were supported by the generosity of many VCU, governmental and private funders, including:

- AD Williams Trust Funds
- American Heart Association
- Amgen Summer Scholars Research Program
- British Academy
- Honors Summer Undergraduate Research Program
- Howard Hughes Summer Scholars Program
- Jeffress Memorial Trust
- Levehulme Trust
- National Institute on Drug Abuse
- National Institutes of Health
- National Science Foundation
- Ronald McDonald Charities
- VCUarts Grants for Undergraduate Students
- VCU Center on Health Disparities
- VCU Clinical Research Center
- VCU Department of Biology
- VCU Department of Psychology
- VCU General Clinical Research Center
- VCU School of Education Research Grants Program
- VCU School of Engineering
- VCU School of Social Work
- VCU Undergraduate Research Opportunities Program (UROP)
- VCU University College
- Virginia Institute for Psychiatric and Behavioral Genetics
- Virginia Premier Health Plan
- Virginia Tobacco Settlement Foundation
The Undergraduate Research Advisory Committee

Dr. John J. Ryan – Associate Vice President for Research, Committee Chair

Herb Hill – Director of Undergraduate Research Opportunities, Assistant Chair

Dr. Blythe Bowman - UROP Coordinator, Wilder School, Community Engagement and Disaster Risk Reduction Group

Dr. LaChelle Waller, Director of Advising and Undergraduate Research, Dept. of Chemistry

Dr. Ananda Newmark Director BSW Program, School of Social Work

Dr. Lisa Phipps, STEM-H Online Learning Specialist

Dr. Joseph Porter, Professor, Department of Psychology, Director of Biopsychology Program

Dr. Nancy Scott, Associate Dean, School of the Arts

Dr. Jackie Smith-Mason, Assistant Dean, Director Undergraduate Research, Honors College

Dr. Dewey Taylor, Associate Professor, Department of Mathematical Sciences

Dr. Manoj Thomas, Director of Technology, Information Systems, School of Business

Dr. Cathy Viverette, Advising and Undergraduate Research, Life Sciences

Jason Chow, Asst. Professor, VCU School of Education

Dr. Timmerie Cohen, Director of Clinical Education, Radiation Sciences, School of Allied Health

Dr. Sarah Golding, Director of Undergraduate Research, Department of Biology

Dr. Shilpa Iyer, Director, Dean’s Undergraduate Research Initiative, School of Engineering

Dr. Alison Montpetit, Asst. Professor, Department of Adult Health and Nursing Systems, School of Nursing
1. **Reperfusion Therapy With Rapamycin Prevents Myocardial Ischemic Injury, Through Activation of AKT and ERK**

*Sean Roh, Post Baccalaureate Certificate Program, with Dr. Anindita Das and Dr. Rakesh Kukreja, Division of Cardiology, Dept. of Internal Medicine*

Our previous study confirmed that by administering Rapamycin (a drug often used for organ transplant to reduce the rejection of the organs) before the onset of heart attack (Ischemia) preconditions the heart in which making it less prone to the heart attack damage on cardiomyocytes. (Heart tissues) In our current project, we further delve into the novel effect of Rapamycin on reducing the damage of cardiomyocytes during the onset of heart attack, more specifically during the reperfusion stage (opening of clogged coronary artery). We were able to find the effect of the drug: It increased the survival rate of the mice as well as reducing the infarct (damaged) regions. We concluded that the drug could be one of the novel treatment strategies to attenuate reperfusion injury in the heart.

2. **Piano Practice as a Technique for Remyelination: Multiple Sclerosis Therapy for Children (Ages 7-18)**

*Michelle Nguyen, Department of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College*

Pediatric multiple sclerosis (MS) only accounts for 3-5% of all MS cases, yet it affects children more intensely due to demyelination of underdeveloped white matter. Pediatric MS research into complementary and alternative medicine remains limited. Because of this, I examined the effect of practicing piano on the remyelination of axons in the corpus callosum because it is important to evaluate childhood white matter development in order to further understand whether playing the piano could potentially serve as therapy for pediatric MS patients (ages 7-18). In addition to this, I reviewed the necessary protocol that must be pursued in order to assess piano practice as pediatric multiple sclerosis therapy. I explored scholarly articles regarding: the corpus callosum in pediatric MS patients in comparison to healthy patients, brain plasticity in childhood, music practice as emotional and physical therapy, and synthesized the procedures of related studies to propose a study that will measure the effect of piano practice on the corpus callosum of pediatric MS patients. Through this investigation, I have found that piano practice could be a more effective therapy for pediatric multiple sclerosis (MS) because it counteracts the effects of MS demyelination by increasing myelination in children’s white matter bodies. Practicing the piano increases white matter volume in the corpus callosum (CC), which connects both hemispheres of the brain. Increasing myelination of the CC will lead to improved function in both hemispheres of the brain, which addresses the cause of many MS symptoms. A long-term study of the effect of consistent piano practice on the mental, physical, and cognitive health of pediatric MS patients would more definitively evaluate the efficacy of piano practice therapy.
3. Assessing Dendritic Identity and Protein Trafficking in Regenerated Dendrites in Adult Drosophila

Sarah S. Izabel; Laura Devault; Lily Jan, PhD; Yuh Nung Jan, PhD. Physiology Department, UCSF, Howard Hughes Medical Institute

Neurons exchange information through synaptic signals or sensory inputs received by the dendrites, which may generate action potentials that can propagate along the axon. This exchange can be interrupted when axons or dendrites are damaged. Axonal regeneration has been widely studied, but dendritic regeneration has not received the same attention. For that reason we have focused this study on assessing injury recovery in Drosophila dendrites. The model we used has several desirable features: neurons that are easily imaged, a tractable genetic system, and the potential to build a framework for future studies. Previous research has assessed dendritic growth in response to acute injury using Drosophila larvae. We aim to evaluate such growth in adult animals. Drosophila larvae are still developing. We aim to understand how stable adult dendritic arbors respond to injury. When injuring the animals, we utilize lasers from a two-photon microscope to sever all dendrites at the first branch point by laser ablation, leaving a bald neuron. In assessing injury response, we image animals and perform immunohistochemistry staining. This staining assesses the injured neuron’s maintenance of neuronal identity, ability to correctly traffic somatodendritic proteins and integrity of cytoskeletal structure. We stained these neurons using the antibody against PPK-26, a neuronal type specific marker, to assess the identity of injured neurons. We also stain for PPK-26 in a non-permealized condition to attest that these proteins are located at the surface of the neuron, as in uninjured neurons. Finally, we test for stabilized microtubules, by staining for Futsch, the Drosophila MAP1B homolog. Preliminary results indicate the presence of PPK-26 in regenerated neurons suggesting that the dendrites present morphological similarities to those of fully functioning healthy neurons. We have also located presence of Futsch marker in regrown dendrites. Although certainty is only reached after quantitative analyses, we hope to find that these dendrites also contain microtubules in its regenerated expansions. Ultimately, we aspire to expand our knowledge of the cytoskeletal structure of regenerated dendrites and compare with findings of the larvae model, which have established that regrown dendrites maintain some but not all of the characteristics of uninjured dendrites.

The NIH (Initiative for Maximizing Student Development program), the Howard Hughes Medical Institute (Exrop Research Training Program) supported this work.

4. The Tuskegee Syphilis Experiment

Colleen Arthur, Dept. of Political Science and Homeland Security & Emergency Preparedness, with Dr. Herbert Hirsch, Dept. of Political Science

The aim of this paper is to look into the human rights violations committed by the United States against the black men during the Tuskegee Syphilis Experiment as well as touch on the broader concept of racial medicine. In addition, my goal is to dismantle the pretense society may hold about the United States and the moral high ground it claims to stand on. In order to accomplish this goal, I will make parallels about
atrocities committed by the United States on the African-American population to those committed by the Nazis on the Jewish population in Germany. I will first briefly define the disease in order to provide an understanding of its severity. Then I will discuss the Tuskegee Syphilis Experiment (TSE) in its entirety. Next, I will discuss and analyze the specific human rights violated. I will then go through and break down aspects of the TSE and provide direct examples of crimes committed by the Nazis to dismantle the mask the United States wears. I will also attempt to investigate the physicians in order to get a thorough understanding of racial medicine and its application specifically in the Tuskegee Syphilis Experiment as well as in general. In conclusion, I will synthesis the inability of the government to protect its people to the implications it presents today.

5. **Of Shining Sea and Rising Sun: cultural storytelling in the genre of horror in video games**

   Anna Webster, UROP Summer Research Fellow, Dept. of English, with Brian McTague, Director of the VCU Writing Center

   In the modern era, video games are hardly the simple, mindless medium that they used to be. Rather, they are now being used as a vehicle for artistic expression and storytelling worldwide, creating a colorful and comprehensive new approach to the storytelling experience that was previously reserved for books or movies. The immersive nature of the medium provides for a richer and more stimulating experience, from which the genre of horror greatly benefits. Rather than the more passive experience the viewer gets from watching a movie or reading a book, video games allow for the player to be completely immersed, experiencing the story rather than just witnessing it. This general aspect combined with the opportunity for unique artistic expression and storytelling, provides for a better overall horror experience. Within the horror genre, there are two schools of storytelling: the Eastern Style (primarily from Japan and countries in the Far East), and the Western Style (particularly the United States). These styles are both unique with their approaches to the genre, begging the question: what do different cultures find scary? Through careful analysis of the Eastern and Western styles, we can understand the characteristics and unique components, identifying the reasoning behind them. An examination of broader social implications in the areas of religion, history, and psychology, will expand the scope of the digital media studies, providing a greater understanding of the continued evolution of human storytelling. The evolution and future possibilities of storytelling are explored in this study by examining the techniques and implications specific to these two identified schools within the horror genre of video games.

6. **The Influence of Parenting Styles on Alcohol and Nicotine Drug Use among University Students**

   Zackaria Niazi, Dept. of Biology, with Dr. Amy Adkins, Dept. of Psychology, COBE and Dr. Danielle Dick, Depts. of Psychology and Human and Molecular Genetics, and Ms. Megan Cooke, Doctoral Candidate, Virginia Institute of Psychiatric and Behavioral Genetics

   Parenting styles are important in the behavioral development of adolescents. The environment created by the parent, in regards to communication with their child and the level of independence given to their child, may influence the child’s susceptibility to risk behaviors. This study examines the relationship between parenting style and substance use among university students. We hypothesized that university students exposed to lower levels of autonomy granting (AG) or parental involvement (PI) parenting styles would have an increased likelihood of alcohol and nicotine use. We also hypothesized that religiosity, parental education level, ethnicity, and gender would act as moderators of parenting styles and alcohol and nicotine use. Data from Fall 2011-2014 surveys (N = 7368, 61.6% female) of a diverse university-wide sample were used. Results demonstrated that AG had no significant association with alcohol use, however there was a significant negative association with nicotine use (B = -0.037, p = 0.001). All moderators were found to be significant predictors of alcohol use, however only father education level and Hispanic/Latino ethnicity moderated the relationship between PI and alcohol use. Religiosity, ethnicity, gender, and mother’s education were found to
be significant predictors of nicotine use. Only gender moderated the association between PI and nicotine use. Even though nicotine use and AG were associated, our results indicate that once students enter college, previous parenting style does not have a strong effect on alcohol and nicotine use behaviors in our sample.

7. **Causes of Mortality Rates of African American Infants Between 1960 and 1980**

_Hadeel Tewfig, Dept. of Sociology and Aysha Adrees, Pre-Nursing with Dr. Susan Bodner-Deren, Dept. of Sociology_

Background: The East End Cemetery is a historically black cemetery that was established in Richmond in 1897. The upkeep of the cemetery has been neglected and vandalized over time which resulted in many tombstones either broken, displaced or covered in vines and overgrowth. There are current efforts to restore the cemetery to its original state and update records.

Objectives: The study was done to trace the rate of infant mortality during the 1960s to the 1980s and whether the deaths were due to preventable causes.

Methods: 35 subjects that fit within the time period were collected and those that were up until the age of 2 accepted. The names and age were then verified on an online data base off. The cause of death recorded from the death records were then sorted out under preventable or unpreventable causes. To determine whether the cause of death was preventable, further research was done into the technologies and medicines that were used of death was preventable, further research was done into the technologies and medicines that were available at that time.

Results: It was found that during the chosen time period, discrimination played a role in the high rates infant mortality in the African American community. During the 1960s-1980s, a great number of the deaths, 69% of the collected data, were caused by preventable causes. The remaining 31% was due to unpreventable causes or Sudden Infant Death Syndrome (SIDS).

8. **Early Computing Education Competition**

_Anthony Kormos, UROP Summer Research Fellow, and Mary Bull, with Dr. Elena Olson, Department of Information Systems, School of Business, Virginia Commonwealth University._

Abstract: Industry needs more graduates proficient in STEM. Early introduction to STEM concepts leads to more STEM professionals (Pike, Smart, Ethington 2012). There are currently programs throughout the country that help high-school students become proficient in many STEM disciplines, but few that allow students to focus on e-Business technology. Our research project concentrates on designing and developing a program that would create a vocational semester-long club/course teaching e-Business technology at a high school level. We modelled our research on similar projects that were successfully implemented in different STEM areas such as robotics programs. The students will be working in small teams under supervision of a Virginia Commonwealth University faculty/student mentor and a high school-based mentor on a complete SDLC of a team website. After creating and testing the website, the teams of different schools will compete against each other on the functionality, creativity, and design of their website. (Soldner, 2012). This project will allow high-school students to gain experience in research, through the exercises conducted in the club, and to develop valuable networking and project management skills, by introducing them to businesses and deadlines. The project will refine the high-school students’ knowledge in web design and development, improving achievement in introductory computer science, and increasing the number of students meaningfully involved in STEM. (Soldner, 2012).

References:
9. **Surface layer climatological analysis of meteorologic data at The VCU Rice Rivers Center**

*Joseph Robinson, Dept. of Biology, with Dr. Vickie Connors, Center for Environmental Studies*

Air temperature, precipitation and wind direction are important atmospheric variables for climatology, which specifies the climatic norms of a certain region. Climatologies can be useful references for environmental and life science researchers to better understand the environmental conditions of their research. For this investigation, data were acquired by the VCU Rice Rivers Center (RRC) bluff meteorological tower, whose data ranged from 15 June 2008 to 21 July 2016 and had a temporal resolution of ten minutes. Time series plots of daily average temperature were created for each year. Temperature data were validated by comparison to similarly resolved weather data from a National Oceanic and Atmospheric Administration (NOAA) sponsored station in Hopewell, VA for the same time period. A two-sample t-test between the two data sets demonstrated that the RRC data were of high quality. Cumulative precipitation plots were produced for 2014, 2015 and 2016. Comparison of these plots to both Hopewell and the Richmond International Airport (RIC) showed high amounts of rainfall at the RRC, which can be explained in part by El Niño Southern Oscillation (ENSO) teleconnections. Wind direction was also investigated to determine whether or not channeling occurred that carried air pollution from Hopewell to the RRC. The data analyzed, however, did not support this effect. The climatology produced by this investigation provides valuable insight to the environment of the RRC and its surroundings, and is a useful tool for researchers seeking environmental information for their work.

10. **Measuring Binding between PilA and PilN from P. aeruginosa**

*Samuel Paek, Dept. of Biology, with Dr. Michael Donnenburg, MD., Department of Internal Medicine, Division of Infectious Disease*

The primary focus of this project involves proteins of the Type IV pilus machine in *Pseudomonas aeruginosa*. This pathogen causes mild to severe life threatening conditions including pneumonia, bacteremia, and death (10 February 2017; www.cdc.gov/hai/organisms/pseudomonas.html). Type IV Pili (T4Ps) are long appendages of bacterial pathogens that are involved in many functions. The biosynthesis of T4Ps in *P. aeruginosa* requires many different molecules working together to create its structure (Laverty et al. 2014). The pilus itself is made primarily of PilA proteins, but also includes different minor pilin proteins (Laverty et al. 2014). Starting from the cytoplasm of the bacteria, T4P spans into the inner and outer membrane, each with a ring linked to the one above it. Each ring is comprised of different protein molecules that exhibit different functions, depending on the location (Chang et al. 2016). Within each layer of membrane space there are many functional proteins that make up its core. These proteins together form the T4P machine, which operate and control the pilus of the respective pathogen. The pili are essential to the bacteria’s many different virulence functions such as surface motility, biofilm formation, colonization, and pilus extension or retraction (Chang et al. 2016). The overall goal of the laboratory is to develop a complete understanding of the function of the T4P machine, as this knowledge could lead to new approaches to preventing or treating infections caused by bacteria that produce them. This project seeks to play a role in outlining the relationship between two specific proteins within the large molecular machine that controls the pilus retraction/extraction, and become part of the developmental framework that adds to the overall goal. Understanding the molecular
machinery of type IV pili will play a crucial role in combating \textit{P. aeruginosa}, because of the pili’s role in attaching to host cells (Persat et al. 2015). Our research seeks to integrate this information in order to combat the epidemic taking place with many pathogens that have developed a strong resistance to different types of antibiotic treatments (Leighton et al. 2015). By gaining clear insight into the functions and intricate machinery of its pilus mechanisms, we can seek to counteract the pathogen’s ability to bind to host cells, and render it harmless (Leighton et al. 2015).

11. \textbf{Role of \textit{Spag17} gene in spermatogenesis}

\textit{Elizabeth Kazarian\textsuperscript{1}, Maria E Teves\textsuperscript{2}. \textsuperscript{1} College of Humanities \& Sciences. Virginia Commonwealth University. \textsuperscript{2} Department of Obstetrics and Gynecology. School of Medicine. Virginia Commonwealth University.}

Spermatogenesis is a process in which sperm are developed from male primordial germ cells into species-specific spermatozoa. The \textit{Spag17} gene is a complex gene composed of 49 exons that plays a role in sperm flagellum motility. \textit{Spag17} encodes for several protein isoforms that are associated with microtubules and have tissue and cell specific expression patterns. The 250 kDa full length SPAG17 isoform protein is found in testes and tissues with motile cilia. Varying protein band expression was found by performing Western blot on samples collected from wild-type mouse testes and mix germ cells. Western blot using Anti-SPAG17 C-terminus antibody showed the 250 kDa full length protein as well as the known 97 kDa SPAG17 isoform. There was also a consistent band across three Western blot results, which was indicated between 75 and 50 kDa, potentially pointing to a new isoform of the SPAG17 protein. RT-PCR experiments were performed to evaluate the expression of different transcripts from wild-type mouse testes and mix germ cells. Nucleotide sequence was analyzed by using the ncbi NIH BLAST tool, which detected sequences with varying transcripts when contrasted to original sequence. In addition to the known transcripts, there were several new transcripts derived from alternative splicing that were found in testes and germ cell samples. These transcripts were T400, which included exon 1 to exon 3 skipping to exon 18 to exon 19, and transcript T500, which included exon 1 to exon 2 skipping to exon 17 to exon 19. There was also one more transcript T800, which included exon 1 to exon 3 skipping to exon 19 to exon 22. Localization of SPAG17 protein was evaluated by immunofluorescence in sperm and mix germ cells with samples double stained for acrosome and microtubule markers. Immunofluorescence images showed colocalization of SPAG17 with Golgi body and tubulin at varying stages of spermiogenesis. This result correlates SPAG17 with the development of the Golgi body, an organelle essential to acrosome progression in spermatogenesis, as well as tubulin, central in the organization of the acrosome and flagellum. The future vision for this research project is to continue the characterization of the SPAG17 protein isoforms throughout the stages of spermatogenesis.

12. \textbf{Destructive Stationary Phase Gradient for HPLC}

\textit{Caitlin Cain, Dept. of Chemistry, with Dr. Maryanne Collinson and Dr. Sarah Rutan, Dept. of Chemistry}

High-performance liquid chromatography (HPLC) is a robust and universal analytical method for the separation of compounds, making it a widely used technique in fields from pharmaceuticals to environmental science. With the growing complexity of samples, improved resolution is needed for the better differentiation between eluted peaks; therefore, the selectivity of the separation must be improved. Improving selectivity can give rise to inefficient separations, so these two concepts must be balanced. For the past couple decades, chromatographers have focused on refining the efficiency of the stationary phase. We believe that enhancing the selectivity of the stationary phase is now necessary and can be done with the creation of a continuous gradient along the length of the column. Current work has shown that continuous gradients on in-house monolithic columns have led to efficient, optimized separations with novel selectivities. However, there has yet to be a continuous gradient created on a packed column. This work focuses on the development of a destructive gradient stationary phase, where the functional groups on a commercially packed column are cleaved to form a gradient. The aim of creating a continuous stationary phase gradient in this fashion is for all chromatographers to be able to develop novel selectivities on old packed columns. Preliminary experiments show that these functional groups can be cleaved with the use of sulfuric acid in a gradient fashion, changing the selectivity of the stationary phase.
13. **Perceptions of and Attitudes towards Social Supports of Individuals that are incarcerated at a Local County Jail**

Jillian Olson and Michael DiGiacomo with Dr. Allison Ryals, VCU School of Social Work

Humans need social support. This is especially true during periods of stress and emotionally overwhelming experiences. The purpose of this research project is to describe the existence of, perceptions of, and attitudes towards social supports of individuals that are incarcerated and participating in substance abuse programs at a local county jail. This information was obtained through administering surveys to the aforementioned program participants using unique researcher-crafted questions along with a frequently used existing tool, the Multidimensional Scale of Perceived Social Support (MSPSS). Results of this study can be useful for corrections employees, social workers, and individuals that are incarcerated, as insight into how individuals that are incarcerated perceive their social supports will be useful for further supporting them as they attempt to reintegrate into society.

*Keywords:* incarceration, social supports, survey, jail, perception, programs

14. **Figure This: The Figurines of Ancient Mesoamerica**

Anna Wagstaff, Dept. of Communication Arts, with Dr. Bernard Means, Dept. of Anthropology

Figurines are an essential part of the the archeological record of ancient Mesoamerican civilizations. They hold the answers not only to chronological, but also to cultural, social, and religious mysterious about their prehistory. By studying their design and production archeologist can be used to build a blueprint of the way of life for these ancient societies. They depict ritual icons, and leaders, and the form and function of these figurines can show us how they featured in the religion, rituals, and daily lives of the ancient peoples of the Olmec, Aztecs, and Mayans.

15. **Pediatric Plaque Psoriasis: Targeting IL-17A and IL-17F Pathways, Keratinocytes, and TH17 Cells with Combination Therapy of Etanercept and Intermittent Narrowband Ultraviolet-B Phototherapy**

Amulya Kotha, Dept. of Bioinformatics, with Prof. Mary Boyes, VCU Honors College

The development of psoriatic plaques and lesions is attributed to the inflammation of Interleukin-17A and Interleukin-17F pathways along with the overproduction and proliferation of keratinocytes and Th17 cells. Currently, treatment for pediatric plaque psoriasis is mainly topical with results that provide temporary relief but fail to tackle the disease at its roots and cure it. Combination therapy of etanercept and narrowband ultraviolet B phototherapy is a new development in psoriatic treatment and has been proven to be efficient with minor side effects in treating adult plaque psoriasis. Etanercept functions to block the inflammatory pathways and halt the production of keratinocytes and Th17 cells while phototherapy diminishes pre-existing plaques. The efficacy of combination therapy is yet to be evaluated in treating pediatric plaque psoriasis. This paper discusses the avenues of etanercept monotherapy, phototherapy monotherapy, and combination therapy along with the pathogenesis of psoriasis through the evaluation of various studies conducted in the field of psoriatic medicine. It is geared towards the development of a long term, substantial cure for pediatric psoriasis through the proposal of a future study of combination therapy confronting its roots while simultaneously diminishing pre-existing plaques and lesions. Future studies should evaluate the efficacy of combination therapy of phototherapy using UVB-LEDs and pre-irradiation of mineral oil along with intermittent etanercept therapy in treating pediatric plaque psoriasis.
16. **Impact of Facility Age on the Presence of Legionella spp.**

*Wisam Elia, Dept. of Biology, with Dr. Amy White*

Legionella pneumophila bacteria may cause the rare but serious Legionnaires’ disease. An estimated 8,000 to 18,000 people contract Legionnaires’ disease each year and need care in the hospital.1 Legionella is commonly found in the environment in warm water sources, and studies have recently suggested that Legionella can spread through aerosolized forms, a possible new source of transmission.2 More information on the growing environments of Legionella is required; therefore, our research tested for the presence of Legionella in water sources at Virginia Western Community College, in hopes of better understanding the bacteria’s preferential environments. We hypothesize that Legionella will be most present in older buildings due to possible biofilm buildup in pipes.

17. **The 3-Dimensional Heisenberg Lie Algebra**

*Sarah Williams, VCU Honors College, Mathematical Sciences, with Dr. Marco Aldi, Dept. of Mathematics*

Generalized geometry is used in physics to study supersymmetry in the context of string theory. This research involves integrating mathematics and physics in this way by focusing on generalized Cauchy-Riemann F-structures (CRF-structures) on low-dimensional nilpotent Lie algebras, specifically the three-dimensional Heisenberg Lie algebra. The goal of this project is to analytically describe the geometry behind extra dimensions (in addition to space and time), especially those that are simple enough to be described mathematically, but complex enough to not be trivial. This research is of interest to both physicists and mathematicians, as it would account for the observed behavior of subatomic particles and contribute to the study of string theory.

18. **Design and analysis of a Microbiome Mock Community: Understanding and Mitigating Methodological Biases**

*Mosby, S.1, Kiflezghi, M.1, Rivas-Cruz, V.2, Edwards, D.1,3, Brooks, P. J.1,3, and Rivera, M.C.1,2*

1: Center of Biological Complexity, IMSD Research Scholars, Virginia Commonwealth University

2: Department of Biology, Virginia Commonwealth University

3: Department of Statistical Sciences & Operations Research, Virginia Commonwealth University

The gut microbiome has been shown to influence immunity, to play a role in obesity, colorectal cancer and diabetes among others. Although much research has been done, there is still a lack of understanding of what factors in the gut microbiome are influencing the health and/or disease state of the host. Among the challenges facing microbiome research are the difficulties in accurately identifying and quantitating the components of a microbiome. A typical protocol for analyzing and comparing microorganisms is to conduct a taxonomic and phylogenetic survey or census of the members of the microbiome community. The microbiome survey is typically performed by high-throughput sequencing of PCR amplification of the 16S rRNA gene from the community metagenome, followed by applying bioinformatics methodology to assign a taxonomic identification to each one of the sequenced fragments. These processing steps can introduce bias that can distort the true or original composition of the microbiome. The ultimate goal of the experiments presented here is to understand the type and magnitude of the bias introduced by the typical protocols used for microbiome characterization. In order to uncover potential biases affecting microbiome studies we are designing and analyzing a mock community or a synthetic microbiome. The mock community is designed by combining in vitro known proportions of a set of well-characterized bacterial species. Processing the mock community with the same protocols used by microbiome experiments will allow us to generate a quality control for these types of experiments. We designed a low complexity mock community composed of 10
species of bacteria isolated from different hosts. These 10 bacterial species will be mixed at different ratios and the different mixes will be subjected to a full microbiome analysis. This analysis includes DNA extraction, PCR amplification, NGS sequencing and bioinformatics analysis. The goal of the experimental design is to determine our ability to recover the original input ratios. The ratios obtained by our experimental protocols will ultimately be used to develop mathematical models to predict the “true” composition of the microbiomes.

In the initial phase of the project we grew each organism individually as a pure culture followed by PCR amplification and sequencing to assess the purity of the cultures. We analyzed the sequences by comparing them to the NCBI nucleotide database using BLASTN. The BLASTN results indicated we had to distinct cultures sharing only 95% sequenced identity; the sequence of one of the cultures showed a 99% sequence identity to *Escherichia coli* and the other showed 99% sequence identity to *Shimwellia blattae*. The same methodology will be used to analyze another 8 pure cultures.

19. **The Role of CaMK-II in the Development of Leukemia/Lymphoma in Zebrafish**

Daniel Mohammadi, UROP Summer Research Fellow, VCU Honors College, Dept. of Forensic Science, with Dr. Sara Rothschild, Dept. of Biology

Acute lymphocytic leukemia (ALL) is a blood disorder characterized by aberrant proliferation of immature lymphocytes. ALL is the most common cancer in children and can result from external influences, such as radiation, or internal influences, such as genetic mutation. Additionally, Ca\(^{2+}\)/calmodulin-dependent kinase II (CaMK-II) is a serine/threonine protein kinase whose increased expression has been found in various leukemias. Zebrafish and human immune cells are analogous and both species have conserved hematopoietic stem cell specification mechanisms. In this study, the constitutively active form of CaMK-II, resulting from a threonine to aspartic acid point mutation at the 287 base-pair location (T\(^{287}\)D), was paired with the EGFP transgene using Tol2 Gateway technology and injected into zebrafish at the one-cell stage. The zebrafish expressing the transgene were outcrossed to wild type and mutant p53 zebrafish and then monitored for leukemic development using flow cytometry and pathology. Based on FACS results, the mutant p53 bearing the T\(^{287}\)D mutation were found to have increased levels of lymphocytes compared to the mutant p53 zebrafish without the T\(^{287}\)D mutation. Furthermore, hematologists confirmed the development of B-cell leukemia/lymphoma from histological slides prepared from the mutant p53 with the T\(^{287}\)D mutation. The mutant p53 without the T\(^{287}\)D mutation did not yield such results. These findings highlight a potential role of CaMK-II in the abnormal development of lymphocytes and provide a useful model, from which, drug studies can be performed for potential treatment options.

20. **Archaeological Analysis of Worked Bone Artifacts (working title).**

Madelyn Knighting, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

The act of carving animal bone into tools or ornamental figures has been practiced by numerous societies across the globe for millennia. The earliest presence of worked bone is associated with the excavated remains of Homo sapiens found in Africa which date back to about 1.5 million years ago. The presence of worked bone has been documented in hunter-gatherer societies, a multitude of indigenous sites, and various religious contexts around the world. It is important to be able to determine from which animal the worked bone came due to its ability to give social and environmental context to the site in which it is found. This research poster will discuss the history of worked bone, how it is manufactured, and how it is analyzed using case studies from Monongahela and Iroquoian archaeological contexts to compare and contrast worked bone usage cross-culturally.
21. **Exploring Barriers and Facilitators to Sustaining Mindfulness Practice in Healthcare Professionals**

Andrew Harris, UROP Summer Research Fellow, School of Nursing, with Dr. Patricia Kinser,

Mindfulness is the discipline of being continually, deliberately, and non-judgmentally aware of the present moment. It is believed to be beneficial to healthcare providers (HCPs) for alleviating burnout, which is a combination of emotional, physical, and mental exhaustion accompanied by decreased effectiveness and engagement at work, with potential negative sequela for patients and health systems. The goal of this VCU UROP Summer Research Fellowship project is to explore whether healthcare professionals/ trainees continue to engage in mindfulness practices beyond those which occur during a formal class. This study evaluates qualitative data from participants of the “parent study” (PI: Kinser), HCPs and trainees who were students in an 8-week VCU elective course on mindfulness from fall 2014 to spring 2016. The UROP study explores how (or if) the parent study’s participants continue to practice mindfulness after the conclusion of the course, with a particular focus on what has helped or hindered that practice. Data was analyzed using an iterative content analysis based on descriptive qualitative methodology in the manner of a hermeneutic circle. The major themes that arise will be compared to the literature and will be used to construct a coherent picture of participants’ general experiences. Preliminary data analysis reveals the following emerging themes: (1) HCPs view mindfulness as a lifestyle and/or a discrete tool; (2) barriers to personal mindfulness occur when the “tool” approach is the focus instead of integration of mindfulness as a lifestyle; and, (3) although mindfulness apps are common and easily accessible, most participants view self-driven mindfulness practices to be most effective in both personal and professional life. By contributing to our understanding of participants’ experiences with barriers and successful strategies for maintaining mindfulness practice, the findings from this study will inform future research about mindfulness-based interventions for HCPs, with the goal of reducing burnout and enhancing resilience in HCPs and ultimately improving quality and safety in healthcare environments.

22. **Roles of Coactosin like protein 1 (COTL1) in the regulation of cancer cell adhesion and motility**

Faisal Shakir, Dept. of Biology, with Dr. Andrei Ivanov, VCU Institute of Molecular Medicine

The majority of solid cancers originate from different human epithelia, and they frequently progress from well-differentiated primary to poorly differentiated metastatic tumors. During this progression, tumor cell lose epithelial characteristics, such as strong intercellular adhesions (junctions) and acquire ability to migrate and disseminate throughout the body. This process involves robust remodeling of the actin cytoskeleton that drives disassembly of intercellular junctions and promotes tumor cell motility. Actin filament turnover (polymerization/depolarization) plays key roles in this cytoskeletal remodeling, however mechanisms that regulate actin dynamics in cancer cells remain incompletely characterized. In this study, we investigated the involvement of an enigmatic actin-binding protein, coactosin-like protein 1 (COTL1) in the regulation of adhesion and migration of colon and lung cancer cells. COTL1 belong to a family of so-called Actin-Depolymerising Factor Homology Domain proteins, which are the major controllers of actin filament turnover. COTL1 was found to be overexpressed in lung cancer but its roles in tumor metastasis remain poorly-characterized. By using a specific siRNA-mediated knockdown of COTL1 in SK-CO15 and HT29 colon cancer, and H209 small cell lung cancer cells, we made the following novel and important observation: (1) COTL1 colocalized with apical junctions in confluent colonic epithelial cell monolayers and its depletion significantly increased epithelial barrier permeability to small ions and large uncharged molecules; (2) loss of COTL1 disrupted the steady-state integrity of adherens and tight junctions and attenuated junctional reassembly in a calcium switch model; (3) COTL1 knockdown had a dual effect on the motility of colon and lung cancer cells by attenuating collective migration (wound healing), but promoting individual transfilter migration of these cells. Overall, this study identified COTL1 as a novel regulator of cell-cell adhesions and motility of cancer cells in vitro. Further studies are required to reveal mechanisms mediating the observed cellular activities of COTL1, as well as the roles of this actin-binding protein in the regulation of tumor progression and metastasis in vivo.

Justin Moore, IMSD Research Scholar, Qian Zhong, and Sandro R.P. da Rocha* School of Pharmacy & Chemical and Life Science Engineering, Virginia Commonwealth University – Richmond, VA 23298-0533

Two dimensional (2D) monolayer cells cultured on flat substrates have been for decades an important in vitro tool used to test and understand numerous biomedical problems. Traditionally, these cell culture assays have been a monolayer of cells cultured in vitro. However, these 2D cultures have recently come under scrutiny for their significant departure when compared to the in vivo tumor microenvironment they are designed to mimic. In 2D monolayer cell cultures cell-to-cell/cell-to-matrix interactions, biomedical gradients and signaling pathways are lost, tumor characteristics that significantly affect the drug transport. The long-range of this project is to establish a 3D in vitro model to test the ability of dendrimer-anti-cancer therapeutics to treat solid tumors, and the impact of their chemistry in terms of its ability to penetrate deep regions of the solid tumor environment. The first part of this project is establish a more relevant in vitro model system that can represent the natural three-dimensional architecture of solid tumors, and also to establish a cytotoxicity protocol to compare the 3D system to traditional 2D systems. The 3D system prepared here consisted of multicellular spheroids (MCS) on a gel-embedded matrix. This resembled avascular tumor nodules, intervascular regions of large solid tumors with respect to micro milieu, volume growth kinetics and some histomorphological features. Briefly, a certain number of 4T1 metastatic breast cancer cells were seeded in flat-bottom 96 well plates, which were coated with agarose gel. The MCS were allowed to grow for 4 days. It was found that the size of MCS varies with the number of the cells seeded initially, and a protocol was established to grow these spheroids to an optimum and consistent size, with the important characteristic of being >400 μm. Using an MTT assay, we tested the cytotoxicity of doxorubicin (DOX) on the grown MCS, and then compared these results to a 2D model system assay. The MTT assay showed that much higher concentration of DOX are required to achieve 50% of cell death (IC50%) in the 3D spheroid (ca. 13 fold) compared to the 1uM IC50% observed in the 2D monolayer. Next steps in our study include the establishment of cell co-culture model, and to study the effect of dendrimer-DOX conjugates with various functionalities as nanocarriers for the delivery of anti-cancer molecules.

Corresponding author: srdarocha@vcu.edu

Acknowledgements: VCU for a Start-up Grant; NSF-DMR Grant # 1643770 and VCU IMSD - NIHR25GM090084 for a scholarship for JM.

24. **Utility of Bacteria Associated with Human Hairs in Forensic Investigations**

1Courtney Hutchens, 2Amelia A. Bussell, 3Richard R. Sikon, and 1Baneshwar Singh

1Department of Forensic Science, Virginia Commonwealth University, Richmond, VA 23284. 2Texas Department of Public Safety, Austin, TX 78752. 3Virginia State Anatomical Program, Virginia Department of Health, Richmond, VA-23219.

Hair is one of the most commonly encountered physical evidence at the crime scene. Hair evidence is extremely valuable in association or exclusion of suspect to the crime scene or the victim, and can play critical role in narrowing down suspects based on identification of age, sex, and race, of an individual. Currently, microscopic analysis is performed for determination of age, sex, and race of hair evidence, but this method requires extensive experience, is subjective, lacks individualizing power, and has no known error rate. Often hairs that are left at the crime scene are rootless, which makes nuclear DNA analysis very challenging. Even with nuclear DNA analysis, it is not possible to determine if a particular hair originated from scalp or
In this situation, an alternative unbiased quantitative method for hair examination is needed. In this study, scalp and pubic hairs were collected from 14 donated human cadavers by the Office of the Chief Medical Examiner (OCME) in Richmond, Virginia. DNA was extracted from each hair samples using an organic method, and extracted DNA was quantified using the Qubit® dsDNA HS assay kit. Variable region 4 (V4) of 16S rDNA was amplified and sequenced on MiSeq sequencing platform using dual-index strategy and following manufacturer’s protocol. Sequences were then analyzed using Mothur version 1.39.4 and statistical analysis was performed using R version 3.3.2. Preliminary results from this study suggest that bacterial structure associated with scalp hair is significantly different from bacterial structure associated with pubic hairs. Bacterial structure associated with pubic or scalp hairs from human cadavers were not significantly different between male and female. All samples except one, included in this study were collected from Caucasian individuals and hence any difference in bacterial structure associated with race was not determined. In conclusion, this study provides evidence that microbial data associated with human hairs has tremendous potential in development of a quantitative tool for hair analysis.

25. Race, Ethnicity, and Trauma Symptomology among Children Exposed to Intimate Partner Violence

Ksenia Dombo, UROP Summer Research Fellow, School of Social Work, with Dr. Shelby McDonald, School of Social Work

It is estimated that one in four children in the U.S. will witness intimate partner violence (IPV) during their lifetime. Children who witness IPV are at higher risk for mental health problems, such as post-traumatic stress symptoms (PTS). Research on adult samples of trauma survivors suggests that cultural, racial, and ethnic factors have an impact on the manifestation of mental health symptoms, with recent studies reporting differences in PTSD symptom clusters and factor structures among Hispanic, non-Hispanic White, and African-American survivors of trauma. Such cultural differences may have important implications for interventions with children exposed to IPV. Yet, to date, no study has explored whether there are subgroups of children with similar patterns of trauma symptomology, and whether the manifestation of symptom clusters is associated with children's racial or ethnic identity and/or cultural factors. Therefore, the current study explored the following research questions: (1) Can meaningful and distinct classes of trauma symptomology be identified among children exposed to IPV using multiple indicators of posttraumatic stress?, (2) If multiple latent classes are identified, is race and/or ethnicity related to class membership?  

Method: Two hundred and ninety-one mother-child dyads were recruited from 22 domestic violence agencies. The sample of children was gender-balanced (53% male), with a mean age of 9.07 (range 7-12; SD=1.64). The racial/ethnic identification of children was as follows: 55% Latinx, 22%, non-Latinx White, 18% Multi-racial/ethnic, 4% African American/Black, 1% American Indian or Alaska Native, and 0.3% Asian American. PTS symptoms were measured using maternal report on the Child Behavior Checklist (CBCL; Achenbach, 2001). Latent class models were estimated using a maximum likelihood estimator with robust standard errors and were implemented in Mplus software. Results: Fit indices (i.e., AIC, BIC, adjusted BIC, LMRT, BLRT) resulting from the latent class models containing 1 through 5 classes indicated that the 4-class solution was the optimal model. Classes were labeled as follows: Low/no PTS (n = 164), Intrusive/Arousal PTS (n = 57), Anxious arousal PTS (n = 43), and Severe PTS (n = 27). A chi-square test of independence indicated that child racial/ethnic identity was significantly related to class membership. Notably, 74.5% of Latinx children in the sample were in the “low/no” symptomology group. Conclusion: Our findings are inconsistent with the small body of prior research documenting higher levels of trauma symptoms among Latinx children. Future research should continue to explore how children’s racial and ethnic identities, and associated cultural factors (e.g., familismo), influence the manifestation of PTS symptoms following exposure to IPV.
26. **Utilization of University Counseling Services in the Spit for Science sample**

Ann Sperou, Dept. of Biology, with Dr. Amy Adkins, Dept. of Psychology

University Counseling Services (UCS) is a valuable resource for students experiencing mental health challenges while in college. Several previous studies have shown that gender and other similar identifiers correlate with students’ utilization of UCS, though other studies have shown no effect. In this study, we used the Spit for Science dataset to investigate UCS utilization and the influence of gender and other related factors. Based on the literature, it is hypothesized that males will utilize UCS less than females. Over the course of 2 years, 2,374 students were asked if they had utilized UCS before. Preliminary data showed that about 19% of the participants had utilized the services. Current analyses are examining whether service utilization differs by gender and other factors. Our analyses can provide further data to UCS as to what factors influence utilization of UCS at VCU.

27. **Peopling of the Americas: Exploring a Pre-Clovis Presence of Humans in the Americas**

Juan Goncalves Borrega, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

Interpreting how the peopling of the Americas occurred has been approached by scholars using interdisciplinary methods such as anthropology, biology, genetics and linguistics. However, the scope of this assignment focuses on the archaeological record along with respective radiocarbon dates. The goal of my research is to reevaluate the “Clovis first” model of settlement of the Americas. My research draws primarily from three pre-Clovis sites in eastern north America and three sites in south America that suggest initial entry onto the southern continent well back in the late Pleistocene. Reading scholarly articles published by notable archaeologists in favor of the “Clovis first” model and from those in favor of the “Clovis-late” model will provide me with a strong and objective standpoint to the debate. Comparative lithic analysis between stone tool kits found at non-Clovis sites and Clovis sites will enable me to make accurate distinctions between the characteristics of the Clovis cultural complex and others. I expect to find an emerging archaeological record that supports a pre-Clovis human occupation of the Americas. My major findings include the discovery of certain south American sites which demonstrate that by the time of the Clovis horizon in North America, all major environmental landscapes were already occupied by well-adapted populations with distinctive technologies unrelated to Clovis. Future avenues of research include further digging in both continents to clarify and create new productive models of the peopling of the Americas.

28. **Capacitive memory alters alternans and spontaneous activity in a minimal cardiomyocyte model**

Tien Comlekoglu, VCU Honors College, Dept. of Biomedical Engineering, with Dr. Seth Weinberg, Dept. of Biomedical Engineering

The electrical behavior of cardiomyocytes are typically simulated using ideal parallel resistor-capacitor circuit networks. However, recent studies have suggested that non-ideal capacitor circuit elements, in which the current-voltage relationship is governed by a fractional order derivative, may more appropriately model cell membrane properties. These fractional-order dynamics can represent capacitive memory effects in which electrical activity is altered by the membrane potential prior history. Previous work has shown that fractional-order membrane dynamics alters spiking rates and ionic currents in neurons. Here, the effects of capacitive memory are investigated in a cardiomyocyte model using a minimal 3-variable system, modified for fractional-order membrane voltage dynamics. This model was chosen due to its intrinsic lack of memory effects. Fractional-orders from 0.5 to 1 with varying cycle lengths were simulated. We found that decreasing fractional-order shortened action potential duration (APD) and suppressed the pro-arrhythmic beat-to-beat alternation, alternans, at shorter cycle lengths. For fractional orders less than 0.75, spontaneous electrical activity was observed. Memory effects were represented by a hypothetical memory current that acted to
suppress alternans at decreasing cycle lengths and generate spontaneous electrical activity at sufficiently small fractional orders. We suggest that capacitive memory serves to alter the incidence of alternans and may play a role in pacemaking.

29. **Does maternal depression predict parenting in African American mothers of children with and without ADHD?**

Jannah Madyun, Dept. of Psychology, with Dr. Heather Jones, Dept. of Psychology

Both child attention-deficit/hyperactivity disorder (ADHD) and maternal depression are associated with negative parenting (Graziano et al., 2006; Giannotta et al., 2015). Further, compared to other parents, African-American parents report more psychopathology, including maternal depression (Huang et al., 2013). The relationship between maternal depression and parenting in families of children with ADHD has not been studied in African Americans. Thus, the purpose of this study was to investigate whether maternal depression predicted parenting in African American mothers, over the influence of child ADHD.

Participants in this study included 70 African American mothers (Mage=35.44, SD=6.46) of children with ADHD (n=41, Mage=7.83, SD=1.38) and without ADHD (n=29, Mage=7.59, SD=1.40). The Schedule for Affective Disorder and Schizophrenia for School Age Children was used to assess for current child psychopathology. The Beck-Depression Inventory-Second Edition was administered to measure maternal depression. Lastly, to evaluate their parenting behaviors, caregivers completed the Alabama Parenting Questionnaire; we used the Positive Involvement and Positive Parenting subscales for the analyses below.

Hierarchical regressions were conducted to examine the ability of maternal depression to predict reported parenting behaviors in African American families of children with and without ADHD. Results indicated that the predictors accounted for 11% of the variance in positive parenting, $F(3, 75) = 2.81, R^2 = .11, p<.05$, and maternal depression significantly predicted positive parenting ($\beta=-.25, p<.05$). The predictors accounted for 14% of the variance in positive involvement, $F(3, 75) = 3.89, R^2 = .14, p<.05$, but maternal depression was not predictive of positive involvement, beyond the impact of socioeconomic status and ADHD diagnosis ($\beta=-.25, t(72)=-1.89, p=.05$).

These findings are largely consistent with research conducted with primarily White families, although it is interesting that maternal depression was not a predictor of involvement in their child’s life. Although it accounted for a small amount of variability, clinicians working with African American families of children with ADHD should consider whether to screen those mothers engaging in low levels of positive parenting for depression. Researchers should further investigate maternal depression in African American families of children with ADHD, and whether such depression interferes with treatment engagement and child outcomes.

30. **It’s hot as moth balls in here! Stage-specific responses to heat stress in the invasive gypsy moth (Lymantria dispar L.)**

Madison Glackin$^1$, Hannah Byrne$^1$, Nana Banahene$^2$, Salem Salem$^2$, Trevor M. Faske$^1$, Lily M. Thompson$^2$, Andrew J. Eckert$^1$, Salvatore Agosta$^1$ and Kristine L. Grayson$^2$, (1)Biology, Virginia Commonwealth University, Richmond, VA, (2)Biology, University of Richmond, Richmond, VA

**Abstract Text: Background/Question/Methods** Understanding the role of climatic limits for invasive species is important for determining range expansion and the potential for future spread. The spread of the gypsy moth (Lymantria dispar L.) across wide climatic gradients in North America provides an ideal system for studying the role of thermal limits in invasion. Previous work has shown that variability in spread rates at the southern invasion front (West Virginia and Virginia) is correlated with exposure to supraoptimal
temperatures. We tested the effect of heat stress on survival and performance by exposing gypsy moth individuals to either an optimal control (22-28°C) or one of three supraoptimal temperature treatments (30-36°C, 32-38°C, or 34-40°C) at specific developmental stages (first through fourth larval instar, pupae) for either two or seven days. We measured survival over the duration of the heat exposure and long term effects on development time and pupal mass or adult size.

**Results/Conclusions** Survival of larvae and pupae generally decreased as treatment temperature increased for all stages. The 34-40°C temperature treatment had the largest effect on larval survival, with seven days of exposure being lethal for all stages except second instar and pupae. The 22-28°C and 30-36°C temperature treatments had more than 80% survival and the 32-38°C temperature treatment showed only slightly lower survival for all larval instar stages measured. For pupae, there was no difference in survival after two days in the heat for the three lower temperature treatments. The long term effects on final pupal mass of the two day exposure to heat during the larval stage were more pronounced for females than males. In general, exposure to heat at later larval stages resulted in larger decreases in pupal mass. Together, these results show negative effects of high temperature on gypsy moth populations and support patterns of spread seen in the southern invasion front. Our work provides important data on the susceptibility of gypsy moth to high temperature across different developmental stages. As global temperatures rise, understanding how temperature can mediate the spread of invasive populations will be a critical component of management decisions.

### 31. The Evolution of Protein Complexes in Bacterial Species

**Shwetha Hara Sridhar and Wedad Albalawi, Dept. of Bioinformatics with Dr. Peter Uetz, Center for the Study of Biological Complexity**

Protein complexes are composed of two or more associated polypeptide chains that may have different functions. Protein complexes play a critical role for all processes in life and are considered as highly conserved in evolution. In previous studies, protein complexes from E. coli or Mycoplasma pneumoniae have been characterized experimentally, revealing that a typical bacterial cell has on the order of 500 protein complexes. Using gene homology (orthology), these experimentally-observed complexes can be used to predict protein complexes across many species of bacteria. Surprisingly, the majority of protein complexes is not conserved, demonstrating an unexpected evolutionary flexibility. The current research investigates the evolution of 174 well-characterized (“reference”) protein complexes from E. coli that have three or more subunits. More specifically, we study the evolutionary flexibility by using evidence and patterns of the presence or absence of the subunits across a range of 894 bacterial species and to interpret whether the evolution is due to the loss or gain of a subunit in the protein complex. The purpose of this study is to determine how the presence or absence of a subunit affects the protein complexes’ functionality. We discuss the functional changes observed in a protein complex due to the presence or absence of a particular subunit by using a statistical approach and by confirming its significance.

### 32. Characterizing the Use of Specific Delivery Strategies in Cognitive Behavioral Therapy for Anxious Youth across Therapy Settings

**Vishnupriya Srivastava, Julia R. Cox, Davis Erney, Michael A. Southam-Gerow, & Bryce D. McLeod, Dept. of Psychology**

Cognitive-behavioral therapy (CBT) for youth anxiety often features specific skills that therapists teach to clients (e.g., relaxation, problem solving). As attention to measuring treatment integrity—a multidimensional construct that typically comprises adherence, competence, differentiation, and relationship factors (e.g., Southam-Gerow & McLeod, 2013)—increases (Perepletchikova, Treat, & Kazdin, 2007; Southam-Gerow & McLeod, 2013), some have found value in separating the content of the intervention from the method of delivery (e.g., Hawley, Brookman-Frazee, & Hurlburt, 2008). This is partly because treatment manuals may
prescribe or suggest different treatment delivery strategies for the same skill. For example, when teaching cognitive restructuring skills, therapists may choose to employ didactic and modeling strategies early in treatment and turn to rehearsal in later sessions as the child’s mastery of the skill increases. Therapists’ use of specific delivery strategies may also depend on their comfort with and training in directive approaches (e.g., rehearsal of exposure tasks; Becker, Zayfert, & Anderson, 2004). Further, how extensively therapists use such delivery strategies may correlate with other therapy process factors, including the use of specific interventions and relational factors. The main goal of this descriptive study is to examine how therapists in different treatment settings use specific delivery strategies while providing individual cognitive behavioral therapy for anxious youth. Data were drawn from two randomized controlled trials (RCTs) in which therapists providing individual CBT for youth anxiety (Coping Cat; Kendall, Hudson, Gosch, Flannery-Schroeder, & Suveg, 2008) treated a diverse sample of children, aged 8–15: (RCT1; Kendall et al., 2008) in a university laboratory (N=51; 44% female, 85% Caucasian), and (RCT2; Southam-Gerow et al., 2010) in community clinics (N=17; 56% female, 38% Caucasian). Therapist adherence using six specific delivery strategies of CBT for youth anxiety—didactic (ICC = 0.73), collaborative teaching (ICC = 0.69), modeling (ICC = 0.74), rehearsal (ICC = 0.88), coaching (ICC = 0.43), and self-disclosure (ICC = 0.71)—throughout treatment was double coded on a 7-point scale extensiveness scale using the Cognitive-Behavioral Treatment for Anxiety in Youth Adherence Scale (CBAY-A; Southam-Gerow et al., 2016). A total of 744 sessions were coded (RCT1 = 532; RCT2 = 212). We will (1) compare mean-level delivery scores between settings, and (2) present delivery scores in correlation tables with model adherence and client-involvement scores. Findings may help inform future therapy process models and dissemination efforts (e.g., improved training, supervision, consultation).

33. **Investigations of Replicability Failure Leads to Improvements for Future Replications**

Yunjung Chung, VCU Honors College, Eleni Walker, Dept. of Psychology, with Dr. Jennifer Joy-Gaba, Dept. of Psychology

Cacioppo, Petty, and Morris (1983, hereafter “CPM”) found that individuals with a higher need for cognition were more affected by argument strength than those with a lower need for cognition. Many Labs 3 (Ebersole et al., 2016) attempted to replicate CPM as well as to see if participants’ responses varied as a function of the time in the semester. Many Labs 3 failed to demonstrate the previously reported results. Petty and Cacioppo (2016) suggested that the failed replication was due to alteration of the original independent variables, using weaker arguments than those used in CPM, and implementing a shortened, less reliable Need for Cognition scale. Supporting this view, Luttrell, Petty, and Xu (2017, hereafter “LPX”) replicated the study using a modified protocol. The purpose of the current study was to replicate the LPX protocol for the optimal conditions at nine different universities across the United States and Canada. Our results produced the same interaction between argument quality and need for cognition, although with a weaker effect size. In addition, we failed to reliably distinguish between the ML3 and LPX protocols, suggesting that latter protocol is no better than the former. LPX’s protocol is recommended for use in future research that plan on investigating the effect of cognition and argument quality on persuasion.

34. **Forensic Analysis of a 19th Century Good Boy**

Heather Buettner, Dept. of Anthropology with Dr. Bernard Means, Dept. of Anthropology

The physiology of the domesticated dog, *canis familiaris*, contains vast variations among different breeds. While visual inspection of superficial remains can quickly lead to identification, is it possible to identify the breed of a domestic dog solely by its skeletal remains? Could there be there identifiable evidence of lifestyle, use, and diet on a canine skeleton dating to the late 19th century? By comparing skeletal structure of known
breeds of domestic dogs, research of canine anatomy and genetics, and examination of the available remains for metric data, as well as any evidence of potential genetic pathology, deduction of relative breed can be determined.

35. **Dental Anthropology**

_Katelin McGinnis, Dept. of Anthropology with Dr. Bernard Means, Dept. of Anthropology_

The purpose of this research is to understand the methods of a Dental Archaeologist. These methods are to further understand what a dental archaeologist is looking for with dentition it may be something specific like someone’s age, sex, or diet. I want to understand what is being studied, why is it being studied, and why it is beneficial to Archaeology. In order to study this I will look at a 3-D scan of a mandible from North India and compare it to the methods of a Dental Archaeologist to better identify the mandible. I hypothesize that the methods of a Dental Archaeologist are strict and complex in order to get information correct about archaeological specimen. Question: My research goal is to understand the methods that a Dental Archaeologist would take in order to study dentition or archaeological remains. Literature Review: I will look at references to address this question by: Looking at the dentition of various humans -Studying the methods of dental archaeology I found my references from the VCU Libraries database and narrowed it down to topics such as Dental Archaeology and Archaeological Dentition. Digital Models: 3-D Scan of a Mandible from North India. Anticipated Results: My anticipated results are to be able to understand the concepts and methods of Dental Archaeology.

36. **Quality of Life and Anxiety Symptoms in Children with Asthma**

_Caroline George, Sudeepti Trivedi, VCU Honors College, Samantha Miadich, Mona Quarless, with Dr. Robin S. Everhart, Dept. of Psychology_

The purpose of this research was to gain a better understanding of the association between quality of life and anxiety symptoms in children with asthma living in an urban area. Quality of life is a measure of how well a child is adapting to his or her asthma; children experiencing more anxiety symptoms may not adapt as well to their disease as children who are experiencing fewer anxiety symptoms. Families were recruited from the Richmond area through a call list, and were interviewed through self-report questionnaires. The Pediatric Asthma Quality of Life Questionnaire (PAQLQ) and the Multidimensional Anxiety Scale for Children (MASC) were both administered to 61 children with asthma. The PAQLQ was designed to measure functional problems of children related to asthma, including physical, emotional, and social issues. The MASC measures symptoms associated with anxiety disorders. Total PAQLQ scores and total MASC scores were negatively correlated ($r = -0.391; p < 0.01$), such that worse PAQLQ scores (i.e., lower scores) were associated with worse MASC scores (i.e., higher scores). Findings suggest that children with asthma who experience a lower quality of life may experience higher levels of anxiety. Asthma programs that target child psychological functioning, and specifically child anxiety symptoms, may serve to improve child quality of life. Moreover, children living in urban areas may encounter additional economic and emotional challenges that compromise their asthma control; alleviating some of these stressors may allow families to focus more on the health of their children. Future research may include designing specific intervention programs to educate children in schools on how to handle dealing with chronic illnesses and alleviating stress and anxiety.

37. **Reconstructing the Diets of Mammoths and Mastodons**

_Alexandra Cooley, Dept. of Anthropology with Dr. Bernard Means, Dept. of Anthropology_

Much is known about one of the biggest mammals of the ice age; the Mammoth. The diet of the Mammoth is less explored. Even less is known about the Mammoth’s relative; the Mastodon. The diets of ice age animals have long been a topic of investigation for scientists. In order to reconstruct the diets of the Mammoth and
Mastodon, the author completed a literature review in an effort to draw parallels between the two species as well as highlight the differences. The author expects to find that the diets of the Mammoth and the Mastodon were similar in some ways but also had differences. Isotopic evidence as well as the shape and size of the prospective animal’s teeth will give clear insight into the diets of these great mammals of the Pleistocene epoch.

38. **Perceptions of Homelessness: Persons Experiencing Homelessness in Richmond, Virginia**

_Hannah Jones and Kadie Von York, VCU School of Social Work, with Prof. Allison Ryals, VCU School of Social Work_

This study highlights the complexities surrounding various perspectives of homelessness and related services. Persons experiencing homelessness face a magnitude of risk factors every day and often experience trauma, victimization, and disrespect. In order to better serve clients experiencing homelessness, the researchers gained direct insight from persons experiencing homelessness in Richmond, Virginia. Over the course of six weeks, a detailed survey was distributed to new clients at a non-profit emergency shelter, Housing Families First. The researchers found that their study mirrored many other study outcomes, while also gaining some new and unique insights. The study indicates that there is a lack of scholarly research regarding homelessness, especially when correlated with specific factors such as incarceration, race, and parenthood. The study highlights the importance of future studies and more inclusive policies impacting housing stability.

_**Keywords:** homelessness, housing stability, perceptions, service providers, race, incarceration, housing policy_

39. **Cocooning as a Method to Reduce Pertussis in Infants and Young Children in Nigeria.**

_Annapoorani Narayanan, VCU Honors College, Dept. of Psychology with Prof. Mary Boyes, VCU Honors College_

Nigeria has one of the highest rates of pertussis worldwide. Many infants and children are infected with the disease each year leading to hospitalization and often death. Cocooning is a method of vaccinating the adults and family primarily around infants in the hope of reducing infant transmission of the disease. The goal of my research is to examine whether cocooning would be effective at reducing pertussis in infants and children in Nigeria and how implementation would need to occur. I examined various studies considering the effects of cocooning, the Nigerian healthcare practices, global vaccination programs, and the Nigerian perception of vaccinations. In my initial examination of these studies I concluded that cocooning is effective at reducing infants pertussis because the primary source on the infection in infants are family members. Pregnancy dose vaccination of mothers is also a viable option in reducing infant pertussis because mothers provide pertussis antibodies during birth protecting infants in the first 6 months of life. In order to successfully implement cocooning in Nigeria education programs focusing on changing public perception and misinformation information is necessary. The distrust of foreign programs and of vaccines in Nigeria causes many obstacles when implementing new programs. The implications suggest that if implemented correctly the number of infections and hospitalizations from pertussis could be decreased by up to 50%. This could save thousands of lives in Nigeria and increase immunization for pertussis in adults and reduce transmission to infants.
40. **The Graphic Novel as a Support and Education Tool for Type 1 Diabetes**

Lohitha Kethu, VCU UROP Summer Research Fellow, Scientific Illustration Program, with Dr. Carmen Rodriguez, Dept. of Biology

Type 1 diabetes (T1D), if left uncontrolled, can become a debilitating chronic illness. Diabetics must rely on resources such as family support, proper instruction, and medication. Often, many marginalized communities do not have these medical resources such as education, proper instruction and support in school and home environments. Additionally, there are significant feelings of shame and guilt associated with a chronic illness such as T1D, leading to depression and anxiety. Thus the goal of this project was to empower, support, and suggest a healthy mindset for diabetic children of color in an entertaining and engaging way. Through a process of storyboarding, character design, and script writing, a graphic novel was written and illustrated in Adobe Photoshop and Indesign for an audience of elementary school children from 7-12 years of age. The story centers around a 9 year old African American diabetic named Jaci who is newly diagnosed, and is navigating how to interact with her family and friends and how to ask for what she needs in public spaces. She experiences conflicts such as sleeping over at her friend’s house and taking her medicine on her own, the pain of taking shots, and going on field trips where she has to wear her medical ID for everyone to see. Ideally, this graphic novel could prompt changes in outlook or feelings about diabetes in young type 1 diabetics.

41. **Racial Microaggressions, Mental Health, and People of Color in College**

Heran Beniam, BSc, Chelsie Dunn, MA, MPH, Deborah Butler, MS, & Faye Belgrave, PhD, Dept. of Psychology

College students are faced, daily, with obstacles, such as racial microaggressions, which is represented with the substantial amount of evidence shown. People of color in college settings are faced with the risk of mental health issues such as anxiety and depression which is said to increase health risks over time (Blume et al., 2012). With the increase of mental instability, people of color are more likely to look to substance abuse as an outlet (Nadal et al., 2014). These factors, in turn, may lead to people of color from having mental distress and substance abuse encounters due to the influence of racial microaggressions.

People of color, in a college and university setting, run into the act of racial microaggressions (RMA) that in result affect their well being, self esteem, mental distress (Nadal et al. 2015), and substance abuse use (i.e., alcohol use as a means to cope with anxiety; Blume et al., 2012). There are three types of racial microaggressions, microinsults, microassults, and microinvalidations, that play a role in how people of color are treated. An example would be telling someone who is Asian American descent that they speak good English (Nadal et al., 2015). In regards to the effect RMA has on people of color, racial microaggressions show a strong association and link to problems that negatively impact a college student’s life (e.g., mental instability in their classes, substance misuse; Nadal et al., 2014).

This informative presentation will examine related factors associated with racial microaggressions and the role it plays on college students’ mental health and substance abuse use. Additionally, we will discuss implications for increasing awareness of racial microaggressions’ effects on people of color mental health and reducing risky behaviors that are a direct result of experiencing microaggressions.

42. **Being Holy and Holistic in Health Promotion Programs for Adolescents of Color**

Yohana Emanuel, BSc, Chelsie Dunn, MA, MPH, Deborah Butler, MS, & Faye Belgrave, PhD, Dept. of Psychology

Religious organizations create an environment of openness filled with faith that helps to influence a person’s daily choices. In many cultures that are profoundly faith-based, religion and spirituality play an important role in building social norms especially among adolescents and providing an idea that “beliefs and practices keep one grounded and wholesome” (Luquis, Brelsford, & Rojas-Guyler, 2012). There has been research that suggests religion and religious organizations may be associated with promoting healthy
lifestyles and enhancing healthcare services among adolescents of color (Cornelius & Appiah, 2016). Certain studies have assessed the use of faith-based programs that have been created to promote healthy living and health education (Cornelius & Appiah, 2016), but there are still limitations on how deep they go in all aspects of health. A person’s faith can alter the way they live tremendously and there needs to be a strong link between the association of religion and health.

Subsequently, some faith-based programs have chosen to include youth sexuality education in their programs that range from elementary to high school. Many African American churches incorporate health promotion programs in their church programs, but provide limited information in regards to sexual education (Francis & Liverpool, 2009). This has exhibited to create positive attitudes when it comes to addressing needs for medical screening and other preventative actions. With regard to adolescent health, many religious organizations do not assess the availability of health services focused on sexual health, preventative measures and overall wellness that adolescents have access to.

This informative presentation will examine the association of religious organizations involvement in health and health services focused among adolescents of color. Additionally, we will discuss implications for decreasing risky sexual, emotional and physical health behaviors and increasing availability of health services among adolescents.

**43. Incorporating ethnic identity in U.S. public schools' sexual education**

*Vanessa Oppong, Chelsie Dunn, MA, MPH, Deborah Butler, MS, & Faye Belgrave, PhD, Dept. of Psychology*

The current model of sex education in U.S public school cannot accommodate the needs of youth of color. The form of formal sexual education in predominantly minority areas remove topics that are of cultural significance, and are formed around a Eurocentric basis (Perry, 2011). Issues that are important to youth of color such as body image, consent, and cultural expectations are not discussed in today’s form of sex education. This is especially the case in predominantly minority areas (Skyes, 2011). Due to this misinformation and lack of cultural relevance, STD rates among youth of color are staggeringly higher in comparison to White students (CDC, 2014). The loss of access to a comprehensive sex education during these impressionable years can cause a minority teen to struggle finding competent and medically accurate information in turn affecting their future sexual behaviors (advocates for youth).

According to a study conducted by the Guttmatcher Institute (2017) when students of color are given more than abstinence only sex education but detailed sexual health information while being culturally relevant, it decreases the likelihood for the student to practice risky sex behaviors. In terms of how ethnic identity plays a role in minority perspective of sex, few studies have examined it from this point of view (Belgrave et al., 2010; Townsend et al., 2006). Nor do the studies identify the role that sexual education in the form of a white context does not respond well to people of color.

My presentation will examine the role ethnic identity carries an influence into how sexual education can be taught to youth of color. Thus, in turn, a decrease in risky sexual behaviors and increase safer sex practices. Additionally, implications will be discussed.

**44. Kushan Figural Art**

*Brittany Blanchard, Dept. of Anthropology with Dr. Bernard Means, Dept. of Anthropology*

Artistic expression by people has found value and appreciation through various media since humans first left behind evidence of their creativity thousands of years ago. During the Kushan period (30-375 AD) in India, frequently people made small terracotta figurines, decorative bricks, and carved stone statues that portrayed images of cultural and religious significance. The images created were often human, animal, or
blended hybrids of the two with fantastical components. What inspired these people to create these objects? What was the cultural significance of these art forms during the Kushan era? How did they learn to shape natural materials to depict their image of choice? Did any of their designs lose significance and eventually disappear from the archaeological record?

45. **Digital Osteology of Trans-Himalayan Burial Culture**

*Nicholas Hemann, Dept. of Anthropology with Dr. Bernard Means, Dept. of Anthropology*

The purpose of this project is to record data about the ecofacts recovered from the Trans-Himalayan region, take them into account regarding the context and provenience of their excavation, and infer cultural behavior or practices from the quantitative and qualitative data gathered via digital osteology. The Trans-Himalayan region is a mountainous zone defined by its location parallel to the main Himalayan range and south of the Tibetan Plateau. The cluster of sites referenced in this paper and the ecofacts retrieved from them primarily reside in the Kinnaur district of the Himachal Pradesh state of India, north of the Sutlej River. The tumultuous nature of the region and the difficulty of the land to be surveyed and excavated has led to a distinct lack of archaeological evidence and inquiry. A digital scan of two human skulls recovered from the Lippa and Kanam sites were rendered using software and then printed using 3D printing. The digital scan and rendering allows the skulls to be manipulated and examined, as well as measured and analyzed. The emerging study of digital osteology permits enhanced analysis of faunal bone ecofacts.

46. **Are Parental Concerns and Beliefs About Medicine Associated with Children’s Asthma-Related Anxiety?**

*Julia Scheidemantel, Department of Psychology, Devon Withers, Department of Psychology, Jeremy Barsell, Department of Psychology, & Robin S. Everhart, PhD, Assistant Professor, Department of Psychology*

**Background:** Children with asthma often experience symptoms of asthma-related anxiety. For instance, children may worry that they will not be able to keep up with their peers, miss school, and even die because of their asthma. Parental concerns and beliefs about the necessity of children’s asthma medications may be a contributing factor in a child’s asthma-related anxiety. When parents do not believe in the necessity of asthma medications, children may experience more anxiety related to their asthma and the consequences of poorly controlled symptoms. **Objective:** This study will investigate the association between caregiver concerns and beliefs about asthma medication and the level of asthma-related anxiety their children experience. We hypothesised that if a caregiver reported negative beliefs and concerns about medication, their child would experience more asthma-related anxiety. **Methods:** The sample included 61 families with a child (aged 7-12; 90% African American) diagnosed with asthma and their primary caregiver. Caregivers completed a questionnaire, *Beliefs about Medicine*, indicating their beliefs and views about medications prescribed to their child. Children completed the *Youth Asthma-Related Anxiety Scale*, reporting on the amount of anxiety/nervousness they felt as a result of their asthma. **Results:** Pearson’s correlational analyses between the Beliefs about Medicine questionnaire (Necessity subscale) and the Youth Asthma-Related Anxiety Scale (Overall score) indicated a significant association ($r = .31, p < .05$). The association between the Necessity of Medication subscale and the Disease-Related Restriction subscale of the Youth Asthma-Related Anxiety Scale was also significant ($r = .32, p < .05$). **Conclusion:** Findings suggest that caregiver beliefs about medicine, especially the necessity of taking prescribed medications, may be a contributing factor in children’s levels of asthma-related anxiety. In the future, research in this area should replicate findings in a larger sample and also consider ways to increase caregiver’s beliefs in the necessity of asthma medications.

47. **World Languages French Curation Project**

*Hannah Foster, UROP Summer Research Fellow, Depts. of French and International Studies, with Dr. Lionel Mathieu, School of World Studies*

With the constantly increasing implementation of technology into individuals’ everyday lives, the use of electronic apps, websites, and other forms of technology have also pervaded the field of higher education. The explosion of electronic educational sources and learning devices has revolutionized the way students learn.
Because of this trend, the research team behind this curation project has found that learning a foreign language from a textbook is no longer the most effective way of aiding in the development of student language acquisition. Consequently, this research team investigates different modes of online language learning in an attempt to create online educational modules of their own, to be implemented in the French 202 classroom at VCU. Their goal is to design task-based, open-source modules that focus on student interests, encouraging them to find French educational resources that relate to their own fields of study. In this way, this research team aims for students to assume a more dominant role in their own foreign language education.

48. Dredging Land Reclamation Causing Mucus Development in Massive Spherical Corals in the Spratly Islands, South China Sea: The Effects on China's Fishing Industry

Tiffany Ho, VCU Honors College, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

Images from Asia Maritime Transparency Initiative depicted huge masses of white coral mucus secreted from coral reefs in the Spratly Islands of the South China Sea, an area where several land reclamation projects are occurring. The purpose of this research was to understand how increased sedimentation levels from the dredging land reclamation method affects mucus development in massive corals, such as Acropora, located in these reefs. Journal articles that focused on the biology of coral mucus, bacterial communities associated with coral tissue, mucus, and seawater, coral mortality from different environment impacts, coral coverage of reefs in Spratly Islands, and symbiotic relationships between reef fishes and corals were studied. The results showed that massive corals produce excess mucus to counteract the high sedimentation levels in the water column caused by dredging activity. Highly active heterotopic microbial communities are then attracted to the mucus’s dissolved organic carbon and perform respiration that rapidly consumes the oxygen and causes the coral to become stressed. Corals are important in the reef ecosystem, so the death of corals would affect fish higher up in the food chain. The South China Sea mainly supports the fishing industry in China. However, recent studies have shown that number of fish species has declined within the past eight years. The findings suggested that despite China’s two-month annual ban on fishery in the South China Sea, populations of fish will continue to decline as more land reclamation projects are implemented in the Spratly Islands, which would significantly impact the fishing economy.

49. Statistical Properties of Multiplicative Functions on Arithmetical Semigroups

Hanqiu Tan, UROP Summer Research Fellow, Dept. of Mathematics, with Dr. Marco Aldi, Dept. of Mathematics

In the context of abstract analytic number theory, we describe full asymptotic expansions for momenta of prime-independent, multiplicative functions on a class of additive arithmetical semigroup that includes the semigroup of unlabelled graphs. Our main technical tool is a theorem that generalizes earlier work of Wright and Warlimont on generating formal power series related by an Euler Product Identity.

50. Does Socioeconomic Status Moderate the Association between Experiences of Discrimination and Self-Reported Physical and Mental Health?

Nancy Sey, VCU Honors College, Department of Psychology, with Dr. Nao Hagiwara, Dept. of Psychology

Prior research has shown that socioeconomic status (SES) and experiences of racial discrimination independently play an essential role in racial health disparities. However, few studies have systematically examined the interactive effects of SES and experiences of discrimination on health in African Americans. To add to the available literature, this study empirically examined both the independent and interactive effects of SES and the experience of discrimination on self-reported physical and mental health of 121 African Americans. The results showed that overall African Americans with higher SES had better physical and mental health than African Americans with lower SES. The experience of discrimination was statistically significant when looking at mental but not physical health. However, there was no interactive effects of the experiences of discrimination and SES. These findings suggest that the experiences of discrimination are detrimental to African Americans’ health regardless of the amount of material resources individuals possess.
51. Ancient Canine Personhood: The History of Dog Burials

Isabel Griffin, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

Humans and dogs have mutually benefitted from one another for tens of thousands of years. Our alliance started when certain packs of dire wolves began following nomadic humans to scavenge their leftovers. They learned to live comfortably among humans, and their frightening characteristics became recessive. Man shaped dog to his liking. Thus, the bond between man and dog grew stronger. The oldest known dog burial occurred at least 15,000 years ago. Burying the dead is evidence of cultural ritual, as well as a sign of respect. Ancient dog burials can be found all over the world. Some cultures viewed dogs as spiritual guides and took their canine companions to the grave with them. Other cultures used dogs in sacrificial ceremonies and processed their bodies before burying them. Whether you love them or hate them, we are forever historically and ecologically bonded to canines.

52. A Face-masked Vessel of Many Names: Rehnish-Stoneware Bartmann Bellerme jugs

Grace Riggs, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

In my research I will attempt to discern if there is one unifying cultural identity associated with the Frechen Bartmann/Bartmann/Bellerme, “face jugs” of the Western Hemisphere. This style of jug with a facemask is characteristic of the land around the Rhine River. The salt-glazed stoneware jugs are significant and notable in part by the bearded face on the neck of the vessel. In my research there have been a handful of sites scattered along the Eastern side of the Western Hemispheric land mass. Specifically, their unique form is present from Canada, the mid-Atlantic, to Barbados. I will examine if there is a distinct cultural identity associated with these vessels, and potentially how they ended up at these locations. I will examine if the ‘Wild Man’ mythological motif traveled with the jugs over to the new world, or whether the jugs have similar or different meanings in their different locations along the Eastern Coast of the Western Hemispheric land mass. Research Question/ statement/ goal: Is there a consistent cultural identity associated with the Frechen Bartmann, Bartmann, and Bellerme jugs of the Western Hemisphere?

Literature Review (Will need a large number of source material due to inconsistent levels of pertinent information in publications) This turned out to be a large obstacle in my research, but luckily, with the qualitative research that I have found the authors also comment on the shortage of data, outdated publications, and the problem of not having enough fragments to complete vessels, to adequately draw a conclusion across an array of samples. I think it is important to note these problems I encountered during my research to provide inside into why I am using the source material the way I am. In my research I will examine references and excavation reports concerning the distinctive style of the Bartmann/ Bellerme jugs. In a number of sites across the (eastern portion) of the Western Hemisphere these salt-glazed, stoneware vessels are present. Canada Jamestown North Carolina Barbados I will examine the origins of these vessels for a comparative study to those found in the Western Hemisphere: Rhineland Cologne Frechen Cultural Identity along with the bearded face masks “Wild Man” motif. Strong, independent, not bound by cultural conventions. Semantic shift of the wild man motif causing the production to increase/decrease as the jugs fluctuate in and out of English Fashion. Viewed as grotesque, then endearing, and then grotesque. It is not entirely evidence whether the differences in the etching of the face are more regionally distinct or temporally so. There seems to be scholarly disagreement on such, and a rational, supported with evidence, argument could attempt to be made for both sides.

53. Association Between GLP-1R and Alcohol-related Phenotypes among College Students

Candance Moore, IMSD Research Scholar, Dept. of Psychology, with Dr. Amy Adkins, Dept. of Psychology

Alcohol use is prevalent on college campuses. Overconsumption of alcohol can lead to negative consequences related to academic performance, health, and social well-being. Approximately fifty percent of the variance for
risk of developing an alcohol use disorder is genetically influenced. Understanding the underlying components contributing to genetic risk is important so that prevention and/or treatment options can be developed. Past research has demonstrated that variants in the gene for the Glucagon-like peptide-1 receptor (GLP-1R) may be associated with alcohol use disorder. This receptor is found in areas that process pleasure and reward in the brain. We are interested in investigating genetic variants in this gene in a young adult sample. The main hypothesis for this study proposes that GLP-1R allele 168Ser (A-allele) will have a positive correlation with alcohol consumption, alcohol use disorder and negative consequences. Spit for Science (S4S) is a university-wide longitudinal study that is currently investigating self-reported data from college students on behavioral health and alcohol use. Using cohorts 1-3 from the Spit for Science sample (n= 6345), a gene association analysis was completed using PLINK. We analyzed the association between 251 variants in GLP-1R and the following alcohol-related phenotypes: alcohol consumption, alcohol use disorder diagnosis, and negative consequences. Covariates included age, gender and ethnicity.

54. **Effects of Astrocyte-Conditioned Media and cAMP on Blood Brain Barrier Integrity**

*Divya Krishna, VCU Honors College, Dept. of Biomedical Engineering with Dr. Mary Peace McRae, VCU School of Pharmacy*

The blood brain barrier is a selectively permeable barrier, consisting of endothelial cells and tight junctions, between the the brain’s extracellular fluids and capillaries carrying blood. This barrier is affected by drugs such as meth, or viruses such as HIV, and can make drug administration a difficult task. HUVEC cells were grown and used to cross the membrane of transwell inserts that mimic the blood brain barrier. In one experiment, HUVECs were given either HUVEC media, or astrocyte condition media. These HUVECs were plated and infected with VE Cadherin, an adhesion molecule. It was found that the HUVECs treated with astrocyte condition media had much tighter, clearer tight junctions that the HUVECs in regular HUVEC media, indicating that astrocytes may play a significant role in strengthening the blood brain barrier. The main project consisted of a series experiments in which HUVECs and Astrocytes in their respective medias were treated with Diazepam at 72 hours, 24 hours, and 2 hours before the addition of Lucifer-Yellow fluorescent dye. Samples were taken at different time intervals after the Lucifer Yellow was added, and absorption was measured. The absorption correlates to the amount of HUVEC cells that have crossed the transwell insert membrane. It was found that the longer the Diazepam treatments, the higher the absorption values up to 30 minutes after adding Lucifer Yellow. This indicates that cells treated with Diazepam for longer periods of time better pass through the membrane, whereas the cells treated with Diazepam for a shorter period of time did not pass through the membrane as readily, so the barrier remained more intact. In the control groups without Diazepam treatments, the absorption values were much higher, meaning that there was a higher concentration of HUVEC cells that crossed the membrane. These results show that both a Diazepam treatment of 2 hours, along with astrocyte condition media, reinforces the barrier in terms of strengthening tight junctions and making the cells less proficient in crossing the barrier. Strengthening the blood brain barrier through different methods would help to lessen the effects of brain-affecting conditions such as HIV and Alzheimer’s, and weakened barriers would aid in the process of medications crossing to the brain.

55. **Through the eyes of the first humans in North America**

*Lisa Day, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology*

During the Ice Age many large land mammals, or megafauna, ruled the Earth. These animals were extremely adapted to the cold and grew to large size in order to keep their bodies warm and were able to travel vast distances in order to get the amounts of food needed to survive. As they travelled across land bridges it is assumed that Ice Age humans followed and hunted them, eventually ending up in North America. Some studies suggest that overhunting by humans along with a warming planet eventually led to extinction of most of the extremely cold-adapted animals, like the mammoth, mastodon, giant beaver, dire wolf, short-faced or Pleistocene bear, Pleistocene camel and giant ground sloth. In this project I hope to bring together some of the animals that were definitely hunted by humans, like mammoths and mastodons, as well as some that may
have hunted the humans. My focus is on the megafauna that humans saw when they first arrived in North America and to hopefully introduce some that people today are not aware existed.

56. **Environmental and Socioeconomic Analysis of Urban Heat Island Effect in the Richmond Metropolitan Region**

*Kaitlin Savage, Depts. of Environmental Studies and Urban and Regional Studies, with Dr. Jennifer Ciminelli*

This research utilizes GIS applications to provide an environmental and socioeconomic analysis of urban heat island across Virginia’s Richmond metropolitan area. As the world’s population continues to grow, cities have undergone tremendous social, economic, and environmental stress. Today, over 80% of Americans live in urban areas while global urbanization trends suggest a continued migration of individuals from rural areas into more densely developed communities; these rapid growth and evolving land use patterns present an imperative for sustainable development within the context of urban planning. Urban heat island (UHI) phenomenon describes urban areas which experience elevated temperatures due to a number of contributing human factors. Decreased vegetation (combined with increasing areas of dark, impermeable surfaces) and higher levels of local emissions from vehicles can enhance the UHI effect, while persistent temperature disparities between urban and rural areas pose a number of threats to human and environmental health.

Initial phase of analysis identifies local concentrations of heat disparities using remote sensing data provided by NASA’s LANDSAT satellite imagery. Environmental data related to localized heat severity was subsequently integrated with a spatial analysis of community demographic variables, such as race, income, and educational attainment, to (1) explore any significant statistical relationships and (2) provide a secondary index to represent community vulnerability to heat island effects. The final research component of this project utilizes phase one and two findings to offer specific local recommendations related to successful future UHI mitigation.

57. **“Being Big Back Then…”**

*Alejandro King, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology*

My research will explore how giant Ice Age animals differed from their cousins, that still live today, and what giant Ice Age animals tell us about their living cousins? For example, I will compare the behaviors and attributes of Giant Beavers or Giant Ground Sloths, to their cousins today, the Beaver and the Sloth. If conclusive enough evidence presents itself, perhaps even findings about the extinction of a species, or a species’ lineage today can be made.

58. **Analysis of lower leg muscles after Spinal Cord Injury using Magnetic Resonance Imaging**

*Alexis Gonsalves¹-², Robert Lester², Ashraf S. Gorgey²,³*

¹ Health, Physical Education, Exercise Science Major-Kinesiology and Health Science, Virginia Commonwealth University, Richmond, VA 23249, USA

² Spinal Cord Injury and Disorders Center, Hunter Holmes McGuire VAMC, 1201 Broad Rock Boulevard, Richmond, VA 23249, USA

³ Department of Physical Medicine and Rehabilitation, Virginia Commonwealth University, Richmond, VA 23249, USA

Shortly after spinal cord injury (SCI), the musculoskeletal system experiences a series of changes in size and composition, predominantly below the level of injury. Reduced mobility and mechanical unloading initiate an adaptive reduction in both muscle size and bone mineral content. The loss of muscle size and strength, along
with increased sedentarism, predisposes persons with SCI to rapid and severe bone mineral density decline and other health related consequences. Studies involving exercise, resistance training, and electrical stimulation have proven to induce muscle hypertrophy and reduce osteopenia after chronic SCI. A variety of imaging technology, including computerized tomography and magnetic resonance imaging (MRI) have been used to determine the effectiveness of exercise programs designed to attenuate rapid muscular atrophy and decline in bone mineral content. In the current review, we aimed to summarize the methodological approach used to manually trace the lower extremity muscles using MRI. This was important to provide an appreciation of the detailed procedures required to perform analysis, despite of the poor muscle quality, increased intramuscular fat (IMF; i.e. the fat infiltrated within muscle fibers and between muscle groups) and altered anatomical boundaries of the target muscles. We also intend to highlight the significance of analyzing lower leg muscle CSA and its relationship to musculoskeletal and venous dysfunction in persons with SCI. Our ultimate goal is to use this technology to determine those who are at risks of developing secondary conditions, including venous thromboembolism, pulmonary embolism, cardiovascular disease, pressure ulceration and osteopenia.

59. A Path to Empowerment: Fundación En Vía's Formula for Success in Teotitlán del Valle

Katharine Hines, UROP Summer Research Fellow, Dept. of Political Science, with Prof. Christopher Saladino, Dept. of Political Science

Fundación en Vía is a non-profit in Oaxaca, Mexico that has created a system that allows women in Teotitlán del Valle to obtain a micro-finance loan, take business classes and offers free English classes to the community. En Vía helps its participants build and or maintain successful businesses through their micro-finance loans they provide by means of ecotourism. The way in which En Vía operates is an example of a highly successful model for non-profit systems due to their high pay back rate. I am conducting this research by spending time with the women in the village who are receiving loans and I am in contact with the administration of En Vía. I will demonstrate the ways in which Fundación en Vía has created a successful finance program for the women in Teotitlán with the combination of their English language program and how it can serve as a model for other non-profits.

60. Ethnographic Study on Hip Hop in Richmond

Chanell Noise, Depts. of Sociology and African American Studies, with Dr. Vivian Dzokoto, Dept. of African American Studies

This ethnographic study on Hip Hop in Richmond aims to answer the question: What is Hip Hop in Richmond, Virginia like? Like many other locales (Atlanta, Toronto, New York, Cape Town, et cetera) Richmond has its own distinct way in which Hip Hop is consumed as an art form and created as a culture. Answering this question allows some of the complexities of this far-reaching and newly diversified sub-culture to come to light. Using literature authored by H. Samy Alim and other well-versed Hip Hop or Black Studies scholars, I created a coding system that would identify words and/or phrases that corresponded with the four flavors of Hip Hop. The four flavors I chose are not exhaustive of how Hip Hop can exist or be interpreted, but were chosen for relevance and time-efficiency. I collected qualitative research via engaging in interviews with Hip Hop arbiters and consumers, transcribed the interviews, decoded the data and concluded each interview by noting the frequency of each flavor showing up in the interview. My data collection is done and I am in the final stages of decoding and transcription. My data is leaning towards Richmond Hip Hop perpetuating original themes (themes of the South Bronx, deindustrialization and being black) while also largely being a genre-less or more artistic expression of oneself. Based on my results I have and what I expect to see, I conclude that Hip Hop in Richmond is comprised of artists, dancers and engineers looking to break rules. This holds with the growing trend in the city to patronize and celebrate art and artistry in physical forms. This study also makes clear the malleability of Hip Hop as an art form and the far reach of Hip Hop as a culture.
61. **Ancient Egyptian Figurines: An Investigation into Manufacture, Use, and Culture.**

Kristina Donnally, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

I will analyze the social and religious role of figurines in Egyptian society. I will delve into the differences in the figurines in both manufacture and purpose between the Old, Middle, and New Kingdoms. I hope to look at religious, political, and other figurines to get a broad spectrum of usage for the artifacts. The main purpose of the research is to identify the time period, purpose, and usage for the figure donated to VCU by Professor Waybright. Questions I have is if the changes in political structure and minute changes in religion between each Kingdom affected the manufacture and use of figurines. Another question is to see if there are any significant differences in the religious figurines during periods of religious conflict such as the Amarna Period.

62. **Pro-inflammatory Macrophage Activation Induced by Exposure to Hyper Gravity**

Cristian Coriano, Dept. of Biomedical Engineering, with Dr. Rene Olivares-Navarrete, Dept. of Biomedical Engineering

Introduction: Microgravity has been shown to suppress immune response in space, leaving the body more susceptible to infection. Activation and proper function of immune cells, specifically macrophages, is essential for the protection and function of the body. In this study we aim to determine the effect of increased gravitational forces on macrophage activation. Methods: To simulate increased gravity cells were centrifuged at varying levels of rotational gforces (xg). RAW 264.7 cells were centrifuged at 50xg, 100xg, and 300xg for 5 cycles of 10 minutes spinning followed by rest and compared to control cells. Changes in macrophage activation were measured by quantitative polymerase-chain reaction (PCR) for markers of pro- (Il1b, Il6, Tnf) and anti- (Tgb1, Il10, Retnla) inflammatory genes expressed by cells immediately after exposure to hyper gravity (unplated) and after 24 hours of culture (plated). Gene expression results were then confirmed by enzyme linked immunosorbent assay (ELISA) quantification of proteins (pro: IL1β, IL6, TNFα, and anti: IL4, IL10) released from cells 24 hours after g-force exposure. PCR (n=3) results displayed as ΔΔCT over control and Gapdh and ELISA (n=6) normalized to DNA levels. Differences were determined by one-way ANOVA with Tukey (α=0.05) comparison between groups. Results: In both PCR and ELISA there was a clear trend of increased pro- and decreased antiinflammatory markers as the exposure to rotational g-forces increased. An increase in antiinflammatory gene expression is measured at 50xg, which then decreased as the rotational gforce increased. Overall, unplated cells showed the greatest fold regulation of pro-inflammatory genes compared to control, while plated cells were able to somewhat recover. Conclusions: The results from these studies demonstrated a strong effect of hyper gravity on macrophage activation. The immediate implication is that this reaction occurs every time cells are pellet. However, if pelleting is consistent within groups at 300xg the change will be negligible. Next steps in this study may be to assess the effect of increased g-forces on macrophage function through phagocytic intake. Increased immune activation with hyper gravity may lead to a method to be applied as a therapeutic means to treat an immuno-suppressed being. Figure 1: Fold regulation of pro- (IL1B, IL6, and TNF) and anti- (Tgb1, Il10, Retnla) inflammatory factors of RAW264.7 cells immediately (unplated) following exposure to increased g-forces and following 24

63. **SETTLER-COLONIAL/DECOLNAL VIOLENCE, INDIGNIOUS POWER, AND POLITICAL EDUCATION IN RHYMES FOR YOUNG GOULS**

Noah Mullinax, Depts. of English and Philosophy, with Dr. Cristina Stanciu, Dept. of English

First Nations director Jeff Barnaby’s 2013 film, Rhymes for Young Ghouls follows Aila, a young First Nations woman dealing with the suicide of her mother and the incarceration of her father, while also trying to avoid being sent to Indian boarding school. At the same time, the Indian Agent targets and threatens Aila and her
Comparing treatment differentiation and adherence instruments across two youth anxiety treatments in community settings

Ruben G. Martinez, Ellie G. Wu, Connor P. Hicks, Stephanie Violante, Bryce D. McLeod, Michael A. Southam-Gerow, Bruce F. Chorpita, & John R. Weisz, Dept. of Psychology

Background

Developing instruments to assess multiple components of treatment integrity is an important goal for implementation science.1,2 The Therapy Process Observational Coding System - Revised Strategies scale (TPOCS-RS)3 has been used to assess treatment differentiation (i.e., extent to which interventions outside a model are delivered) in research and community settings4,5 with cognitive-behavioral therapy (CBT) and usual care. The TPOCS-RS was not specifically designed to assess treatment adherence (i.e., extent to which model-prescribed interventions are delivered) to a specific treatment protocol. However, the TPOCS-RS items cover five broad theory-based domains (cognitive, behavioral, psychodynamic, client-centered, family), which allows researchers to assess the extent to which interventions that are consistent and inconsistent with a treatment protocol are delivered. Assessing the extent to which treatment differentiation and adherence tools overlap could move the field toward the goal of reducing resources required to measure treatment integrity across settings. Method The purpose of this study is to assess the relation between the TPOCS-RS and the CBT Adherence Scale for Youth Anxiety (CBAY-A) when assessing therapeutic interventions delivered as part of standard manual treatment (manualized treatments with prescribed order; SMT) and modular treatment (31 modules corresponding to SMT practices with no prescribed order; MT) for youth anxiety in community settings.6,7 The CBAY-A is an observational coding system that measures adherence to SMT and MT.8 This study will use a sample of N = 603 recordings from N = 38 youths diagnosed with anxiety disorders.6,7 All sessions were coded using the TPOCS-RS and the CBAY-A. Two TPOCS-RS subscales will be generated in order to measure adherence to SMT and MT.5 In addition, the two created TPOCS-RS subscales will be compared to three existing TPOCS-RS subscales (Client-Centered, Family and Psychodynamic) and the TPOCS-Alliance scale (TPOCS-A)9 to assess discriminant validity. Analytic plan Mean levels of adherence and inter-rater reliability (ICCs) will be reported for the relevant TPOCS-RS and CBAY-A scales. Convergent validity of the TPOCS-RS and the CBAY-A will be assessed by calculating Pearson’s r for the following subscales: 1) CBAY-A and TPOCS-RS MT subscales in the MT sample, and 2) CBAY-A and TPOCS-RS SMT subscales in the SMT sample. Pearson’s r will also be calculated at the overall level. Discriminant validity of the MT and SMT subscales on the TPOCS-RS will be assessed by calculating Pearson’s r for the two generated TPOCS-RS subscales (MT and SMT) and the following scales: TPOCS-RS Family, TPOCS-RS Psychodynamic, TPOCS-RS Client-Centered and TPOCS-A. Learning objectives: 1. To discuss the overlap between treatment differentiation and adherence tools 2. To further understand the psychometric properties of the TPOCS-RS 3. To discuss future considerations in efficient treatment integrity measurement. Keywords: Treatment
65. **Role of Desmosome and Nuclear LINC Complex Forces in Cardiomyocytes**

*Nicole R. Duggan*\(^1\) UROP Summer Research Fellow, Paul T. Arsenovic\(^1\), Daniel E. Conway\(^1\) \(^1\)Department of Biomedical Engineering, Virginia Commonwealth University, Richmond, Virginia 23284

**Introduction:** Genetic mutations in both desmosomal and nuclear LINC complex proteins result in cardiomyopathies. However, the role of these cytoskeletal-connected structures in cardiomyocytes is not well understood. We sought to use dominant negative proteins to decouple desmosomes and the LINC complex from the cytoskeleton to determine the importance of mechanical forces across these structures.

**Materials and Methods:** Cardiomyocytes derived from induced pluripotent stem cells (iPSCs) were purchased from Cellular Dynamics. These cells spontaneously beat and are therefore a useful model to study forces on both desmosomes and the nuclear LINC complex. Cardiomyocytes were cultured on glass bottom dishes suitable for fluorescent live cell imaging. Adenovirus was used to express dominant negative (DN) KASH to decouple the nuclear LINC complex from the cytoskeleton or dominant negative desmoplakin (DP-NTP) to decouple desmosomes from intermediate filaments.

**Results and Discussion:** Cardiomyocytes expressing DP-NTP and DN-KASH exhibited altered movement when compared to control cells. To quantify this movement, cells were stained with Hoechst to label nuclei, and nuclei were tracked using high speed wide field fluorescence microscopy. The frequency of nuclei movement was higher for both DP-NTP (Figure 2) and DN-KASH (Figure 3) than control cells (Figure 1), with the highest frequency for DN-KASH. We are currently using force biosensors to measure the mechanical forces exerted across desmosome and LINC complex proteins.

**Conclusions:** Decoupling desmosomes or the LINC complex from the cytoskeleton alters the beat frequency and nuclei movement in cardiomyocytes. These results support the hypothesis that mechanical forces through desmosomes and the LINC complex are important regulators of cardiomyocyte physiology.

66. **Trenches and Tribulations**

*Adam Blakemore, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology*

This poster intends to delineate the state of Public Archaeology, as well as its importance in creating relationships between archaeologists and the public. With an increase in social media and a new level of transparency for the public, studies need to be done in how best to connect with and disseminate archaeological data to the interested public, as well as those who don’t know they should be interested. I expect to find a connection between posting data on social media sites like Instagram and Twitter, and an increased level of interest from the public. There may be a lack of data, but could make some of this research difficult, but I expect to be able to draw some conclusions.

67. **The Public’s Perception of Archaeology**

*Diana Salazar, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology*

Today, exotic locations have always been a big attraction among the public which often becomes entertainment in the form of film, literature, or exhibits. This is mainly due to the acts of archaeologists who travel to discovery the several wonders of different cultures that many would not have the time to see themselves. However, there are always problems and issues when it comes to accurately portraying cultures that are not commonly known to others. This poster aims to discuss the influence of archaeology among the public’s perception of dissimilar cultures, especially in reference to the Luxor Casino’s King Tut Exhibit. The
direction will focus on how and why archaeology influences the public, how the public viewed the Egyptians, how accurate the Casino replicated the tomb of King Tut in Luxor, Egypt, and possible solutions in correctly informing the public about exotic locations.

68. **Figures and Ornaments: Art of the Iroquoian Peoples**

*Ben Snyder, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology*

This research will look into the artistic products of Iroquoian speaking peoples over the years, with a special focus on the early colonial era. Some background on who the Iroquois are and their history will be given, as well as on their material culture specifically. Folklore, mythology, and other narratives and potential meanings will be examined in relation to the art and especially figural representations. It will be seen how various objects would have been used through people’s lives, and the ideas and motivations involved in them. This will all be done in the context of looking toward recent discussions on how American Indian art should be seen and the importance of the living traditions that represent it today.

69. **Predicting outcome of cardiac arrest patients undergoing induced hypothermia through observing alterations in metabolite compositions**

*Kyle Gilley, Dept. of Biology, with Dr. Dayanjan Wijesinghe, Department of Pharmacotherapy and Outcomes Sciences. Dr. Mary Ann Peberdy, Department of Internal Medicine*

Metabolite changes in the body brought on by cardiac arrest can provide significant insight to the subsequent complication among patients. As such, they could prove helpful towards instituting a more targeted treatment of the patient through personalization of care. The need for personalized care for cardiac arrest patients is critical as damage to the body from oxygen deprivation, specifically the brain, and the speed in which care and proper resuscitation efforts were performed varies greatly from patient to patient. By measuring and detecting metabolomic changes, biologic pathways critical for survival can be identified and targeted in an effort to improve patient’s long-term outcomes. Induced hypothermia is a hospital procedure used in which the core body temperature is lowered to approximately 33°C, and it is recommended in cardiac arrest patients to improve survivability. This study focused on analyzing metabolomic changes in the patient’s plasma at three different time intervals: Once the patient is admitted to the hospital (T1), after hypothermic therapy is administered (T2), and once the patient’s core temperature is brought back to normal (T3).

70. **Oncolytic Poliovirotherapy of Glioblastoma:**

*Sadaf Kolia, VCU Honors College, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College*

Glioblastomas stem from astrocytes that comprise the supportive tissue of the brain and are regarded as one of the most aggressive types of tumors of the central nervous system. While surgical resection, chemotherapy, and radiation are viable treatment options readily prescribed today, prognoses remain dismal and survival rates rarely surpass one year. Recently, researchers have directed their efforts towards improving oncolytic virotherapy and have conducted numerous clinical trials with different viruses in order to study the antineoplastic and immune-stimulatory properties of oncolytic viruses. Specific attention has been given to poliovirus recombinant, PVS(RIPO) and its ability to effectively bind to and lyse glioma cells as well as induce an anti-tumor immune response. In this review, I studied the relationship between expression levels of cell-surface adhesion molecule, CD155, poliovirus binding rate, and subsequent immune response by analyzing published studies on the effect of CD155 on the efficacy of oncolytic poliovirotherapy. The results of the studies I analyzed indicate a positive correlation between expression levels of CD155 and glioma growth, migration rate, and migration distance. However, greater levels of CD155 expression also resulted in an
increased affinity of glioblastomas for poliovirus and lead to increased immunogenic cell death (ICD), which then produced an inflammatory, anti-tumor immune response, thus resulting in further ICD. These results imply that while increased rates of CD155 expression may correlate with faster rates of tumor cell migration to greater distances, if poliovirotherapy is being utilized as a treatment plan, upregulating CD155 molecules on the surface of glioblastoma cells would prove beneficial as more CD155 raises the overall rate of tumor ICD, stimulates an antineoplastic immune response, and ultimately improves the effectiveness of oncolytic treatment.

71. STIMULATING CREATIVITY THROUGH MINDFULNESS PRACTICES WITHIN THE INFORMATION SYSTEMS CURRICULUM

Nibal El-Aridi, Dept. of Information Systems, with Ginny Ross and Dr. Elena Olson, Dept. of Information Systems

Mindfulness has become an increasingly important practice established within workplaces to stimulate creativity and organizational awareness. Mindfulness is referred to as the process of engaging in the present and being aware of your surroundings to raise levels of focus (Batalo, 2012). Due to the increase in complexity of IT use, mindfulness has specifically become prominent in the field of information technology and computer science to counteract hypersensitive technical environments. High-reliability organizations, such as air traffic control systems, naval aircraft carriers, and nuclear power operations, are critically dependent on seamless IT performance since the slightest technology or system error can send the organization to a crumble. Organizations as such are required to respond to potential threats by sustaining high levels of mindfulness (Valorinta, 2009). IT leaders within these organizations are engaging in mindful practices to improve their managerial conduct. This mindful engagement by leaders can spur IT innovation within one’s organization to reveal dynamic perspectives in workplace performance and decision making (Lu, 2010). In this paper, we research various technology organizations to recognize, classify, and rank the use and impact that mindful practices have on the organization. By analyzing the behaviors of the organization’s technology leaders and current industry cultures, we look to identify the best practices that help technology organizations maintain sustainable levels of mindfulness. The identified practices will be incorporated into the environments of Information Systems classrooms to aid the students in developing cognitive skills necessary in preparation of the future IT leader’s career track within modern organizational cultures. The increase of mindful practices by Information Systems students is expected to increase their perceptions of creativity and tendencies to learn in their educational curriculum and long-term professional career (Lourenço, 2011). REFERENCES: Batalo, M. (2012). Creativity and Mindfulness (Doctoral dissertation). ERIC Institute of Education Sciences. ED547198 Lourenço, F., & Jayawarna, D. (2011). Enterprise education: The effect of creativity on training outcomes. International Journal of Entrepreneurial Behavior & Research, 17(3), 224-244. doi:10.1108/1355255111130691 Lu, Y., & Ramamurthy, K. (2010). Proactive or reactive IT leaders? A test of two competing hypotheses of IT innovation and environment alignment. European Journal of Information Systems, 19(5), 601-618. doi:10.1057/ejis.2010.36 Valorinta, M. (2009). Information technology and mindfulness in organizations. Industrial and Corporate Change, 18(5), 963-997. doi:10.1093/icc/dtp027

72. Evaluation of Social Networking Sites as Applicant-Screening Tools for Human Resources Professionals

Caroline Clary, VCU Honors College, Business Administration, with Prof. Mary Boyes, VCU Honors College

Social networking has taken the Internet by storm with a multitude of platforms from which to choose, and human resources professionals are anxious to explore the potential of these sites as strategic screening mechanisms in order to maximize the value of their human capital and thus increase corporate profitability and sustainability. Personal social media accounts offer employers a wealth of information about each individual applicant, opening a window into a prospective employee’s private life far beyond anything that can be viewed as job related. As a result, businesses may find that selecting the best and brightest talent based on social media screenings as a component of the hiring process often collides with current legislation, corporate image, and views on corporate ethics. In spite of these findings, companies continue to forge ahead with their use of social networking sites for applicant screening purposes; however, research and judicial rulings are currently lagging behind, making it difficult for employers seeking a sense of direction in the use of this new
applicant screening strategy. Through an examination of current, peer-reviewed research and government publications, this study promotes informed decision-making through the analysis of current benefits as well as challenges associated with the use of social media sites in applicant screening, and provides guidance for companies wanting to incorporate its use into their screening protocols. Until social media screening is more fully evaluated and established, employers should minimize its use, and at the very least, exercise due diligence in developing policy and structured protocols that are clearly founded in job relatedness.

73. Stress reactive heart rate variability and cortisol response in adolescent and young adult monozygotic twins discordant for lifetime major depression

Bijal Rajput, VCU Honors College, Dept. of Biology, with Dr. Roxanne Roberson-Nay, Dept. of Psychiatry

Reduced heart rate variability (HRV) has been associated with major depressive disorder (MDD) and is a useful marker and predictor of cardiovascular morbidity and mortality. Depressed males have a higher cardiovascular morbidity and mortality rate than depressed females, suggesting there could be a difference in HRV between genders. Depression also has been found to be associated with blunted cortisol reactivity, a measure of the hypothalamic pituitary adrenal (HPA) axis stress response. This study aims to 1) examine differences in HRV and cortisol reactivity among adolescent monozygotic (MZ) twins discordant for a history of MDD and 2) examine gender differences in HRV among those a history of MDD. Participants include 110 adolescent pairs of MZ twins between the ages of 15-20. HRV was measured 5 minutes before and after participants were subjected to the Trier Social Stress Test (TSST), a laboratory paradigm designed to induce stress through a public speaking task and serial subtraction. Cortisol was measured prior to and four times following the TSST. For Aim 1, the study will use a discordant MZ twin design, in which differences in pre-post HRV and cortisol reactivity will be compared. Aim 2 will compare pre-post HRV between depressed male and female twins. We predict that twins with a history of MDD will exhibit lower HRV and blunted cortisol reactivity compared to their MDD unaffected co-twins and, furthermore, that depressed males will have lower HRV than depressed females. Results will identify utility of HRV and cortisol as diagnostic validators of MDD history.

74. Petersburg Urban Farming System

Quinton Batts, Dept. of Interdisciplinary Studies, with Prof. Mary Shelden, VCU University College

The project I am proposing is a sustainable urban farming system that I believe can benefit the City of Petersburg and help rebuild and revitalize the local communities. My vision is create a urban farming system around the community with greenhouses positioned strategically in local neighborhoods around the city making the food more accessible and easier to transport. I want Petersburg to become what it once was a thriving historical city that is also transformational in local sustainability. The greenhouses will only use aeroponic growing systems that’s will cut down on water consumption and the use of dirt. This will produce fresh healthy produce all year round no matter the season making this a very profitable opportunity for the city. I have seen first hand from my community partner how powerful community gardens are how the concept could help bring together local communities and also help raise funds for the city giving power back to the people in Petersburg, Virginia. The city has been hit with many trials and tribulations from financial troubles to politics. I want to see something positive given to my hometown to give them a sense of home and something to build upon.
75. Using Augmented Reality to Explore the Relationship Between the Physical and the Metaphysical

Bethany Allen, UROP Summer Research Fellow, Dept. of Sculpture and Extended Media, with Prof. Matthew Warren, Dept. of Photography and Film

The purpose of this project was to determine ways that augmented reality could be used with art to challenge how we think about perception, space, the qualities of objects, and other inquiries in the metaphysical. AR technology raises questions about how we define space and how that definition may need to adapt to advancements in both technology and our understanding of the world. The experience of AR can create a beautiful and easily illustrated metaphor about these things. The goal was to create such an experience by making a book of images that have corresponding AR imagery which can be viewed through an application on a smartphone. The beginning of the process involved creating the images for the book and altering them until they were recognizable by the program that would initiate the AR imagery. The overall approach was to experiment with and manipulate both the 2D images and the 3D imagery until a satisfactory visual and conceptual relationship was developed between them. Upon completion of the work, we found that our interactions with and responses to the book and app provoked the questions we were aiming for.

76. Developing Functionalized Nanofibers for Hazardous Chemical Detection

Jessica Corson, VCU Honors College, Dept. of Chemical and Life Sciences Engineering, with Dr. Christina Tang, Dept. of Chemical and Life Sciences Engineering

Chemical warfare is a prevalent approach of attack in the current combat environment. Common chemical weapon agents are organophosphates like Tabun, Sarin, Soman, and VX, which function as neurotoxins, leading to loss of muscle control and death. Currently, soldiers are able to detect these organophosphates with handheld detection devices and color-changing paper; however, the devices are cumbersome and temperature/humidity sensitive while the paper fails in water and may indicate false positives. The purpose of this research is to address the current problems in portable organophosphate detection. Our approach is to couple nanofibers that change color as pH changes with an enzymatic degradation of organophosphates to produce an acidic byproduct. pH responsive nanofibers are achieved by incorporating polyaniline (PANI), a pH sensitive, color-changing polymer. Enzymatic degradation is achieved by immobilizing organophosphate hydrolase. Currently, we are using atrazine chlorohydrolase (enzyme) to detect atrazine, an herbicide, as a model system. Nanofibers that change from blue to green in the presence of HCl vapor have been achieved by both embedding PANI within cross-linked polyvinyl alcohol (PVA) nanofibers and grafting PANI to the surface of nylon nanofibers. Comparing the two color changing fabrics, PANI/PVA changes color more quickly and noticeably than PANI on nylon. Specifically, when exposed to 2nM HCl vapors, PANI/PVA changed color from blue to green after 20 seconds while PANI on nylon changed color from blue to blue-green after 50 seconds. We attribute the difference to increased PANI specific surface area when encapsulated compared to grafted on the fiber surface. The next step is to immobilize protein using the PANI-containing nanofibers as supports. We are currently investigating the activity of immobilized enzyme.
“Skintronics” is a project that covers multiple different facets. The portion of the project I work on is the microfabrication of Electrocardiography devices, ECGs. The ECGs I fabricate are designed to be flexible, stretchable and wireless circuits that can be applied to the skin directly. The device is encased in a conformal, silicon-like substance, called Eco-flex, that allows the ECG to be packaged with the electrodes. Each electrode has been previously measured and verified that it will fall in the correct placement needed for a reading. Prototyping this ECG/electrode combination allows the user or doctor to mount the prototype directly to the patient without having to plug-in and attach ten electrodes. This prototype solves the issue that comes about when a doctor, nurse or emergency medical technician must attach a traditional 12-lead ECG that requires sufficient knowledge and experience required to place every electrode accurately and precisely in order to achieve an accurate reading. In my fabricated device, the ECG is wired directly to the three most crucial electrodes placed at V2, V3 and V4 based on the traditional precordial electrode placement for a 12-lead ECG. By covering these three positions, my research team and I can ensure we achieve an accurate reading, and will not have to struggle to find the correct placement due to the compact design of pre-placed electrodes. Another benefit of this new prototype is its flexibility. This allows the circuit to be more durable when being picked-up, transferred to the patient, and then removed; this may also allow for multiple applications whereas conventional electrodes can only be used once. This prototype is currently in the preliminary stages of testing and will hopefully be implemented into medical practice in the future.

The gram-negative bacterium Sneathia amnii is a poorly-characterized commensal of the female urogenital tract frequently associated with adverse clinical outcomes such as bacterial vaginosis (BV), amnionitis, and preterm labor. To investigate its potential role in virulence, we sought to identify and characterize virulence determinants produced by S. amnii in an effort to better understand the pathogenesis of infectious preterm birth. Through sequencing of the Sn35 genome (type strain of S. amnii), we identified two genes with amino acid sequence similarity and structural similarity to the filamentous hemagglutinin (FHA) protein of Bordetella pertussis and its Type Vb autotransporter. Because S. amnii requires human blood components for growth and lyses human red blood cells, we hypothesized that this two-partner system was involved in hemolysis. To characterize the function of the FHA-like protein, a purified, recombinant peptide was used to induce an antibody response. The polyclonal rabbit serum against the antigenic peptide was incubated with S. amnii to block the FHA-like protein prior to the addition of red blood cells. Pre-treatment with the antiserum inhibited hemolytic activity against human erythrocytes suggesting that the FHA-like protein is somehow involved in hemolysis. Additionally, we found that the hemolytic activity of S. amnii was highly specific against human red blood cells; it did not lyse horse or rabbit red blood cells and only minimally lysed sheep red blood cells. Further research efforts will focus on purifying functional FHA-like protein for further characterization and to determine whether it is sufficient to induce hemolysis.
79. Early Adolescents' Perceptions about the Practicality and Relevance of the Second Step Youth Violence Prevention Lessons on Emotion Management

Cheyenne Johnson, Alyssa Bulan, Antoinette Waller, Dept. of Psychology, with Dr. Terri Sullivan, Dept. of Psychology

Second Step is a youth violence prevention program intended to promote positive social and emotional development among youth. It uses age-appropriate methods to explain coping and decision-making skills to support youth through common difficulties they go through at their age, such as peer pressure and bullying. Some studies have assessed this program's effectiveness in preventing youth violence (e.g., Espelage, Low, Polanin, & Brown, 2013), but little research has focused on student's evaluation of the practicality and relevance of the skills learned (see Farrell, Mehari, Mays, Sullivan & Le, 2015 for an exception). This study examined students' perception of the relevance and practicality of Second Step skills for emotion management by interviewing middle school students about their experiences. A total of 74 students from an urban public school participated, and most students identified themselves as African-American (97.5%). A total of 75.6% of students reported that they had used emotion management skills taught in the program to deal with problematic situations. Of those students, 55.4% reported this skill as working favorably for them, and 6.8% reported that this skill did not work favorably for them. For students who used this skill, 55.4% reported being confident in using it, while 6.8% reported that they did not feel confident applying this skill. Of the students who did not use this skill, 9.5% said they felt “pretty” or “very” confident that they could use the skill, and 2.8% said they felt “not at all” or “not very” confident using the skill. Qualitative analyses will be presented that describe why students did not use the skill, how well it worked if the skill was applied, and factors that made it easier or harder for students to implement the skill. Implications of the study findings will be discussed.

80. "I know he only wants the best for me" : A Qualitative Exploration of the Relationship Between African-American or Mixed-Race Youth and Natural Mentors

McKenzie Stokes, Deps. of Psychology and African-American Studies; Research conducted with the University of Virginia Summer Undergraduate Research Program

Objectives: To utilize data from a longitudinal study investigating the development, characteristics, and influence of non-parental youth-adult relationships (YARs) across contexts over key transition points during adolescence. Specifically, with the intent to better understand how African-American and mixed-race youth perceive relationships with their natural mentors (VIPs) and other significant persons in their lives.

Methods. The current project employs a qualitative design, in which a case study of eight minority youth was performed. This investigation was guided by two soft research questions: 1) How do African-American and Mixed-race youth perceive relationships with their natural mentors? and 2) What types of social support do these youth favor from significant adults? The larger research team had already utilized Dedoose to code for five forms of social support: companionship, emotional, instrumental, informational, and validation (Wills & Shinar, 2000). In addition they also systematically coded for other variables such as frequency of contact and quality of interaction. All of the aforementioned codes and more guided thematic analyses of the interview transcripts to complete the overall case study.

Results. Data revealed that African-American and Mixed-race youth emphasized variables of distance, in-vivo closeness, and shared experiences as factors that contributed to their relationships with their natural mentors. More specifically, African-American participants expressed that frequency of contact, quality of interaction, and adult initiation were what helped them develop and maintain relationships with their VIP. These findings are interesting in comparison to youth of mixed-race who explained that length of time known and youth initiation is what made their relationships to their VIP and other significant adults meaningful.

Conclusions. Findings illustrate how African-American and biracial youth in this sample perceive relationships with their natural mentors, and further our understanding of what helps to foster such bonds. It
is important to note that this design was a qualitative case-study and in no way should be generalized to larger groups of people. However, this work should be a reference point for future larger studies seeking to investigate the relationships between minority youth and relationships with natural mentors.

81. Evaluating Feature Extraction Methods for Biomedical WSD

Clint Cuffy, Dept. of Computer Science, with Dr. Bridget McInnes, Dept. of Computer Science

Introduction. Biomedical text processing is currently a high active research area but ambiguity is still a barrier to the processing and understanding of these documents. Many word sense disambiguation (WSD) approaches represent instances of an ambiguous word as a distributional context vector. One problem with using these vectors is noise -- information that is overly general and does not contribute to the word’s representation. Feature extraction approaches attempt to compensate for sparsity and reduce noise by transforming the data from high-dimensional space to a space of fewer dimensions. Currently, word embeddings [1] have become an increasingly popular method to reduce the dimensionality of vector representations. In this work, we evaluate word embeddings in a knowledge-based word sense disambiguation method.

Methods. Context requiring disambiguation consists of an instance of an ambiguous word, and multiple denotative senses. In our method, each word is replaced with its respective word embedding and either summed or averaged to form a single instance vector representation. This also is performed for each sense of an ambiguous word using the sense’s definition obtained from the Unified Medical Language System (UMLS). We calculate the cosine similarity between each sense and instance vectors, and assign the instance the sense with the highest value.

Evaluation. We evaluate our method on three biomedical WSD datasets: NLM-WSD, MSH-WSD and Abbrev. The word embeddings were trained on the titles and abstracts from the 2016 Medline baseline. We compare using two word embedding models, Skip-gram and Continuous Bag of Words (CBOW), and vary the word vector representational lengths, from one-hundred to one-thousand, and compare differences in accuracy.

Results. The overall outcome of this method demonstrates fairly high accuracy at disambiguating biomedical instance context from groups of denotative senses. The results showed the Skip-gram model obtained a higher disambiguation accuracy than CBOW but the increase was not significant for all of the datasets. Similarly, vector representations of differing lengths displayed minimal change in results, often differing by mere tenths in percentage. We also compared our results to current state-of-the-art knowledge-based WSD systems, including those that have used word embeddings, showing comparable or higher disambiguation accuracy.

Conclusion. Although biomedical literature can be ambiguous, our knowledge-based feature extraction method using word embeddings demonstrates a high accuracy in disambiguating biomedical text while eliminating variations of associated noise. In the future, we plan to explore additional dimensionality reduction methods and training data.


82. Nanoparticle Named Entity Recognition

Megan Charity, Bridget T. McInnes, PhD, Nastassja A. Lewinski, PhD, Dept. of Computer Science

Introduction: The solutions and discovery of the combination of certain nanoparticle characteristics can be easily overlooked. Thousands of other published articles and journals with similar topics can drown out this beneficial information. To identify these characteristics without having to manually annotate each and every article ever created relating to nanoparticles, a named entity recognition program was created that aimed to develop a model that can automatically identify the nanoparticle characteristics within the article’s text. The program examines the properties of the individual words and their relations to other words within the text in order to establish a pattern.
Method: A binary vector was created for each individual word representing their orthographic, morphological, lexical, syntactic, and semantic features of themselves and adjacent words. These vectors were processed through the machine learning package WEKA using the support vector machine learning algorithm. The algorithm was evaluated using 5-fold cross validation and reported the precision, recall, and f-measure. We compared our results to a majority label baseline - the precision you would receive if you labeled everything the majority label.

Data: We evaluated our method on the END database which consisted of 42 drug FDA labels. The dataset was manually annotated by chemical and life science students who identified 16 nanoparticle characteristics (e.g. surface coating, adverse reaction).

Results: We evaluated the 16 nanoparticle characteristics for each feature type. Overall, the precision, recall, and f-measure increased as additional features were added. Characteristics that contained more instances were more likely to exceed the majority sense baseline with fewer features being analyzed. However, every characteristic obtained a higher precision than the majority sense baseline.

Conclusion: Incorporating the orthographic, morphological, lexical, syntactic, and semantic features increased the overall f-measure of the entity extraction system. These results show that looking at different properties of text can help to identify and find a pattern between words and key features of nanoparticles.

83. Variability in Skeletal Muscle Fiber Type and Size after Spinal Cord Injury

Quincy Fotis1,2, Laura O’Brien3, Laura O’Brien2,3, Ashraf S. Gorgey2,4

1 Kinesiology and Health Sciences, Virginia Commonwealth University, Richmond, VA 23249, USA
2 Spinal Cord Injury and Disorders Center, Hunter Holmes McGuire VAMC, 1201 Broad Rock Boulevard, Richmond, VA 23249, USA
3 Department of Physiology and Biophysics, Virginia Commonwealth University, Richmond, VA 23249, USA
4 Department of Physical Medicine and Rehabilitation, Virginia Commonwealth University, Richmond, VA 23249, USA

Objective: Skeletal muscle consists of two types of muscle fibers, slow and fast twitch. Type 1 fibers are also known as slow-twitch fibers, while fast twitch fibers can be distinguished into two groups, fast twitch glycolytic (Type IIx) and fast twitch oxidative (Type IIa). Individuals with spinal cord injury (SCI) often exhibit dramatic muscle atrophy below the level of injury and a predominance of type II fibers. The purpose of this study was to measure cross sectional area (CSA) and fiber type in individuals with SCI.

Methods: Muscle biopsy samples of the vastus lateralis were obtained from twenty-two men with chronic SCI as part of a clinical trial (NCT01652040). Histochmical staining of myofibrillar actomyosin ATPase was performed to determine fiber type. Images were analyzed on the NIH software ImageJ. Muscle fibers were individually traced to determine CSA and optical density (OD). Fibers were identified by OD, with type I having the highest OD followed by IIx and IIa. The mean range in OD units was 0.37-0.58, 0.50-0.75, and 0.78-1.51 for type IIa, IIx, and I fibers, respectively. The overlap between IIa and IIx was due to poor image/fiber quality.

Results: The majority of individuals (77%) expressed >90% type II fibers. Individuals under age 40 had a greater percentage of type I and IIx fibers than older individuals but there was no difference in fiber CSA. There was no difference in fiber type between paraplegics and tetraplegics. However, paraplegics had a greater fiber CSA than tetraplegics.

Conclusion: These findings suggest that there is a predominance of type II fibers after SCI. Younger individuals had a greater percentage of type I fibers independent of level of injury. An exercise training program such as resistance training may result in a shift from type IIx to IIa. This would result in a muscle that is less susceptible to fatigue and muscle damage in individuals with SCI.
84. **The Attenuating Effects of Mindfulness on State Shame and Guilt**

Matthew Miera, Dept. of Psychology, with Jaclyn Moloney and Dr. Jeffery Green, Dept. of Psychology

Shame and guilt are negative affective states that are generally triggered by ‘moral lapses’, or a failure to uphold a moral standard, thus shame and guilt are often considered moral emotions. Shame and guilt are rooted in a negative internal attribution following a perceived wrongdoing, however they differ in that shame focuses on the global self, while guilt focuses on a specific behavior (Lewis, 1971). Mindfulness is “the state of being attentive to and aware of what is taking place in the present” (Brown & Ryan, 2003, p. 822). Previous research suggests that dispositional mindfulness may help individuals avoid negative affective states and more effectively regulate emotions. Given previous findings, we predicted that individuals higher in trait mindfulness would experience less state shame and guilt after an experimental manipulation than those lower in trait mindfulness. We conducted a cross-sectional study that examined the effects of dispositional mindfulness, as measured by scores on the FFMQ (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) and MAAS (Brown & Ryan, 2003), on feelings of guilt and shame after a guilt/shame induction. Participants (N = 200) were randomly assigned to either the experimental or control group; the experimental group was asked to write for five minutes about a time when they had felt ashamed due to an interpersonal offense, while the control group wrote about an ordinary day. All participants completed measures of dispositional mindfulness, and state shame and guilt. To test our hypotheses, we ran separate linear regressions for guilt and shame for those participants in the experimental condition. Both the MAAS and the FFMQ negatively predicted feelings of shame, but did not significantly predict guilt. A multiple regression was run to control for each measure’s individual effect on shame. When controlling for the FFMQ the MAAS still negatively predicted shame, however when controlling for the MAAS there was no longer a significant effect of the FFMQ. Overall, the results partially supported our hypotheses, mindfulness significantly predicted feelings of shame but did not significantly predict feelings of guilt. Participants higher in mindfulness reported less shame after an experimental induction than those lower in mindfulness. This research shows that mindfulness can successfully predict discrete emotional states and highlights specific ways in which mindfulness may help individuals avoid negative affective experiences.

Keywords: mindfulness, shame, guilt, moral emotions

85. **Scripture Like a River: The Appeal of Modern Adult Catechetical Programs to Jungian Psychological Preferences**

Elise Ketch, VCU Honors College, Dept. of Communication Arts, with Prof. Faye Prichard, VCU Honors College

Catholics preach that their faith is for everyone, yet conversion candidates frequently drop from catechetical programs that they sense ‘just aren’t for me.’ This perception of catechesis is not only detrimental to the spiritual development of the student, but also discouraging to the spiritual director who must interpret what intrinsic needs of the individual are not being fulfilled and provide supplements. This exemplifies the weakness of modern adult catechetical programs in appeal and effectiveness towards all personalities. Surveys measuring the personalities of active Roman Catholics through the Myers Briggs Type Indicator report a consistent trend of non-participation by certain personality metagroupings across various forms of adult religious education, ergo indicating failure of these ministries to engage with these personality types and provide for their distinct needs. Moreover, analysis of catechetical ministry through Jungian theory makes evident the psychological preferences that are neglected by specific models of catechesis. By understanding the relationship between psychological preferences and effective catechesis, adult catechetical programs can be better designed to fulfill these overlooked preferences and avoid bias towards common preferences. Through investigation of the relationship between psychological preferences and the foundational elements of catechesis such as forms of prayer, interpretation of scripture, and learning style, spiritual directors can make recommendations that appeal to the needs of individuals holistically in their development of religious attitudes. Following this model I dissect an acclaimed contemporary young adult catechetical program and analyze it for personality bias. I then propose amendments to accommodate for the eight Jungian
psychological preferences, whose combined influences in turn can be analyzed to address the needs of individuals. Furthermore, understanding the relationship of psychological preferences to religiosity will not only assist the Catholic Church in designing catechetical programs that address students comprehensively, but also will potentially assist her in evangelizing and better serving all people.

86. The Effects of Dietary Counseling and Nutritional Education on Patient Awareness and Compliance

Quy-Hien R. Dang, UROP Summer Research Fellow, and Jenica L. Harrison, PhD, MT(ASCP), Dept. of Clinical Lab Sciences

Background: Hemophilia A (HA) is an X-linked recessive inherited hemorrhagic disorder in which a coagulation cofactor known as Factor VIII (FVIII) is deficient. In the clinical laboratory, mixing studies and specific factor assays are two coagulation tests that are used to aid in the diagnosis of bleeding disorders such as HA. Study Objective: The objective of this study was to develop and test mixing study and factor assay protocols for the assessment of FVIII activity in human plasma. This project also aimed to establish protocols that can be used to demonstrate the benefits and practical use of advanced hemostasis testing to junior level Clinical Laboratory Sciences (CLS) students at Virginia Commonwealth University (VCU). Moreover, this project aimed to foster the undergraduate student researcher's appreciation for and exposure to laboratory research. Methods: In this study, the activated partial thromboplastin time (APTT) assay was employed in order to evaluate the activity of FVIII in human plasma. Manufacturer provided assay controls were used in the initial part of this study in order to determine the suitability of the STart®4 Analyzer for performing APTT assays. Next, a 1:1 ratio mixing study protocol using with assay controls, pooled normal human plasma (PNP), and FVIII deficient plasma was evaluated. Lastly, a factor assay protocol was assessed to determine the level of FVIII activity in human plasma. Results: The initial phase of this study demonstrated that the STart®4 Analyzer is a suitable instrument to perform APTT assays. Both intra- and inter-assay precision were performed in order to assess the performance characteristics of assay controls. The overall %CV for the normal and positive controls were 0.6% and 1.4%, respectively, in the intra-assay precision assessment. The overall %CV for the normal and positive controls were 1.8% and 2.3%, respectively, in the interassay precision assessment. FVIII deficient plasma demonstrated a prolonged APTT of 121.2 seconds. When FVIII deficient plasma was mixed at a 1:1 ratio with PNP, the prolonged APTT was corrected. The factor assay revealed that the FVIII deficient plasma employed in this study had less than 1.48% FVIII activity. Conclusion: The results show that the STart®4 Analyzer can be employed to test for coagulation abnormalities using mixing study and factor assay protocols. In addition, using these protocols in the CLS student laboratory at VCU has the potential to enhance students' knowledge of hemostasis testing while serving to better prepare them for clinical rotations. Lastly, this project served to help the undergraduate student researcher gain a deeper understanding of advanced clinical laboratory assays used in the assessment of abnormal hemostasis. In addition, the student researcher gained knowledge of how to test and write scientific protocols.

87. VIGoR - Visceral Indicators of Growth or Risk

Jaime McGinthy, BSN, RN, UROP Summer Research Fellow with Dr. Leigh Small, PhD, RN, CPNP-PC, FNAP, FAANP, FAAN and Dr. Jamie Sturgill, PhD, VCU School of Nursing

Background: Excess body weight has been associated with poor health in children and adults and has been linked to the development of several chronic illness processes. Central or abdominal obesity, reflecting the presence of visceral adipose tissue and as evidenced by a larger than normal waist circumference, is a significant predictor of cardiovascular disease (Rana et al., 2007). Abdominal obesity in 4-19-year-old children has been found to be associated with initial endothelial dysfunction and vascular damage (Hacihamdioglu et al., 2011), a first stage in the development of atherosclerosis, higher blood pressure, insulin resistance, dyslipidemia (LDL cholesterol, triglycerides) and increasing circulating proinflammatory
peptides compared with children without abdominal obesity (Steinberger et al., 2009). However, it is unclear if these inflammatory markers are significantly elevated in young children, those younger than 6 years, who have visceral adiposity (waist circumference > 90th percentile) compared with children of the same age with normal waist circumferences (25-89th percentile). Identification of an associations between inflammatory markers and visceral adiposity in young children (4-8 years of age) may aid in early intervention in this pediatric population. **Methods:** Children ages 4-8 years were recruited from the general pediatric outpatient and pediatric endocrinology clinics at Virginia Commonwealth University Health (VCU Health). Eligible children who were of normal weight (25th-85th BMI percentile) and obese (>85th BMI percentile) were enrolled in this pilot study with their parents’ permission. Once enrolled, salivary specimens were collected along with anthropometric assessments. **Results:** We were able to successfully enroll 44 children into the study. 39 had a normal waist circumference (abdominal girth 25th - 89th percentile) and 5 with visceral adiposity (abdominal girth >90th percentile). However given the difficulty enrolling obese children, salivary samples have yet to be analyzed. Despite the small number of obese children into the study, we do observe significant differences in both waist by height ratio and BMI. **Conclusion:** Given the significant public health impact obesity has on the US population, further research in this field is warranted. We are seeing children in the clinic with BMIs already in the obese range, thus intervening at a young age may prove effective however recruiting children who fall into this category has proven a challenge. We plan to continue the study to recruit more obese children so that adequate comparisons in terms of inflammatory markers can be made.

88. Preserving a Sense of Honor, Conscience, and Dignity during Medical School for the Physician-Patient Relationship

Sameen Meshkin, UROP Summer Research Fellow, VCU Honors College, Dept. of Biology, with Dr. Susan Bodnar-Deren, Dept. of Sociology

Despite a noble and dignified spirit that draws many to the practice of medicine, it has been observed through encounters with a variety of physicians, regardless of specialty, that many doctors at some point in their medical journey, become cynical and jaded. The importance of maintaining the sense of calling when viewing the work of a physician as inherently noble, as affirmed in the Declaration of Geneva, is elucidated by Curlin et al. (2006), as a deeply felt motivation for work that goes beyond the satisfaction of the worker’s material and social needs. At some point in the physician’s training and/or practice, there is a movement away from this motivation, in which the practitioner loses touch with the honor and noble traditions of their chosen profession. There has been a small but growing body of research that has looked at the role of how religion and spirituality (R/S) affect the physician’s attitudes in preserving the sacredness of the practice and subsequent physician-patient interactions. Additionally, a number of medical institutions such as the George Washington University (GW), have suggested changes to medical school curriculum to better incorporate the notion of the sacred in medical practice. With this in mind, we conducted a thematic content analysis of the VCU School of Medicine curricular materials to assess coherence to the best practice model put forth by The GW Institute for Spirituality & Health. We additionally conducted a mixed-methods survey of medical students’ underlying assumptions about how R/S and a sense of a higher calling affects the nature of the physician-patient relationship. Preliminary analyses of the data reveal that among medical students, the vision for their future work is of great importance to them and that this sense of a higher calling ought to be taken into account during curriculum development to help medical students maintain their sense of calling throughout their profession.
89. Modeling Demographic Transitions: The Role of Technology Gaps

Abigail Burns, UROP Summer Research Fellow, VCU Honors College, Depts. of Economics and International Relations, with Dr. Carol Scotese, Dept. of Economics

Every region on earth, beginning in the nineteenth century with Europe and North America, has experienced or is currently undergoing the fertility transition (Guinnane 2011; Bongaarts and Casterline 2012). The mechanism driving this transition is the quantity/quality tradeoff, a utility maximization function in which families seek to optimize not only their number of children but also the quality of those children (Becker 1981). Productivity increases due to technological growth, which increase the returns on child quality, have been shown to be the primary cause behind these shifts in family fertility preferences and, thus, country and region-wide fertility transitions (Becker 1981; Galor 2012). In light of this, analyzing the relationship between countries’ changing productivity levels and their relative fertility transitions is vital to creating a cross-country model of fertility choice. By exploring the relationship between countries’ distances to the world technology frontier (DTF) and their fertility levels, the groundwork will be laid for developing a cross-country model of fertility change that includes DTF data. This will allow for an understanding of how productivity affects fertility transitions, why different regions transitioned at different rates, and how DTF and productivity growth may affect countries and regions still in transition.

90. Metal Thin Films as High Efficiency Surface Enhance Raman Scattering Substrates for Detection of Chronic Biomolecules

Vaghjiani, Nilan G.¹, Nahar, Lamia², and Arachchige, Indika U.³

¹UROP Summer Research Fellow, VCU Honors College Biomedical Engineering, Virginia Commonwealth University

²Graduate Student, Chemistry Department, Virginia Commonwealth University

³Assistant Professor, Chemistry Department, Virginia Commonwealth University

Oxidative stress is defined as the imbalance between increased exposure to free radicals and antioxidant defenses. Isoprostanes are a specific class of lipids that mediates oxidative stress. These molecules are prostaglandin-like substances that are primarily produced in vivo by free radial-induced peroxidation of arachidonic acid. In humans the identification and quantification of isoprostanes have important clinical applications. For instance, studies have shown that these biomolecules are related to a variety of human diseases, including Down’s syndrome, Alzheimer’s, Huntington’s and Creutzfeld-Jacob’s disease. In this work, we hypothesize that Surface Enhanced Raman Spectroscopy (SERS) can be used for rapid and real time detection of isoprostanes potentially down to single molecular level, which helps for early diagnosis of chronic medical conditions. This study developed wet-chemical syntheses for production of Ag and Au/Ag alloy nanoparticles and their self-supported nanostructures as high efficiency SERS substrates for rapid detection of isprostane molecules. Ag and Au/Ag alloy nanoparticles were directly cross-linked to high surface area, nanoporous aerogel materials, prior to SERS analysis. The effect of synthetic parameters on the primary particle size, morphology, surface area and porosity of Ag and Au/Ag alloy aerogels will be discussed in the light of application in SERS based chemical sensing.
91. **Synthesis and Characterization of Superhydrophobic Fibrous Membranes**

*Arzan Dotivala, UROP Summer Research Fellow, Dept. of Chemical and Life Science Engineering, with Dr. Christina Tang, Dept. of Chemical and Life Science Engineering*

Superhydrophobic i.e. water repellent materials are important in a number of applications, such as self-cleaning paints, protective coatings, and textiles. Polymer-based materials such as polystyrene are of particular interest because they are cost effective, durable, heat and chemical resistant. The purpose of this project is to fabricate superhydrophobic polystyrene membranes with controlled microstructure and determine how microstructure affects the hydrophobicity. Two methods have been explored to fabricate fibrous membranes with tunable microstructure: electrospinning and force spinning. Using electrospinning, collecting fibers on a rotating mandrel to control fiber deposition was used to achieve uniaxially aligned fibers. Orthogonal fibers were achieved with a layer-by-layer deposition, rotating the substrate between deposition of each layer. Quantifiably the electrospinning method produced membranes with fiber spacing ranging from ~10μm to ~35μm. These results demonstrate that the variability in fiber spacing was too large to determine the effect of fiber spacing on hydrophobicity. To improve the uniformity of fiber spacing, we are currently exploring a force spinning technique known as Spinneret Based Tunable Engineered Parameters (STEP). In STEP, a viscous polymer solution is extruded through a needle and a rotating collector is brought in contact with the liquid droplet; the shear forces overcomes surface tension and pulls the droplet into fibers (figure 1 below). STEP is a mechanical drawing method that avoids the whipping instability inherent to electrospinning, thus a more consistent fiber spacing can be achieved. Using STEP, the nanofiber diameter is comparable to electrospinning ~5 μm. The fiber spacing and angle between fibers are currently being investigated. Preliminary findings show a fiber spacing ~ 70μm with improved fiber spacing variability compared to electrospinning. To assess hydrophobicity, the apparent water contact angle will be measured.

92. **Developing an Efficient Method for Fluorescent Labelling of Cell-Penetrable Peptides**

*Danarubini Ramanan, UROP Summer Research Fellow, Stacie L. Richardson, Matthew C.T. Hartman, Dept. of Chemistry, Massey Cancer Center*

Peptides coupled to fluorescent compounds are frequently used in drug development assays as cell-penetrable drug carriers. However, conventional coupling methods are not time efficient and do not produce high yields of fluorescent peptides. The coupling method proposed in this project enables 100% yield of various cell penetrable peptides to fluorescein, a fluorescent compound, within two hours. Peptides were synthesized on rink amide resin using microwave assisted peptide synthesis, purified using RP-HPLC, and confirmed through MALDI. Di-acetylated 5-carboxyfluorescein N-hydroxysuccinimide ester was synthesized according to literature. The peptide coupling assay utilized peptide coupling reagents, NMP, DIEA, and HATU, to provide efficient yields of fluorescent peptide. The fluorescent peptides were purified through RP-HPLC and identified by MALDI. Percent yields were calculated through the intensity of the product peaks in the RP-HPLC spectra. These findings indicate that this procedure may be used to produce greater yield of fluorescent peptides in a shorter amount of time for medicinal chemistry studies.

93. **Impacting knowledge, attitudes and behaviors for the prevention and control of hypertension and diabetes among rural, medically underserved Jamaican women of childbearing age**

*Elyse Duani, UROP Summer Research Fellow, Depts. of Sociology and Health, Physical Education & Exercise Science, with Dr. Joann Richardson, Dept. of Kinesiology and Health Sciences*

**Background:** Non-communicable diseases (NCDs) are a global burden and at the forefront of the public health challenges the world is facing in the 21st century according to the World Health Organization (WHO,
In Jamaica, over the past 30 years, “NCDs have emerged as the leading cause of morbidity and mortality” (Ministry of Health--Jamaica, 2013; p 5). Among Jamaican women, the prevalence of hypertension and diabetes is higher than in men (Bourne, 2009). The priority population was rural, medically underserved Jamaican women of childbearing age, 15-44 years old (Sumar et al., 2011), who are at high risk for hypertension and diabetes. Uncontrolled disease contributes to the subsequent development of cardiovascular and cerebrovascular disease as well as increased mortality. In addition, these two diseases pose an additional risk for the development of gestational hypertension, the leading direct cause of maternal mortality (United Nations International Children’s Emergency Fund [UNICEF], 2016), as well as gestational diabetes which is ranked in the top five indirect causes of maternal death in Jamaica (McCaw-Binns et al., 2007). The proposed project also intends to decrease their likelihood of pregnancy and/or birthing complications resulting from hypertension and/or diabetes in the event they become pregnant in the future.

**Methods:** This research design was an exploratory, community-engaged research study to address the research question. The study utilized primary data collection methods, i.e., a semi-structured survey, face-to-face focus groups, and baseline physiological variable measurements (i.e., blood pressure and glucose levels and Body Mass Index [BMI]). The survey instrument addressed: demographic information; self-reported perceptions of health status; their knowledge of healthy diets and recommended levels of physical activity; facts about hypertension and diabetes and the associated risks; their attitudes regarding the seriousness of the diseases, their susceptibility and the influence of poor dietary habits and physical inactivity; family history of hypertension and diabetes; and, their practice of healthy behaviors. The focus groups sought more in-depth information linked to the questions in the survey. During the intervention, participants gathered in an easily accessible location within the community (e.g., faith-based organization) where the surveys (pre- and post-test), focus groups, measurements of baseline physiological variables and the educational intervention were conducted. Prior to any data collection, participants were consented using a Virginia Commonwealth University (VCU) Institutional Review Board (IRB) approved consent form.

The participants engaged in two sessions, one per week during Time 1, June 19 to July 1, 2016. During session 1 (week 1), the pre-test survey was administered followed by a focus group that gathered open-ended responses that elaborate on their survey responses. Then, the baseline physiological measures (i.e., blood pressure, blood glucose and BMI) were completed followed by the educational intervention. The session 1 educational module addressed the importance of disease prevention and control in maintaining health, basic facts about hypertension and diabetes pathology, their susceptibility to the diseases, the seriousness of the diseases, and the role of physical activity, proper diet and weight control in the prevention and control of diabetes and hypertension. Researchers adapted educational materials for the cultural context and presented the information in a culturally competent manner. During session 2 (week 2), the educational module addressed self-efficacy to empower them to modify unhealthy behaviors, strategies for improving dietary habits and nutritional intake and for increasing physical activity. The post-test survey was administered followed by a focus group to gather open-ended responses that elaborated on their survey responses. The physiological measures (i.e., blood pressure, blood glucose and BMI) were completed post-intervention at the end of session 2.

**Time 2 post-intervention data (i.e., 3 month follow-up) was collected from participants after October 1, 2016 using the post-test survey instrument to determine if improvements in knowledge and attitudes had continued and whether behavior changes had been made.** The instrument was administered by the community leader/gatekeeper.

**Time 3 post-intervention data (8 month follow-up) was collected by March 15, 2017.** The mentor, Dr. Joann T. Richardson, conducted an Alternative Spring Break Study Abroad to Jamaica during spring break 2017 (March 4-11, 2017). During that time, the post-test survey instrument was used to determine if improvements in knowledge and attitudes had been sustained over time and whether behavior changes had been made and/or sustained. In addition, a focus group was conducted to gather open-ended responses that elaborate on their Time 3 survey responses. **The physiological measures (i.e., blood pressure, blood glucose and BMI) were also completed post-intervention at Time 3.**
94. **Does Aquatic Insect Emergence Correlate with the Timing of Breeding and Nestling Condition in the Prothonotary Warbler (Protonataria citrea)?**

*Huy Phan, UROP Summer Research Fellow, Dept. of Environmental Studies, with Dr. Lesley Bullock and Dr. Andrew Garey, Dept. of Biology*

Emerging aquatic insects (EAI) from rivers and streams provide an important food source for riparian consumers. One such consumer is the Prothonotary Warbler (*Protonataria Citrea*), an insectivorous songbird that breeds in bottomland forests of the southeastern United States. It is well understood that birds synchronize their breeding times to capitalize on peaks in prey availability to feed their nestlings; however, few studies have quantified the overlap between the timing of EAI and the breeding of birds or the fitness benefits associated with such overlap. To address this knowledge gap, we studied emerging aquatic insects and Prothonotary Warbler nesting during the 2016 breeding season at Deep Bottom Park, Henrico County, Virginia. The objectives of this study were (1) to assess prey availability during periods of high demand by looking for the degree of overlap in the timing of EAI and the timing of warbler nestling feeding and (2) to determine if mean nestling condition was greater in weeks with more EAI. There were two peaks in nestling feeding and only the second one (aka the second clutch) overlapped with peak EAI availability. This differs from 2014 when the first clutch overlapped with aquatic insect availability—the spring weather in 2016 was colder and wetter than average and likely the cause of the annual difference. Nestling condition is a measure of the bird’s mass in relation to body size and was calculated as the residual from a regression of mass and nestling age in days. Mean nestling condition decreased with increasing EAI biomass (*P* < 0.01) as well as specific taxa of EAI including Ephemeroptera (*P* = 0.02), Diptera (*P* = 0.01), and Trichoptera (*P* < 0.01). These results suggest that nestling body condition deteriorated as total emergence increased over the study period, regardless of which taxa was most abundant. This surprising result is also likely due to this year’s anomalous weather. Nestling body condition is typically lower later in the season and it was hypothesized that this was due to declining prey availability but our findings suggest there may be another factor at play. Even when prey availability is high, parents may feed nestlings less as they need to allocate energy to molt in preparation for fall migration. More study is needed to understand the relationship between EAI prey availability and nestling condition in this species.

95. **Biocatalytic potential of deoxyribose-5-phosphate aldolase variants in the synthesis of stain side-chains**

*Linda Foreman, Dept. of Chemistry, with Dr. Katherine Belecki, Dept. of Chemistry*

Deoxyribose-5-phosphate aldolase (DERA) is an enzyme found in all bacteria. The catalytic properties of DERA can be harnessed to perform carbon-carbon bond forming reactions that are relevant to the production of fine chemicals, including some pharmaceuticals. Rosuvastatin, the active ingredient in Crestor®, has historically been synthesized via a lengthy and inefficient process which employs traditional organic chemistry methods. A biocatalytic approach to the chiral side chain of rosuvastatin and other statin drugs would improve the overall process, making it more efficient and more environmentally friendly. My project consists of using site-directed mutagenesis to create DERA variants that can then be evaluated as to their effectiveness as biocatalysts in the synthesis of the chiral side chain of rosuvastatin.

My project continues from earlier work where the *deoC* gene, which codes for the DERA protein, was inserted into a commercially available plasmid in such a way that the DERA product has a hexahistidine tag. The altered plasmid was then introduced into Escherichia coli (*E. coli*) so that the DERA protein could be over-expressed and collected. Site-directed mutagenesis was then employed to make rationally designed changes in the DERA protein DNA. The biocatalytical activity of the resulting variants were then experimentally evaluated for their ability to incorporate novel substrates into a precursor that can be used in an efficient synthesis of rosuvastatin and other statin drugs.
96. Social Isolation and Acculturation Needs Assessment of Bhutanese Older Adult Refugees in Richmond

Caitlin Lange, UROP Summer Research Fellow, Dept. of Social Work, with Dr. Hyojin Im Dept. of Social work

Each year tens of thousands of refugees arrive in the United States and amongst the variety of needs that need to be addressed and mental health care can be cast aside in favor of basic survival requirements. As a result of mental health not being viewed as a necessity; severe issues can be developed later on in life. During the acculturation process refugees are particularly at risk for poor mental health outcomes due to the stressors associated with trauma leading to the relocation and cultural loss, adjusting to the new norms and skill sets needed in the host community and acquiring resources for oneself and their family. The present study is focused on assessing the specific needs of Bhutanese older adults during acculturation in the Greater Richmond Area as this group has one of the highest suicide rates of any population. Older adults are at a higher risk than other age populations due to a more likely chance for social isolation and number of adverse traumatic experiences. Specifically older adults from Bhutan reflect such concerns in their refugee communities, highlighting cultural trauma and bereavement, compounded by lack of appropriate services or interventions. Using in-depth interview methods, this study explores why such mental health challenges have occurred to the Bhutanese refugee community and assess resources and support, both formal and informal, to address such gaps and burdens. The findings from thematic analysis will discuss implications and limitations of the study.

Key words: Older Adults, Refugees, Acculturation, Needs Assessment

97. Sensory Sensitivity in Typically-Developing Children and its Association with Cognitive Adaptation

Nicholas Donnelly, Dept. of Psychology, with Dr. Marcia Winter, Dept. of Psychology

Sensory sensitivity relates to one’s ability to process sensory information from everyday stimuli. People with a low sensory threshold may detect more input, generally feeling more distracted and overwhelmed than others, leaving them with fewer resources to devote to reacting and coping with the changing demands of their environments. Typically, previous research has focused on the impact of profound sensory sensitivity in children with disabilities; however, its effects within the normative-developmental spectrum are less explicit. Given that executive functions controlling attention, cognitive flexibility, and regulation are all developing in young children, and could be impacted greatly by the relative sensitivity threshold one has, this study examines the potential link between sensory sensitivity and child cognitive adaptation in a sample of young, typically-developing children. Children ages 3-8 are recruited in the Children’s Museum of Richmond. After consent and assent, parents report family demographics and children’s sensory sensitivity (Sensory Profile-2); children complete the Dimensional Change Card Sort (DCCS; NIH toolkit) task via iPad in two trials: under normal museum conditions of high sensory stimulation and under limited sensory conditions (visual barrier and noise-cancelling headphones). Hierarchical regression analysis will be used to test associations between levels of child sensory sensitivity and child cognitive adaptation/shifting scores from the DCCS (calculated via norms for child age and gender). It is hypothesized children who are higher in sensory sensitivity will score lower on the DCCS (have a harder time shifting cognitively) than children less sensitive to sensory input, especially under normal, high sensory input museum conditions. Results will be discussed as they pertain to how children successfully adapt to the changing demands of day-to-day life and how this ability could promote resilient outcomes in the face of life’s challenges.
98. **Experimental Design for the Online Introductory IT Class Emphasizing Student-to-Student Interaction**

Aktarul Alam and Louis Dajeu, Dept. of Information Systems, with Dr. Elena Olson, Dept. of Information Systems

Online classes have always been a practical option for many working students as well as general full time IS students. This project is a continuation of our conducted study from 2015. The purpose of this year’s research is to build a model for an investigation of the effect of Student-to-Student online interaction in online introductory Information Technology courses on student learning outcomes. The research model consists of Students in the online introduction to e-Business Technologies course are exposed to different types of Student-to-Student interactions while working on the semester long IT project. One section is designed to emphasize on teamwork through introducing the group projects and group discussions, while the other section is designed to emphasize on teamwork through introducing group projects and group discussions. With the data gathered, we hope to restructure the introductory online courses in Information Systems to allow students to build a stronger foundation that will facilitate their progression into the higher-level courses.

99. **Sensitizing cancer cells through protein interactions**

Kaylee Newcomb, UROP Summer Research Fellow, VCU Honors College, Dept. of Chemistry, with Dr. Matthew C.T. Hartman, Dept. of Chemistry

Cancer chemotherapy results in systematic damage as the drugs used are also toxic to benign tissue. Sensitizing a cancer cell to therapy by interfering with the DNA repair mechanisms would decrease overall toxicity, as the necessary dosage of chemotherapy drugs would be lowered. The Hartman lab developed a peptide (8.6) that binds with a $K_D$ of 1 μM to the C-terminal domain of breast cancer associated protein (BRCA1), blocking homologous recombination. The crystal structure of the peptide shows the tyrosine and threonine residues are close together, suggesting that by cyclizing these positions, the peptide may already be constrained into its bound conformation. A series of dibromomethylnaphthalene linkers of various length were synthesized and cyclized through alkylation of the cysteine residues on peptide 8.6. The binding of the cyclic peptides with the BRCA1 (BRCT)2 domain will be compared to peptide 8.6 through the use of fluorescence polarization.

100. **Assistive Technologies for Continuing Medical Education in Nepal**

Ruxandra Zait, UROP Summer Research Fellow, with Dr. Manoj A. Thomas, Dept. of Information Systems

Continuing Medical Education (CME) is the process of lifelong learning, by which diverse constituencies of health professionals continually acquire new knowledge and skills to stay up to date with the latest drugs, equipment, and medical procedures. The educational and workplace learning redesign process begins with the understanding that the status quo attitude will not be effective in this era of numerous complex diseases. Both the spread of diseases and the technological advancements are proceeding rapidly and it is extremely important for the latter to outpace the former. Internationally, the provision of health care is questionable in underserved communities, such as the ones in Nepal, where legislation to make CME a requirement, made little progress over the years. All the medical personnel, from doctors to community health volunteers, signal the lack of well-structured and easy accessible CME, as well as the lack of motivators for completing these programmes. According to local experts, over 60% of rural doctors had access to a computer, but not Internet. To address this challenge our team designed the CME on a Stick (CMES) solution, which essentially is an auto-running USB drive with CME content and some OS-like functionalities. The CMES solution provides CME content bundled by different topics areas within emergency medicine. The software allows practitioners to synchronize
and update new content when used on a computer with Internet access. Audio and textual CME content is provided by emrap.org, and the updated content is available for synchronization on a monthly basis. Further, the initiative of providing distance-learning CME to doctors working even in the most remote locations in Nepal faces not only the challenge of poor communication infrastructure, but also the challenge of low retention rates and reduced involvement. Therefore, the CME content is managed based on the user requests and interests. Also, to ensure efficient and effective learning, our team will continue to provide different types of content (text, audio, video), so we can reach a larger group of individuals who might simply have different learning styles. Finally, in realizing the promise of high-quality health care, several physicians in Kathmandu accepted to serve as role models. Our team hopes that their motivation to fulfill their “initial promise to society” in reducing the burden of suffering and disease in their communities, will serve as an intrinsic incentive for the remaining physicians. In conclusion, a series of both intrinsic and extrinsic incentives, along with the use of simpler but innovative technologies, promise to result in better physician involvement and increased CME completion rates. This is a program with strong international emphasis, so we are trying to increase the participants’ self-esteem, but also their desire to align to international standards.

101. **Philadelphia Freedom**

*Michelle Thomas, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology*

Many do not realize the presence of free African Americans in Philadelphia during the 18th century. Free African Americans and enslaved peoples began migrating to Philadelphia around the 17th century, starting communities throughout the city. Excavation done before the building of the National Constitution Center has uncovered artifacts with free African American context. This project focuses on objects found believed to have belonged to James Dexter, a free African American who was prominent in the Philadelphia community, and other artifacts with free African American context around the 18th century. This project emphasizes the presence of free African Americans during this time through study of the material remains.

102. **The Body and Art: Importance of the Head Across Culture**

*Alexander Wilson, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology*

The head, seen by cultures as the seat of the soul and individuality, is represented in many ways. The Celtic people and Yoruba people both portray the head in art by over exaggerating the size and detail in comparison to the body. The Ancient Egyptians are speculated to have participated in skull elongation, and by comparing these different depictions of the head; we can gain insight into the world of these ancient cultures. By using the known application and implications of the head in Yoruba culture, and art we can try to draw some similarities between the three in regards to the imagery of the head in sculpture. By comparing these cultures we can see the importance they held to certain aspects of the human body, and how the art reflected these beliefs.

103. **Predators of the Pleistocene and their Role in Megafaunal Extinction**

*Nicholas Girard, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology*

Predators are one possible cause of the megafaunal extinction event than is normally considered, of which this research design will be exploring and discussing. Too many predators contributed to an imbalanced ecosystem, which is shown through evidence of a mastodon bone with short faced-bear, as well as dire wolf markings found on it. This research design discusses how the predation is a possible cause of the North American megafaunal extinction that took place roughly ten thousand years ago. The two different prehistoric animal markings will provide knowledge on how to tell apart the dire wolf markings from the short-faced bear. Determinates of which markings belong to each animal will be explored through the pressure used on the bone to create the marks, the estimated age of the mastodon attacked, and similar findings of these marks by other archaeologists’ research.
104. PATTERNS OF ENSLAVEMENT AND ECONOMIC OPPRESSION OF CENTRAL VIRGINIA

Hannah Bedwell, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

I address how anthropologists can identify the patterns and development of slavery and economic oppression through archaeology and the visualization of Virginia enslavement. My focus is on the enslaved people of James Madison’s Montpelier and I will use 3D modeling as a foundation for integrating enhanced visuals. My goal is to present a tangible understanding of the enslaved individuals in relation to the artifacts and history of the archaeological sites. I intend to show a common theme in economic oppression by comparing modern themes in slavery and examining Fraser D. Neiman’s synthesis of the evolutionary perspective of slavery, and how little has changed in economic practices.

105. Determining the Structure of Mammalian ORMDL

John Vio E. Suemitsu, VCU Honors College, Dept. of Chemistry with a Concentration in Biochemistry, with Dr. Binks Wattenberg, VCU School of Medicine’s Department of Biochemistry and Molecular Biology

Sphingolipids are a class of lipids built on sphingosine, an eighteen carbon amino-alcohol backbone. This family comprises a diverse group each of which have important functions in cell signaling and membrane structure. Sphingolipids are modified in a variety of ways resulting to numerous types of sphingolipids but despite the diversity of sphingolipids, there is only one anabolic and catabolic pathway that create and degrade sphingosines, respectively. Serine palmitoyl transferase (SPT) serves as the initiating enzyme and its activity is presumed to be the rate-limiting step of the sphingolipid synthesis. SPT is homeostatically regulated such that elevation of cellular sphingolipid results in reduced SPT activity. The ORMDLs, membrane proteins of the endoplasmic reticulum, are critical components in SPT’s regulation. ORMDLs, which are the homologs of ORMs found in yeast, detect the levels of sphingolipids but not much is known about its regulatory mechanism. The major questions that Dr. Wattenberg’s lab tries to answer are how ORMDLs sense sphingolipids and how ORMDLs affect SPT activity. One critical step in understanding ORMDL mechanism is determining the structure of ORMDLs, which is the primary focus of my research. The research aims to specifically identify the region of ORMDLs that sense sphingolipids and possibly another ORMDL site that interacts with SPT. To find the location of ORMDL binding sites, suspected important segments of the ORMDL (the N and C termini, transmembrane regions, and loops) have been replaced by segments of the ORMs resulting to a “protein chimera”. Although both proteins are homologues, ORMs are indirectly regulated by ceramides through kinases which means that they are missing segments that make it possible for ORMDL to directly respond to sphingolipids. We believe that by replacing an important region of the ORMDL with an ORM segment, the ORMDL will no longer be responsive to ceramide levels, this region would then be a candidate for the binding site in ORMDL of sphingolipid. Constructs have been made through gene blocks, site-directed mutagenesis, and cloning. The resulting sequences were analyzed to be valid and we are in the process of testing the constructs.

106. "Soul Food, Mmm!" Do Food Preferences Impact People's Perceptions of Black Americans?

Danyel Smith, Dept. of Psychology, with Dr. Nao Hagiwara, Dept. of Psychology

Although health promotion behaviors, such as healthy eating, are influenced by a number of factors (e.g., health knowledge, accessibility, socioeconomic status), previous research has found that racial identity is one important factor contributing to health promotion/risk behaviors. Specifically, it has been shown that African Americans (AA) with stronger, as opposed to weaker, racial identity are less likely to engage in healthy eating because healthy eating is viewed as incongruent with the AA identity (Oyserman, Fryberg, and Yoder, 2007). The current study extends the previous research by examining inter-personal perceptions of food preferences...
in 291 AA and White college students. In the present experimental study, participants were randomly assigned to view one of four profiles ostensibly completed by another VCU student. The student profiles were manipulated to vary on gender (i.e., DeShawn vs. LaKeisha) and food preference (i.e., Salad vs. Soul food). Race/ethnicity were reported in the profiles as African American. Both AA and White participants perceived DeShawn and LaKeisha as having weaker racial identity when their favorite food was indicated as salad as opposed to Soul food. However, AA participants reacted more negatively to LaKeisha when her favorite food was indicated as Soul food as opposed to salad. There was no difference in participants’ affective reactions to DeShawn as a function of his favorite food, suggesting that effects of food preference on inter-personal perceptions have to be understood in a context of intersectionality between race and gender. This study has implications in a variety of health fields including health psychology, public health, and health advertisement. Specifically, this research may inform culturally sensitive nutrition interventions that target AA youth and young adults by focusing on the association between AA identity and culturally-rooted foods.

107. Longitudinal Analysis of Adolescent PTSD: Implications of Genetic Variants and Environmental Variables

Laurel Kovalchick, VCU Honors College, Christina M. Sheerin, Cassie Overstreet, Lance M. Rappaport, Vernell Williamson, Vladimir Vladimirov, Ken Ruggiero, Ananda Amstadter, Dept. of Psychiatry

Objective/Aims: Children and adolescents affected by natural disasters are at an increased risk for negative post-disaster outcomes, particularly post-traumatic stress symptoms and diagnosed posttraumatic stress disorder (PTSD). Genome-wide association studies (GWAS) and candidate gene studies have supported the role of genetic variation in the etiology and severity of PTSD, but few studies have focused on understanding the role of genetic influence on longer-term symptom presentation and recovery following trauma. Most of these investigations focus on common genetic variation, with much less work to date examining rare and less common variation. Moreover, even fewer studies have focused on genetic risk on outcomes post-disaster in adolescents.

The current study aimed to 1) characterize PTSD symptoms and its trajectory over time following a natural disaster and 2) identify rare and common genetic variation associated with PTSD symptom presentation over time in an adolescent population.

Method: The genetic data were obtained from a subset of subjects (N = 707; M_age = 14.53, SD = 1.73; 51.9% female) who participated in a larger population-based randomized controlled trial of a web-based intervention administered following tornado exposure. The National Survey of Adolescents PTSD module was used to assess PTSD symptoms at baseline, 4 months, and 12 months. Additional measures included adolescent self-report at the baseline assessment on environmental variables: trauma history, tornado severity, social support and family conflict.

Saliva samples were provided and processed on an exome array, which queries 247,870 variable exonic sites including rare variants. Following quality control procedure, gene-based sum scores were created based on genes identified to be associated with lifetime PTSD in a previous study.

Analytic plan: Multilevel modeling was conducted to examine change in PTSD symptoms over the three time points (baseline, 4 months, 12 months) and to determine the influence of aggregate genetic risk, controlling for web-based intervention group. Using the top 13 genes identified as associated with PTSD status at baseline, gene-based risk scores were created by summing the risk alleles for variants in each gene (M = 19.2 variants included per gene, range = 5-50). Additional analyses will examine the association of gene-based risk sum scores and environmental variables on trajectories describing change in symptoms over time.

Results: PTSD diagnostic status and average symptom count (out of 17) are as follows: baseline, 7.3% M = 3.37; 4 month, 5.7% M = 2.79; 12 month, 4.0% M = 2.73. Multilevel models revealed significant curvilinear reduction in PTSD symptoms over the three time points (b = .81, SE = .16, p < .001) whereby the greatest
decrease in symptoms was present from baseline to 4 months’ post-baseline assessment. The poster will further present on the association of genetic risk sum scores and environmental variables with symptom trajectories.

**Conclusion:** PTSD symptoms demonstrated an expected natural recovery in the population following tornado exposure. Given the present results suggesting that the average symptom counts are highest at baseline, interventions administered within the first few months following natural disaster exposure would be most beneficial to the general population and may further increase the natural rate of recovery suggested in the present findings. Individuals with genetic variation, including rare variation, and environmental conditions that are associated with poor recovery following trauma represent a population that would most benefit from targeted prevention and intervention. Limitations to the study include attrition across time points resulting in a smaller sample size that may be underpowered to identify genetic effects.

---

### 108. Ethnobotany of Medicine Across the Globe

*Cassandra Lubowsky, Department of Anthropology with Dr. Bernard Means, Dept. of Anthropology*

The relationship between humans and plants is older than the concept of ethnobotany itself. When one begins to look into the variety of ways that different cultures use plants for similar medicinal healing, then the relationship of man to plant grows exponentially. The goal of this research is to see how different cultures approach similar health problems with what is common to the area in which they inhabit.

### 109. Richmond’s East End Cemetery and Racial Disparities in Health in the 1950s

*Emily Michaelis, Chloe Tibert, with Dr. Susan Bodnar-Deren, Dept. of Sociology*

In a service learning project with East End Cemetery located in East End Richmond, Virginia, students in medical sociology at VCU collected data from headstones and attempted to answer a question about life for African Americans in this area of Richmond. After noticing an unusually high mortality rate reported for the 1950’s, we chose to ask questions about the year 1950 and the decade that followed. We also noticed several instances of low life expectancy, and questioned the causes of death for both of these variables. We found several publications on the racial climate in Richmond during this time and existing studies on the effect of racial discrimination and racial injustices on health. Our study seeks to look at a unique population: 78 African Americans who died in 1950-1959 from East End Richmond and its neighboring communities. Our goal was to evaluate specific factors that could explain a spike in mortality in the 1950’s. We also sought to compare social demographics with both acute and chronic illness in relation to cases of low life expectancy for this population. We concluded that while several possible explanations for excess mortality and low life expectancy in the 1950s remain, a combination of the dismantling of black communities and the physiological stress of perceived discrimination had the most significant effect on the two variables in question.

*Keywords: socioeconomic status (SES)*

### 110. Release Kinetics of Nanoparticles from Electrospun Fibers

*Rebecca Walker, with Dr. Christina Tang, School of Engineering, Department of Chemical & Life Science Engineering*

Polymer drug delivery systems that enable tunable release profiles can improve therapeutic effect, reduce toxicity and improve patient compliance when compared to conventional dosage forms. Nanofiber based systems are especially promising for transdermal, implantable, and oral drug delivery due to their high specific surface area and high porosity. We aim to achieve erosion-controlled release of drug-loaded nanoparticles from electrospun polymer nanofibers. Nanoparticles loaded with perylene, a hydrophobic fluorescent dye, and stabilized with polyethylene glycol were prepared by Flash NanoPrecipitation as a model system for studying release rates. The nanoparticles were blended with a fiber forming polymer and
electrospun into nanofibers. The nanoparticle loading achieved was 0.9 (wt/wt)%, mass of nanoparticles/mass of polymer fiber. These results indicate that nanoparticles loaded with hydrophobic drugs can be successfully incorporated into nanofibers. We are currently investigating the release rate of nanoparticles as the polymer fibers erode using fluorescence measurements (excitation at 415 nm and emission at 475 nm). Nanoparticle fluorescence has been detected at a fiber concentration of 0.17 mg/mL (mg of fibers/mL of water). Since the nanofibers appear to dissolve within 5 minutes, the systems studied may be used as fast dissolving membranes for sublingual drug delivery.

111. **Identification of "Kratom" (Mitragyna speciosa) Alkaloids in Commercially Available Products**

*Julia Grzymkowski¹, Justin L. Poklis² and Michelle R. Peace¹*

*Departments of ¹Forensic Science and ²Pharmacology & Toxicology, Virginia Commonwealth University*

“Kratom” is the common name for the botanical mitragyna speciosa. It is a tree native to Southeast Asia in which leaves contain the psychoactive alkaloids mitragynine and 7-hydroxymitragynine. Kratom is often ingested as teas, chewed, or smoked. It acts as a stimulant in small doses and as an opioid in large doses. Overdoses can result in vomiting, seizures, and death. Recently the Drug Enforcement Agency (DEA) placed Kratom on Schedule 1, but, due to public outcry, it was almost immediately removed.

Eleven kratom based products were obtained from various tobacco shops, “headshops” and via the internet including: Choice brand capsule and powder, Krave brand capsule, Lucky brand powder, King Kratom and Purple Haze e-liquids with 0 mg nicotine and 12 mg nicotine, Mojo brand capsule, O.P.M.S Liquid Kratom concentrate, and a K. Kratom chocolate bar. These products and methanol extracted samples were analyzed for psychoactive alkaloids and other components using an AccuTOF Direct Analysis in Real Time Mass Spectrometry (DART-MS) and Gas Chromatography-Mass Spectrometry (GC-MS).

The psychoactive alkaloids mitragynine and 7-hydroxymitragynine along with four other alkaloids, corynantheidine, corynoxine, paynantheine, and speciofoline, were identified in all 11 products.

Unregulated commercial products made from kratom contain psychoactive alkaloids such as mitragynine and 7-hydroxymitragynine. They are readily available in a variety of forms and may be prone to abuse.

112. **Development of Electronic Cigarette Liquid Extraction Techniques and Comparison of Advertised and Actual Liquid Nicotine Concentration**

*Joseph Hunt, Biology Major Jacob Graham, BS, Biology Caroline O. Cobb, PhD, Psychology, Faculty Mentor*

Electronic cigarettes, or e-cigarettes, represent a relatively recent and increasingly popular form of tobacco use that involves use of a battery powered device that heats liquid (typically nicotine-containing) into an aerosol to be inhaled by the user. Interestingly, this increase in use has occurred in concert with a lack of federal regulation of product standards and quality control despite several analytical studies noting that nicotine concentration in e-cigarette liquid deviates substantially from the labeled amount. These discrepancies reinforce the need for more regulation and quality control testing, but few studies have examined the concordance in nicotine concentration advertised and actual amount in widely marketed disposable e-cigarette products. This absence of data is likely due to difficulties in extracting liquid for analysis. The current study aims to develop methods to extract liquid from one e-cigarette brand (blu; Imperial Tobacco Group) with disposable varieties and compare the advertised versus actual nicotine content of several marketed products. First, blu disposable e-cigarettes, disposable “tanks”, and refillable liquid bottles were purchased at the same nicotine concentrations (1.2% and 2.4% of nicotine of total weight).
Piloting of sample preparation/extraction techniques resulted in a multi-step process that differed for disposable e-cigarettes and “tanks”. For the final procedure, disposable e-cigarettes had their blue LED light removed via small pliers; then the battery and circuit board were mechanically isolated from the rest of the disposable e-cigarette. The remaining part of the disposable e-cigarette was placed mouth end down into a 10 mL conical tube. Disposable “tanks” were removed from blister packaging and placed mouth end down into a 10 mL conical tube. Tubes were spun at 1200 rcf for 10 minutes. The liquid collected was removed via pipette and the process was repeated until all liquid or at least 1 mL had been transferred from the conical tube into a 2.5 mL sample tube. Following this procedure, approximately X mL of liquid was extracted for each disposable e-cigarette and X mL of liquid for each disposable “tank”. Nicotine concentration analyses for all samples are forthcoming. Identifying a procedural process to effectively extract liquid from disposable e-cigarette products is important for informing quality control processes as well as future research efforts that may depend on independent testing of e-cigarette nicotine concentration.

113. Alexithymia Moderates the Association Between Maternal Depressive Symptoms and Perceived Adolescent Adjustment

Hayne Noh, VCU Honors College, Depts. of Biology and Psychology, with Dr. Wendy Kliewer, Dept. of Psychology

Rates of suicide among African American youth are increasing faster than any other ethnic group (Bridge et al., 2015). With mental illness associated with suicide rates, it is essential to understand how symptoms manifest during adolescence. Although the association between maternal depression and poor adolescent adjustment is well established, there is a dearth of evidence examining the impact of maternal alexithymia on adolescent adjustment, particularly among low-income youth. The goal of the study was to elucidate the role of maternal alexithymia (difficulty understanding and expressing emotion) in the association between maternal depressive symptoms and adolescent adjustment within a sample of low-income urban youth.

Data from the current sample were drawn from Project COPE, a 4-year longitudinal study of low-income urban youth from the eastern United States. The analytic sample consisted of youth (N = 351, M\text{age}=12.20 years, SD=0.68 years at baseline) and their maternal caregivers from Time 1 of the study. The youth identified as 91% African American and 53% male. Maternal depression and Alexithymia was assessed using self-reports from the Brief Symptoms Inventory and the Toronto-Alexithymia scale respectively. Adolescent adjustment (anxiety and depressive symptoms) was assessed via caregiver reports from the Child Behavior Checklist. Results from moderation analyses revealed that maternal alexithymia moderated the association between maternal depression and perceived adolescent adjustment. Specifically, the association between maternal depressive symptoms and decreased perception of youth’s adjustment was stronger in mothers with high alexithymia. These findings illustrate the negative impact of maternal alexithymia on youth adjustment and subsequent poor outcomes.

114. Deconstructing Division: Mindfulness Meditation Training Promotes In-vivo Interracial Helping Behavior

Stuart Lytle, Anmanat Boparai, Justin D. Tubbs, Kirk Warren Brown, Daniel R. Berry, Dept. of Psychology

Empathy promotes compassion and prosocial behavior, but often struggles to unite people across common societal divisions, such as race (Cikara & Zaki, 2016). This disconnect is due to an increased perceived psychological distance between oneself and out-group members (Batson & Ahmad, 2009). Recent research has identified mindfulness meditation, a practice of focusing one’s attention on the present moment, as capable of increasing prosocial helping behavior (Condon et al., 2013) and as a potential means for reducing perceived psychological distance between the self and others (Berry & Brown, 2017). This experiment examined the impact of mindfulness training on helping behavior toward out-group members. Self-identifying white female participants (N=79) were presented an acted scenario involving a self-identifying black female confederate needing assistance, and in-vivo helping behavior was recorded. At the end of this
session participants were randomized to either a sham or mindfulness meditation training condition. After training, participants were presented with a new helping scenario and in-vivo helping behavior was recorded. Three-block sequential logistic regression models revealed that prior to training, trait mindfulness predicted more frequent helping behavior \( (p < .01) \). Additionally, a multilevel logistic regression models showed mindfulness training significantly increased the frequency of helping behavior from pre-test to post-test compared to the sham training \( (p = .05) \). These findings indicate mindfulness leads to increased interracial helping behavior, possibly by overriding perceived psychological distance between oneself and out-group members. Therefore, mindfulness meditation training could be an effective practice for deconstructing social and psychological barriers that limit intergroup kindness.

**115. The Influence of Socioeconomic Status and Marital Status on Breastfeeding in Black Women**

Jaida Howell, Depts. of Liberal Studies for Early & Elementary Education and African American Studies, with Dr. Vivian Dzokoto, Dept. of African American Studies

Breastfeeding is the most natural form of nutrition for a baby. With the rising acceptance of not only breastfeeding in general, but public breastfeeding in America, this topic still seems oddly controversial in the Black community. This study sought to better understand the acceptance of breastfeeding in the Black community and the likelihood of a Black mother breastfeeding her child. My study focused on how socioeconomic status and marital status influence this likelihood. A survey was administered to 25 Black women, and I interviewed 15 of them. The survey asked questions about socioeconomic status and marital status at the time of the birth of the women's youngest child. It also included a question regarding whether or not the women breastfed that child. In the interview, women who had completed the survey were asked why they did or did not breastfeed their youngest child. In the results, 17 of the 25 women breastfed their youngest child. A scale was used to determine the socioeconomic statuses of the women based off of the survey questions. This scale measured occupation, income level and level of education. Within the women that breastfed their children, 7 of them were from the lower/upper lower socioeconomic class, 10 women were from the lower middle/upper middle socioeconomic class, and none were from the upper socioeconomic class. Of the women that breastfed, 12 women were married and 5 women were single at the birth of their youngest child. Based on my results, I conclude that middle class, married women are most likely to breastfeed in the Black Community, while lower class, single women are least likely to breastfeed their children.

**116. THE NON-ANTICOAGULANT DERIVATIVE OF ENOXAPARIN, 2-O,3-O DESULFATED ENOXAPARIN, IS A POTENT INHIBITOR OF HUMAN NEUTROPHIL ELASTASE.**

Megh Kumar\(^1\), Daniel K. Afosah\(^2\), and Umesh R. Desai\(^2\)

\(^1\)Department of Chemistry, VCU Honors College \(^2\)Department of Medicinal Chemistry and Institute for Structural Biology, Drug Discovery and Development

Human neutrophil elastase (NE) is a serine protease produced by neutrophils in response to infection and inflammation. Its arginine-rich nature renders it highly electropositive, ensuring its interaction with negatively charged species including glycosaminoglycans (GAGs). An upregulation in NE has been shown to exist in a number of inflammatory conditions including cystic fibrosis and emphysema. In such cases NE inhibitors will be very useful, however, there are none approved by the FDA as yet. Unfractionated heparin and enoxaparin have been shown to inhibit NE but their anticoagulant properties limits their use in such conditions.

A heparin derivative, 2-O,3-O desulfated heparin (ODSH), which lacks anticoagulant properties has been shown to be equipotent with heparin in inhibiting NE activity. This observation prompted us to investigate the anti-NE activity of 2-O,3-O desulfated enoxaparin (ODSE), an under-sulfated derivative of enoxaparin. ODSE was obtained by alkaline treatment of enoxaparin with sodium hydroxide. Following neutralization of the alkali and lyophilization, the resulting species was desalted using size exclusion chromatography, to obtain the desired product at about 40% yield. The ODSE so obtained, was characterized using NMR. The activated partial thromboplastin time assay indicated that ODSE lacks the anticoagulant activity of enoxaparin. Our work further demonstrated that ODSE is a potent inhibitor of NE, utilizing an allosteric inhibition
mechanism. In addition, we showed that ionic interactions are a key component of the NE-ODSE interaction, as was observed with the parent molecule. This work advances low-molecular weight non-anticoagulant GAG species as potent NE inhibitors. In addition, this work serves as the basis for the development of heparin oligosaccharides with selectivity for NE inhibition.

117. **Replicating Tissue Stiffness on Microfabricated Post Array Detectors**

Ariana DeCastro, IMSD Research Scholar, Thomas Petet, and Christopher Lemmon, Department of Biomedical Engineering

The extracellular matrix (ECM) is the framework surrounding the cell that is comprised of crucial proteins and molecules. The ECM has a stiffness that varies with tissue type. For example, breast tissue is softer than bone tissue. Fibronectin (FN) assembly is the primary step in remodeling the ECM, usually during wound healing. FN is then replaced with tissue specific proteins throughout the remodeling process. An upregulation of FN secretion is a marker of many disease states, such as fibrosis and cancer. This could lead to major changes in ideal stiffness of a tissue which can in turn change cell activity. So, further studying the role of varying stiffness in the ECM can help us understand cell activity. Microfabricated post-array detectors (MPADs) are microscopic visco-elastic columns made of polydimethylsiloxane (PDMS) that can be manipulated during fabrication process to mirror different stiffnesses found in the body. The purpose of this study is to recreate a range of stiffnesses in the body by mixing ratios of two different blends of PDMS and adjusting the height of MPADs. By doing so, the elastic moduli of the MPADs can be changed and can closely match the values of tissues such as lung or breast. The drawback to this process is that by increasing the height and decreasing the elastic moduli the MPADs become less stable which makes the fabrication process difficult. Future studies would entail quantifying forces exerted by cells using the known mechanical properties of the MPADs and exploring the role of other proteins, such as transforming growth factor beta 1 (TGF-β1), in FN assembly. This work was supported by the IMSD Research Training Program.

118. **The Founding Father Search for Mega-Fauna**

Kristen Egan, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

During the 1700s there was great scientific controversy between French naturalist Georges-Louis Leclerc and American founding father Thomas Jefferson regarding the flora and fauna found in America. Leclerc claimed that the fauna specifically in the United States was inferior to that which was found in Europe. Determined to prove that America was also home to similar fauna Thomas Jefferson decided to fund an expedition to find these great beast of America, this trip was known as the Lewis and Clarke’s expedition. Although the sole reason for the trip was not to find mega-fauna during the Lewis and Clarke expedition it was believed that the animals still roamed in western American. It was hoped that Lewis and Clarke would find live specimens. Thomas Jefferson was not the only founding father that was fascinated by the idea of great American beast roaming their country. Benjamin Franklin was also trying to prove to Leclerc that America could also produce large powerful animals just like those that roamed Europe. The point of this research is to understand the fascination that the founding fathers had surrounding these giant animals such as the mastodon and mammoths and how they affected American ideology.

119. **Global Connections Through Archaeology**

Amanda Benge, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

Archaeology is able to use methods and techniques in order to research and uncover things from our shared past to give us a better understanding of people and cultures that are no longer around. This research isn’t designated to any one part of the world, thus allows for archaeologists to create a greater understanding of all cultures in a global scale promoting a culturally relative perspective to those this knowledge is given. It is due to the use of 3D scanning and printing of artifacts that archaeologists are able to bring these fragile and unique objects into the hands of the public, so they are able to hold a part of history and make deeper connections with the past. With the use of this technology archaeologists are able to bring wide variety of
artifacts for people to see from across the world without worry of the objects being destroyed or stolen. In the Virtual Curation Lab at VCU, their collection of scanned 3D objects carries examples from nearly every part of the world. I will showcasing a small portion of this collection, with artifacts that will showcase objects from the old world.

120. **The Determination of Genetic Diversity among brewing Saccharomyces Strains**

*Arjun Jogimahanti, VCU Honors College, Dept. of Biology with Dr. Fernando Tenjo, Dept. of Biology*

The genus *Saccharomyces* contains several different species of yeast. Many of these species can be combined or genetically altered to produce hybridized species and are used in many biotechnological and industrial applications. In order to determine the genomic similarities and differences among brewing yeast species, PCR fingerprinting, specifically using single primer analysis, are used to amplify a region in the genome and compare the potential genomic differences among these species. Twelve different *Saccharomyces* species were obtained and a distinct fingerprinting banding pattern was generated for each species using three different primers: M13, (GTG)$_5$, and (GACA)$_4$. It was hypothesized that if the banding patterns of the different species is unique, it can help to identify commercially brewing yeast strains and detect genomic variations through the brewing process. Comparison of the banding patterns across the three primers revealed that *S. kudriavzevii* and *S. bayanus* produced bands that contained that same number of base pairs that *S. cerevisiae* produced. Thus, it was likely that these species are closely related to the model organism.

121. **Effect of conductive additives on electrospun poly(vinyl pyrrolidone) nanofibers**

*Emma Rubin, Dept. of Chemical and Life Science Engineering, with Dr. Christina Tang, Dept. of Chemical and Life Science Engineering*

It is well known that exposure to community violence during adolescence has deleterious effects on various health outcomes. Furthermore, research has shown that the resources and assets available to adolescents directly influence their coping behaviors in the context of hassles (e.g. not enough bathrooms at home) and may play a role. Electrospinning has been widely used to develop produce non-woven nanofibers for applications in biomaterials, energy materials, composites, catalysis, and sensors. In electrospinning, an electric potential is applied between a capillary containing a polymer solution or melt and a grounded collector. When the electric field strength overcomes surface tension, the polymer solution is drawn into a nanofiber (30 nm to 10 μm in diameter). Despite its widespread use, electrospinning precise control over the fiber diameter by changing process variables and solution properties remains a technical bottleneck.

We explore the effect of solution conductivity on the size of electrospun poly(vinyl pyrrolidone) nanofibers. Specifically, additives (inorganic salts and polyelectrolytes) were used to tune the fiber size. Uniform fibers between 172 nm and 700 nm were achieved. The molecular size of the ion was an important consideration. Monoatomic salts such as sodium chloride (NaCl) had a greater influence over fiber diameter than the diatomic salt calcium chloride (CaCl$_2$).

Poly(vinyl pyrrolidone) nanofibers containing sodium chloride were more uniform (smaller standard deviation) than those containing calcium chloride. In addition, a correlation between salt concentration and diameter was found: the higher the concentration, the smaller the average nanofiber diameter. At 25mM sodium chloride, the average diameter of the fibers was 174 nm with a standard deviation of 32. At the same concentration of calcium chloride, the average diameter was 234 nm with a standard deviation of 55. When the concentration of sodium chloride was decreased to 5mM, the average diameter of the fibers was 202 nm with a standard deviation of 63. At the same concentration of calcium chloride, the average diameter was 258 nm with an standard deviation of 54.

Chitosan, a polyelectrolyte that is insoluble in water, was also blended with poly(vinyl pyrrolidone) and poly(vinyl alcohol). The results achieved were similar to that of the sodium chloride/ poly(vinyl pyrrolidone) blend. The average nanofiber diameter was 172 nm with a standard deviation of 49.
122. **Trait Mindfulness, Empathy, and Racism, predict Daily Helping Behaviors Toward Out Group Members**

*Marguerite Armanyous, Kirk Warren Brown, and Daniel R. Berry, Dept. of Psychology*

When it comes to helping others, several psychological traits, namely empathy, racism, and qualities of attention like mindfulness play a role in how likely an individual is to demonstrate helping behaviors (Graziano, et al., 2007). According to a study by Cikara and Zaki (2016), individuals are less likely to help racial out-group members. This is a result of individuals perceiving a greater psychological distance between self and other (Cikara et al. 2011). Recent studies suggest empathy training (Batson & Ahmad, 2009) can improve intergroup relations and furthermore help reduce intergroup conflicts (Batson & Ahmad, 2009) and mindfulness training (Berry & Brown, 2017). Research also showed that mindfulness, which is a state of consciousness, differs from one individual to another (Brown & Ryan, 2003). We designed a correlational study to examine whether different psychological traits - empathy, racism, mindfulness, and agreeableness-would predict variation in daily helping behaviors specifically toward racial out-group members. Over 14 days, the researchers observed self-identifying white participants (N=79), recorded social interactions with strangers; these interactions included helping behaviors, positive interactions, and antagonistic interactions. Mixed effects zero-inflated Poisson models revealed that mindfulness and empathy predicted more frequent helping behavior while social dominance and racism predicted less helping (all ps < 0.05). Racial out-groups members were helped less frequently than in group members (p<.05). Importantly, empathy tempered this relation by showing equal helping among social categories (p<.05). This study highlights the potential for empathy and mindfulness in increasing pro-social interactions toward social out-group members.

123. **Nostalgia and Social Media Usage**

*Ashley Bacalso, VCU Honors College, with Anna Behler and Dr. Jeffrey Green, Dept. of Psychology*

Nostalgia is an emotion that has been described as “bittersweet” because it is typically associated with positive memories and emotions, but also involves a longing for the past. Research findings support the idea of nostalgia as being two-sided in its affective nature, as it has been found that experiencing loneliness can act as a catalyst for nostalgia, which then leads to greater feelings of social support. In a sense, nostalgia for one’s past can serve as a protective buffer against loneliness in one’s present. Additionally, social media sites such as Facebook allow individuals to reach out for social connection and also capitalize upon their users’ nostalgic feelings by offering features that allow users to view their previous activity on a particular day over the course of time. In this study, VCU undergraduates (N = 405) took part in a survey that measured several factors including nostalgia, loneliness, and social media use, along with self-esteem and depression. We predicted that individuals higher in trait nostalgia would be more likely to report engaging in increased nostalgic behaviors on social media. We also predicted that loneliness and depression would correlate positively with these behaviors. Using a cluster analysis, we found that partial support for our hypotheses. Results suggested that participants fell into three distinct groups that were characterized by their social media usage patterns and self-reported levels of loneliness and depression.

124. **Reliability and Validity of an Adapted Version of the Cognitive-Behavioral Treatment for Anxiety in Youth Competence Scale (CBAY-C)**

*Diane Keister, Ashley Bacalso, Stephanie Violante, Bryce D. McLeod, Michael Southam-Gerow*

The measurement of competence, characterized by a therapist’s responsiveness and skillfulness in delivering an intervention (Perepletchikova & Kazdin, 2005), is an important component of treatment integrity research (Hagermoser Sanetti & Kratochwill, 2009). The Cognitive-Behavioral Treatment for Anxiety in Youth Competence Scale (CBAY-C) is an observational instrument that was developed to capture therapist competence in the delivery of key practice elements in individual cognitive-behavioral therapy (ICBT) for youth anxiety (McLeod et al., 2016). The initial items on the CBAY-C Scale showed evidence of reliability and representational validity. Recently, there has been a shift toward modularized approaches to treatment
wherein evidence-based practice elements are used to treat a variety of child problem areas, including anxiety, depression, trauma, and conduct problems. In response to this shift, the CBAY-C was adapted to capture therapist competence to these common practice elements. This study aims to replicate previous reliability and validity findings of the CBAY-C when including ten new items that cover a broader range of problem areas. The adapted CBAY-C was used to assess therapeutic interventions delivered as part of Standard Modularized Treatment (SMT), Modular MATCH Treatment (MMT), and usual care (UC) in community settings (Weisz et al., 2012). This study was conducted with a sample of 796 recordings from 38 children with anxiety disorders who were treated by 26 therapists in two clinical sites. None of the items on the CBAY-C scale exhibited the full range on a 7-point Likert-type scale. Most of the original items exhibited a range between 4 and 5.5 points while the new items exhibited a range between 2 and 4.5. Most of the original scale items were coded with some frequency, however seven out of the ten new items were not coded or coded only once. Of the 20 coded items, ICCs were “excellent” for 11 items, “good” for four items, “fair” for three items, and “poor” for two items (Cicchetti, 1994). However, the items with “poor” reliability exhibited limited frequency. Preliminary data showed mixed results for discriminant validity with between-item correlations ranging from $r = -.003$ to $r = .885$ and correlations between competence and alliance scores ranging from $r = .003$ to $r = .907$. The mixed results indicate the need for further exploration of observational measures used to capture competence in the use of modular treatments.

124. **Mastodons vs Wealth**

*Nathan Parks, Dept. of Health, Human Performance and Exercise Science, with Dr. Bernard Means, Dept. of Anthropology*

The researcher explores how possession of mastodon bones was a symbol of wealth and power in Colonial America. This project seeks to show how the biggest known land mammal was sought after by the wealthy so those of elite socio-economic status could display a piece of this animal to symbolize that they had the resources and knowledge to go out and find and recognize these bones so that they could go back to their large estates and talk about it and show it off amongst their fellow rich friends.

125. **A20 expression in human macrophages in response to oral bacteria**

*Linder, Grace, Mooney, Erin, Xia-Juan, Xia, Sahingur, S. Esra.*

1Department of Periodontics, 2Philips Institute for Oral Health Research, School of Dentistry, Virginia Commonwealth University,

**Objective:** Periodontal disease is a common disease caused by a shift of tissue homeostasis inducing a dysbiotic microbiota. This leads to a deregulated immune response of inflammation, which induces the destruction of tooth supporting structures. Persistent forms of the disease are also associated with various systemic diseases. Therefore, it is important to identify molecules within the host immune system to maintain tissue homeostasis and prevent local and systemic adverse effects. Previous studies in our lab had identified A20 as a possible regulator of inflammation in periodontitis. A20 is a downstream signaling molecule involved in the pathway of periodontal inflammation. The aim of this study is to determine the function of A20 in response to periodontal bacteria P. gingivalis and F. nucleatum.

**Methods:** Human macrophage-like cells (THP-1) cells were challenged with heat-killed P. gingivalis (MOI 100:1). A20 mRNA and protein levels were determined at 1, 3, 6 and 12 hours using qPCR and Western blot. Statistical analyses included ANOVA with Dunnett multiple comparisons. p<0.05 was considered significant

**Results:** P.gingivalis induced significantly increased A20 gene and protein expression in THP-1 cells.

**Conclusion:** This is the first study which demonstrated A20 expression in response to an oral bacteria. Further studies are needed to fully understand the role of A20 in periodontal disease pathogenesis.
126. **Perception of Work-Related Demands in Employees With an Internal vs External Locus of Control**

*Austin Skinner, Kataleeya Cashion, Zachary Beland, Sawyer Wilkins with Dr. Charles Calderwood, Dept. of Psychology*

In this study, we sought to evaluate if employees who believe outcomes in their life are more controlled by external forces (external locus of control) perceive higher levels of work-related demands. We suggest that individuals who perceive themselves as having an internal locus of control will perceive work stressors as something they can work to reduce. On the other hand, we suggest that individuals who perceive themselves as having an external locus of control will perceive stress in the work environment as beyond their ability to fix. In order to examine the possible relationship between perceived locus of control and job demands, a cross-sectional online survey was administered to a group of undergraduate, part-time worker participants. The participants of this cross-sectional online survey (*N* = 521) were required to be at least 18 years of age and work at least 20 hours per week in a paid employment position. Measured employee job demands included perceived role conflict, perceived role ambiguity, self-reported conflict at work, and perceived time pressure at work. We hypothesize that employees who possess an external locus of control will also self-report experiencing a significantly higher amount of role conflict, role ambiguity, conflict at work, and time pressure at work. If our findings support our hypotheses, this will have implications for future research regarding the potential risks of selecting employees who possess a more external locus of control. Specifically, employees with a more external locus of control might be more prone to perceive higher job stress, which may influence their health and well-being.

127. **Separation of Blood Mixtures Using Fluorescently Labeled Antibodies and Flow Cytometry**

*Dani Jabado, with Dr. Christopher Ehrhardt, Department of Forensic Science*

Identifying and analyzing biological mixture samples at a crime scene are of paramount concern for forensic scientists, especially if that type of evidence contains only one cell type. This type of evidence makes a greater impact on the reorganization, identification, and reconstruction, of a criminal investigation, than any circumstantial evidence. Furthermore, it provides essential information concerning the nature of the crime that occurred, as well as link/exclude potential suspects to the crime in question. The presence of multiple contributors in a biological evidence sample also reduces the probative value of DNA evidence and can sometimes lead to its eventual loss of value. As such, this study was performed in an attempt to examine and evaluate flow cytometry analysis as a means to separate blood mixture samples labeled with fluorescent antibodies. Fluorescein Isothiocyanate (FITC) antibodies specifically targeted and were bound to HLA (Human Leukocyte Antigens) markers present on nucleated cells present in the blood, after which they were isolated from the blood mixture utilizing Fluorescent Activated Cell Sorting (FACS) - A high throughput technique that separates cell populations based on their optical activity, followed by STR analysis. This approach was tested on fresh and dried blood mixtures containing two contributors, where one contributor possessed an HLA A*02 allele that was not shared with the other contributor. We hypothesize that HLA A*02 positive samples would exhibit fluorescence when bound with the fluorescently labeled antibodies while the HLA A*02 negative samples would not. As such, we would be able to separate both cell populations using FACS followed by STR analysis. Such a work flow is believed to yield discriminant STR profiles unique to each contributor thus increasing the probative value of the evidence at hand. Results supported our hypothesis and yielded discriminant STR profiles for both contributors, with minor peaks from the A*02 negative contributor being observed in A*02 positive contributor sample. We can then conclude that HLA-A*02 antibodies coupled to FACS is a suitable method that can be utilized to evaluate and separate blood mixture samples in an attempt to yield discriminant STR profiles.
128. Middle School Students’ Perceptions of the Usefulness of Second Step Youth Violence Prevention Lessons on Communication and Empathy

Melanie Crabtree, Allison Cherry, Tashawna Floyd, with Dr. Terri Sullivan, Dept. of Psychology

The Second Step youth violence prevention program focuses on promoting positive social and emotional development. A number of outcome evaluations exist for this program (e.g., McMahon & Washburn, 2003), however, few studies address students’ perceptions of the usefulness of Second Step (see Farrell, Mehari, Mays, Sullivan, & Le, 2015 for an exception). The current study evaluated the students’ perceptions the usefulness of Second Step lessons addressing communication and empathy. Participants included 74 middle school students (57% male), a majority of whom identified themselves as African American or Black. This study included students with and without high incidence disabilities, and was part of a larger study evaluating the effectiveness of Second Step. All study procedures were approved by the University Institutional Review Board. For lessons related to empathy, 77% of students reported using these skills; 50% reported that these skills worked “pretty good” or “great” while 10% reported they did not work well. Of students who used skills related to empathy, 64% were confident and 12% were not confident in using these skills. For lessons related to communication, almost all of the students (92%) reported that they had used these skills. Of these students, 75% reported that the skills worked “pretty good” or “great” and only 4% noted that these skills did not work well. Of student who used skills related to communication, 63% were confident and 19% were not confident in using these skills. Additional qualitative analyses will be presented to provide insight as to why students did or did not use a specific skill, what kinds of reactions they received when using a particular skill, situations that influenced their ability to use a skill, and why or why not they would use certain skills in the future. Further implications of this research will be discussed.

129. Sacred & Sculpted

Lauryn Pulium, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

This exhibit focuses on ancient artistic works of various human, animal, and deity pieces created around the globe. The figures displayed will be covering five different cultures and four different periods. Costa Rican clay figures from 1000 AD, a modern African carved bone faze; a Kushan period deity sculpture; a Ganesh sculpture. These pieces display the unique and diverse cultural expression through sculpture.

130. Single-Step Preparation of Gold-Loaded Nanoreactors by Polymer Directed Self Assembly

Tien Vuong, with Dr. Christina Tang, Dept. of Chemical and Life Science Engineering

Multifunctional nanoreactors that combine reaction and separation can lead to more efficient reactions and reduce hazardous waste. For liquid-phase oxidation reactions, gold nanoparticles can be encapsulated within a polymer microenvironment to achieve catalyzed reaction and product isolation by spontaneous phase separation. Nanoreactors can be achieved using a two-step approach in which gold nanoparticles are synthesized and then encapsulated using Flash NanoPrecipitation, a polymer-directed self-assembly method. The structure of the nanoreactors has been analyzed by with dynamic light scattering (DLS), transmission electron microscopy (TEM) imaging, and UV-Vis spectroscopy. Gold-loaded nanoreactors between 50 nm to 300nm have been achieved by varying the amounts of amphiphilic block copolymer stabilizer and gold nanoparticles. Next, we aim to combine gold nanoparticle synthesis and encapsulation into a single-step
process. Specifically, we combine a gold precursor with a reducing agent and amphiphilic block copolymer stabilizer using a confined impinging jet mixer. Currently, we are investigating the effect of the strength of the reducing agent.

131. **Public Archaeology**

*Adam Blakemore, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology*

World War 1, for most of the soldiers involved, was an awful experience: nearly 17 million soldiers and civilians were killed in a war which many felt had no purpose. Through 3D printing, I hope to reproduce some of the average soldier’s kit, giving people a tangible idea of the kinds of equipment they carried. I intend to use 3D scanning and printing technology to give people a physical representation of an incredibly significant historical event that happened almost a century ago.

132. **Reliability and Representational Validity of an Adapted Version of the Cognitive-Behavioral Therapy for Anxiety in Youth Adherence Scale (CBAY-A)**

*Stephanie Violante, Chantelle Miller, and Lucas Melo, with Dr. Bryce McLeod, Dept. of Psychology*

The measurement of adherence, the extent to which the therapy occurred as intended, is a key aspect of treatment integrity research and critical for identifying gaps in implementation of evidence-based treatments. The Cognitive–Behavioral Therapy for Anxiety in Youth Adherence Scale (CBAY-A) is an observational measure designed to capture therapist adherence to common practice elements found in individual cognitive-behavioral therapy (ICBT) for youth anxiety. The initial items on the CBAY-A scale showed evidence of reliability and representational validity (Southam-Gerow et al., 2016). With the recent shift toward modularized treatment approaches, there is a need for reliable and valid measures of adherence to evidence-based practice elements that span a variety of child problem areas, including anxiety, depression, trauma, and conduct problems. This study aims to replicate our previous findings with a new sample. In particular, we examined the interrater reliability of the CBAY-A items. Additionally, we assessed convergent validity of the item scores with scores on an observational measure that measured cognitive and behavioral interventions (TPOCS-RS). Finally, we assessed discriminant validity by examining the magnitude of the correlations among the scores on the model items. We conducted this study with a sample of 796 recordings from 38 children with anxiety disorders who were treated by 26 therapists in two clinical sites.

133. **Evaluation of the Moderation of Anxiety Sensitivity on the Impact of Drinking Motives on AUD in Trauma-Exposed OIF/OEF Veterans**

*Zackaria Niazi, Christina Sheerin, Ruth Brown, Erin Berenz, Scott McDonald, Treven Pickett, Carla Kmet Danielson, Suzanne Thomas, Ananda B. Amstadter*

**Background:** Following trauma exposure, alcohol use disorder (AUD) and posttraumatic stress disorder (PTSD) are common outcomes and have high rates of comorbidity. One possible mechanism for this association is through individual’s drinking motives. This includes coping motives, resulting in individuals who self-medicate with alcohol (i.e., drinking to cope) and enhancement motives, where individuals drink in order to feel positive emotions. Such motives may put one at more at risk for negative outcomes, such as AUD and PTSD. Thus, it is important to identify factors associated with increased likelihood to self-medicate or drink to enhance emotions. One such factor may be the presence of other anxiety conditions or anxiety-related traits. For example, while Anxiety Sensitivity (AS) is correlated with PTSD symptoms, it is unknown how AS may interact with drinking motives to increase risk for problematic alcohol use. It is also unknown whether this pattern differs in individuals with current PTSD.
Aims: In order to better understand the relationship between AS and drinking motives on negative outcomes in the aftermath of trauma, it is important to examine the potential moderating effects of AS on drinking motives in trauma-exposed samples. This study aimed to examine whether AS moderates the impact of drinking motives on AUD and other alcohol phenotypes in a trauma-exposed sample. A secondary aim of the study was to examine whether this relationship differed in individuals with current PTSD.

Methods: The present sample consists of a trauma-exposed subsample (N = 299, 88.6% Male, age = 30.56 ± 4.5 SD) from a larger study of OIF/OEF veterans. Trauma exposure and PTSD status were determined via diagnostic interview with the Clinician Administered PTSD Scale (CAPS; 30.3% PTSD positive). Participants also completed self-report measures including the Anxiety Sensitivity Index (ASI), Drinking Motives Questionnaire (DMQ; using the Social, Coping, and Enhancement subscales), and the Timeline Followback (TLFB; with outcome measures including number of binge drinking days and total number of drinks/month). Primary analyses consisted of linear regressions examining the main and interaction effects of DMQ Social, Coping, and Enhancement subscales, ASI, and the interaction of DMQ subscales and ASI on 2 outcomes: number of binge drinking days and total numbers of drinks/month. In order to determine if the patterns differed in individuals with PTSD, secondary analyses were run using the same models only on individuals who met criteria for combat-related PTSD via the CAPS.

Results: In the linear regression examining total number of drinks per month, a main effect of Enhancement (Beta = 0.31, 95% CI = 2.27-4.76, p < 0.001), as well as a main effect of Coping (Beta = 0.20, 95% CI = 1.016-4.76, p = 0.003) motives was found. The interaction of Coping and ASI was found to be significant (Beta = -0.15, 95% CI = -0.43-0.02, p = 0.02). The same results were found in the linear regression of total number of binge days, with Enhancement (Beta = 0.25, 95% CI = 0.14-0.50, p < 0.001) and Coping (Beta = 0.14, 95% CI = 0.003-0.40, p = 0.04) demonstrating a main effect and a Coping and ASI interaction effect (Beta = -0.15, 95% CI = -0.04-0.002, p = 0.03). None of the models demonstrated a main effect of ASI or Social motives.

In the secondary analyses, examining only those with PTSD, the pattern of findings was somewhat similar. In the regression analysis of total number of drinks per month on drinking motives, no significant main effects were found. The Enhancement and ASI interaction (Beta = 0.37, 95% CI = 0.06-0.86, p = 0.02) as well as the Coping and ASI interaction (Beta = -0.50, 95% CI = -1.19-0.17, p = 0.009) were found to be significant. In the regression analysis of total number of binge days, results did not differ with the trauma-exposed sample. Additional work will further examine the interaction effects in order to determine their pattern. None of the models demonstrated a main effect of ASI or Social motives.

Discussion: Both Enhancement and Coping motives were found to have a weak, significant main effect on total number of drinks per month for primary and secondary analyses, in line with existing literature. The interaction of Coping and ASI demonstrated a slight negative, moderating effect of ASI on the impact of drinking to cope on total number of drinks per month, such that higher ASI increased the impact of coping motives on increased likelihood of alcohol consumption. The same pattern was found with total number of binge days, suggesting that both drinking behaviors are impacted similarly. Although the pattern of findings was broadly similar in the trauma-exposed and the PTSD only subset, Enhancement motives on drinking appear to be particularly relevant for individuals with PTSD, and requires further examination.

Limitations of this study include the cross-sectional nature of the study, preventing the ability to determine whether increased drinking started before or after trauma exposure. In addition, the study solely examines combat trauma-exposed and PTSD diagnosed veterans. Results could be different among individuals who have experienced different forms of trauma or with other psychiatric outcomes, such as major depression.


Melissa Allbrandt, VCU Honors College, Depts. of English and Public Relations, with Prof. Mary Boyes, VCU Honors College

There has been very little research on the early progression of fantastic literature and the origin of the fantasy genre. I studied the transition from fairy tales to fantasy during the Victorian Era, represented “The Golden Bird,” “The Twelve Dancing Princesses,” “The Salad,” and Lilith by George MacDonald, because I wanted to know what elements of the Romantic Movement or the Victorian Era may have influenced the evolution, in order to help my reader understand how the Romantic Movement opened a space for the implementation of
novelistic techniques in fantasy. I have examined these fairy tales and Lilith and compared them to each other. I have also surveyed discussions of early fantasy, the Romantic Movement, and the development of realism to discover what elements may account for the differences discovered in comparison, which may indicate an influence in the shift. I also researched George MacDonald to discover what personal influences may have led him to fantasy. I have found that George MacDonald was influenced by, but not part of the Romantic Movement, which glorified fairy tales and the fantastic. I have also found that Lilith incorporates novelistic techniques and moral views not found in writings from major Romantic writers or others from the period, which points to influence from the novel form. This topic could merit a study into the cultural reasons for a collective push into realism while holding onto fantastic desires.

135. Gender Bias Surrounding Ground Stone

William Swilley, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

This project I will be studying ground stone tools and their relation to women in the archeological record. Specifically the possible bias in the archeological community against studying women and therefore ground stone tools (due to their association). I will be compiling case examples of ground stone excavations and comparing the level of detail and interpretation that went into their excavation compared to other artifacts and ecofacts from those sites.

136. Social Awareness Campaigns: Raising Awareness on Human Trafficking in India

Neha Pondicherry, Dept. of Religious Studies, with Prof. Mary Boyes, VCU Honors College

Human trafficking is a persistent international problem that results in the subjugation of over 1 million people annually. The mass exploitation and abuse of humans for personal gain has taken many different forms over the span of history, including slavery, domestic servitude, labor bondage, etc.

Many social media campaigns are not successful in India because they do not take into account the lack of education and minimal access to technology and other methods of communication. Rural villages actually respond most effectively to media use. In my research, I devised an entirely new social awareness campaign to be executed in India that includes televised soap operas, talk shows on the radio by actual victims of human trafficking, social media notifications, and informational videos/alerts on communication apps such as WhatsApp. The campaign will also utilize various aspects of successful Australian social campaigns, including their content and methods of information dissemination.

137. The Effects of Substrate Stiffness and ECM Protein Coating on Macrophage Activation

Emily Burtch, Jefferson Overlin, Kelly Hotchkiss, Dr. René Olivares-Navarrete, Dept. of Biomedical Engineering

Introduction: Polymers, specifically hydrogels, are an attractive biomaterial option due to their ability to mimic the chemical and physical cues of different tissues. Implanted biomaterials interact with the immune system to generate a response which will determine the fate of the material. Cells of the immune system, macrophages, will regulate the response to synthetic and biological biomaterials. A chronic inflammatory response leads to fibrotic scar formation (5-10 times stiffer than healthy tissue). During early wound healing fibronectin is the main extracellular matrix protein (ECM) protein, followed by collagen-I in late wound healing. Previous studies have shown higher stiffness substrates lead to pro-inflammatory macrophage phenotype. While additional studies have linked collagen-I coatings with reduced pro-inflammatory macrophage activation. The aim of this study was to determine if protein coating or gel stiffness would have a stronger regulatory effect on macrophage activation.
Materials and Methods: Polyacrylamide (PA) gels were prepared (0.5 kPa, 2kPa, 20kPa and 40 kPa) and ECM proteins (PBS, FBS, Collagen I and Fibronectin) covalently bound to the surface. Primary macrophages were differentiated from bone marrow isolated and differentiated from 8 week male C57BL/6 mice before plating on gels for 24 hours. Macrophage activation was measured by gene expression and protein secretion of pro-(IL1β, IL6, Tnfα) and anti- (IL4, IL10, IL13) inflammatory markers.

Results: Increased levels of pro-inflammatory factors were present at high stiffness with both proteins, suggesting a stronger immune response to the 40kPa gels compared to 0.5kPa. Similar to gene expression results, macrophages on both stiffness gels coated in collagen type I released reduced amounts of pro-inflammatory proteins. Fibronectin coating showed elevated levels of pro-inflammatory factors at both stiffness levels.

Conclusion: Overall, protein coating had a greater ability than gel stiffness to control macrophage activation. Higher stiffness polyacrylamide hydrogels coated in fibronectin resulted in increased pro-inflammatory factor release. A stronger anti-inflammatory phenotype was present in hydrogels with lower stiffness and collagen-I coating. These results can be applied to controlling macrophage activation and ultimately the immune response from biomaterials.

138. Exploring the Resilience of Black Culture: Caches and Cash

David Cunningham, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

It is important that we work to construct a dynamic view of Black peoples past here in the Americas. These were people who endured many experiences that shaped their identity today. The enslaved played a vital role in the development of our society. Their forced labor allowed the initial colonies to have economic security. I would like to use archaeology to shed light on these hidden societies and track the development of Black identity. This should allow our modern society to develop a more meaningful connection to our past. At that point, we may be able to take responsibility for our actions from the past into the future.

Research design: In my research I will aim to find out more about the lives of Blacks living in America during its infant stages. Through analyses I will find out where and how they drew the line drawn between bare necessities and supplemental commodities. I hope to highlight aspects of the material record are consistent with Black culture today by comparing my findings to contemporary black life. I plan to use many more sources as my research continues, but I have come across a few texts that might be useful. Archaeology and Slave Resistance and Rebellion at the very least will offer a more intimate perspective of the material culture of the enslaved. Rebellions are an aspect that could help shed the “victim” image of the enslaved. “When Her Thousand Chimneys Smoked” Virginia’s Enslaved Cooks and Their Kitchens details the work life and eating habits of the enslaved. Also, can provide context for any food related artifacts. Archaeology and Slave Resistance and Rebellion would provides insight on early enslaved Africans and their values. Not only would like to know what they define as worth keeping, but what they are and are not allowed to have. I will be using the following digital items in this study: Raccoon Baculum worn as Pendant (VCU_3D_2136), GW’s False Teeth, Top Half (VCU_3D_2133), GW’s False Teeth, Bottom Half (VCU_3D_2132), Stone Pipe Blank (VCU_3D_549), and Quartz Point from Ritual Cache (VCU_3D_1882). At least one of the artifacts will be printed for use in the presentation of the poster. Through my research I expect to reveal idioms of Black spirituality that survived the Atlantic Slave Trade. I also expect to uncover stories of economic activism amongst the enslaved that deconstruct the idea that Blacks merely accepted the conditions of slavery. Ultimately, I expect to reinforce that Blacks have maintained a collective culture; before, throughout, and after being violently trafficked across the globe.
139. **Zombies, Resistance, and the Subversive Power of Cultural Assimilation within Indigenous Cinema**

Zoe Sarris, VCU Honors College, Dept. of Cinema, with Dr. Cristina Stanciu, Dept. of English

This study examines dramatic elements of the visual storytelling language within First Nations Jeff Barnaby’s film *Rhymes For Young Ghouls*. With a focused analysis of the film, I explore the ways in which Western cinematic genre conventions have been subverted by indigenous artists and filmmakers to create a communal narrative of experience and visibility. Specifically, *Rhymes for Young Ghouls* subverts tropes of zombie horror as an aesthetic tool that helps articulate the psychological anguish, anxiety, and pain inherited by the First Nation’s People of Canada living displaced on colonized land. I use two major research strategies: (1) analyzing works done by scholars active within the sphere of indigenous studies and (2) by researching the cinematic works and movements surrounding indigenous history and identity. This presentation challenges the argument that assimilation is inherently and entirely dangerous and unproductive. While it can be difficult to understand assimilation without associating it with the cultural, historical, and spiritual degradation of an oppressed minority group under Imperial rule, I propose it is far more important to see how those within the system of colonization and assimilation can create spaces for subversion and ultimately resistance. Indigenous artists and storytellers have created a language of resistance through film and literature by revising inherited Western traditions and using them as a platform through which tribal communities may heal from past and current trauma whilst simultaneously demanding the mainstream visibility that has been denied them.

140. **Extension of RBC Longevity and Functionality in the Prevention of Graft Versus Host Disease**

Shannuka Gadiraju1 Maryanne Collinson2, Ramesh Natarajan3

1 Department of Chemistry, VCU Honors College 2 Department of Chemistry 3 Department of Internal Medicine

Given today’s current scientific method of preservation, red blood cells (RBCs) donated or drawn from live humans have a storage life of approximately 42 days, after which the blood will be discarded due to degradation of the RBCs. The mechanism that drives said degradation is known as oxidative stress, in which the cells’ inability to balance out the creation and excretion of free radicals causes a conformational change in the shape and efficacy of RBCs. In order to counteract the oxidative actions upon the cells, it has been thought that the addition of reducing agents, specifically ascorbic acid, the reduced form of Vitamin C, to the matrix in which the cells are stored can push back the adverse effects of oxidation, allowing the cells to be stored for at least 56 days. The method by which we quantify the efficacy of the said ascorbic acid treatment involves the measurement of blood redox potential using Nanoporous Gold Electrodes (NPGs). By using nanoporous electrodes in contrast to the more conventional planar electrodes, we can minimize the effects of biofouling on the electrochemical response, giving us more reproducible and consistent results. Through Open Circuit Potential (OCP) measurements, we have measured the redox potential of packed RBCs in both large volumes (milliliters) and in single drops (submicroliters) over a 56-day period. The general statistical trend of the results of the OCPs over the past few months seems to suggest that the ascorbic acid treatment does indeed help stabilize the redox potential of RBCs.
An analysis of genetic differences between generations of brewing Saccharomyces and identification of the presence of microorganisms in an unknown sample

Quinnie Phan, VCU Honors College, Dept. of Chemistry, with Dr. Fernando Tenjo, Dept. of Biology

It has been come to know that the genome of the yeast, *Saccharomyces cerevisiae*, can be used as a model system in genetic research. Yeast have dispersed cells and can undergo induced genetic mutation. They are more genetically complex than bacteria yet can still undergo rapid reproduction. *S. cerevisiae* has both a stable haploid and diploid state; recessive mutations manifest in the haploid strains while complementation tests can be performed on the diploid strains. *Saccharomyces* have become useful for studying evolutionary genomics as high-quality genome sequences are available for the known species. Key industrial hybrids have evolved from the seven natural species of *Saccharomyces*. These industrial hybrids are important to breweries and vineyards. This study uses three commercial strains of yeast—Safale, Bohemian Lager, and Safbrew—with the primers: (GTG)5, (GACA)4, and the M13 sequence GAGGGTGGCGGTTCT. Single Primer Amplification Reactions (SPAR), along with PCR-fingerprinting were used to analyze the genetic differences between respective generations of these three strains of brewing *Saccharomyces*. The SPAR markers produce a unique set of patterns that can detect the presence of yeast hybrids. Additionally, identification of yeast and the presence of bacteria in an unknown sample of beer given from a local brewery company in Richmond was undertaken. The goal of this project is to relay brewing conditions to characteristics of beer, such as aroma, flavor, and appearance, and to develop a consistency in the brewing process.

Noxa and a BCL-2 inhibitor work together to cause efficient apoptosis in HNSCC

Essam Abed, Dept. of Biology, with Dr. Hisashi Harada, Philips Institute for Oral Health Research, Massey Cancer Center

Head and neck cancer is the 7th leading cancer worldwide. Head and neck squamous cell carcinoma (HNSCC) accounts for approximately 90% of Head and Neck cancer cases. An effective treatment to HNSCC has remained elusive despite multiple treatments being tried. Surgery, chemotherapy, and radiation in the past 30 years have done very little to improve survival rates. In a previous study, we demonstrated the susceptibility of HNSCC cell lines to a protein called PMAIP1. PMAIP1 (known as Noxa) is a pro-death protein that inhibits the pro-survival protein MCL-1. We theorize that when combined with a drug such as ABT-263, which induces cell death in cancer cells by inhibiting pro-survival proteins BCL-2 and BCL-xL, both Noxa and ABT-263 will work together to cause even more cell death via their distinct targets. Furthermore, our hypothesis is that Noxa/Noxa combination treatments will induce massive cell death in the HNSCC mouse models. In this study, we tried to establish Noxa-mediated treatment in vitro.

Methods: We examined apoptosis using a semi-quantitative method called Western Blot, which allowed us to take a “snapshot” of cells and compared to each protein by thickness/size of the bands detected by specific antibodies. Furthermore, we used a quantitative method called FACS analysis which allowed us to measure the amount of cell death using Annexin V-Propidium Iodide staining and determine the stage of apoptosis.

The drugs used were ABT-263 (BCL-2 + BCL-xL inhibitor), ABT-199 (BCL-2 inhibitor) and A-1331852 (BCL-xL inhibitor).

Results: Noxa alone is evidently causing plenty of cell death in certain cell lines, while Noxa and ABT-263 combination is causing much more in other cell lines. Overall, more data will be needed before drawing conclusions.

143. **Examining the Relationship Between Substance Use (Tobacco, Alcohol, Marijuana, and Prescription Drugs) and Sexual Risk Behaviors among College Students**

*Mohammed Noh, Abel Gebregziabher, Dept. of Health Physical Education and Exercise with Dr. Faye Belgrave, PhD and Melanie Moore, M.S.. Dept. of Psychology*

**Introduction:** High risk sexual behaviors play a key role in the transmission of human immunodeficiency virus (HIV) and other sexually transmitted infections (STIs) among young adults. According to the Centers for Disease Control and Prevention (CDC), nearly half of the 20 million new cases of STIs each year are among young people aged 15–24 years. In addition, adolescents and young adults ages 13 to 24 represent 1 in 5 new cases of HIV infection. Given that substance use is known to impair judgment and decision making, it has been suggested that their use in combination with sexual activity might increase the probability that risky behavior will occur. This study aims to examine the relationship between substance use and sexual risk behaviors among young adult Black college students. **Method:** Data were collected post-test from participants who completed the VOICES/VOCES intervention program. VOICES/VOCES is an evidenced-based program designed to promote safer sexual behaviors, condom use skills, and condom negotiation skills among young Black adults. Participants completed a survey of questions about sexual risk behaviors, substance use, HIV knowledge, in addition to personal demographics. The sample for this study consisted of male and female college students. **Results:** Descriptive analyses will be performed to determine the percentage of students who reported use of tobacco, alcohol, illegal drugs, marijuana, or prescription drug use without a doctor's order. Logistic regression analyses will be performed to determine any significant relationships between self-reported use of the above substances and whether participants engaged in protected or unprotected sex during their last sexual encounter. **Conclusions:** Significant findings may be important in determining which, if any, substances are most associated with engagement in unprotected sex. These findings may also be of interest to on-campus organizations that focus on HIV/STI prevention, in determining which types of services are needed in terms of reducing risky sexual behaviors among college populations.

144. **An Examination of Skin Complexion Satisfaction and Self-Esteem Among College Black Women**

*Ashley MacDougald, Dept. of Psychology, with Dr. Faye Belgrave, Dept. of Psychology*

**Introduction:** Colorism is a prevalent issue among the Black community that particularly affects Black women. Colorism is defined as prejudice or discrimination against individuals with a dark skin tone, typically among people of the same ethnic or racial group. It has been reported that women of darker skin tones have lower positive attitudes about the self. This is partly due to societal standards of what is considered attractive, and frequent exposure to negative messages about their natural physical features. The purpose of the current study is to examine the relationship between skin color satisfaction and self-esteem among young Black women. It is hypothesized that lower skin color satisfaction will be associated with poorer self-esteem. **Method:** Young Black college women aged 18 and older participated in an online cross-sectional study which collected self-reports of body image, self-esteem, skin color satisfaction, ethnic identity, and general self-efficacy. **Results:** A linear regression test will be utilized to examine the relationship between skin complexion satisfaction and self-esteem by using the Skin Color Satisfaction Scale and the Rosenberg Self-Esteem Scale.
Descriptive analyses will also be performed on the above scales in addition to overall participant demographics.

**Conclusion/Implications:** Young Black women having low self-esteem due to their skin complexion can affect mental health, physical health, and overall confidence. Examining the relationship between skin color satisfaction and self-esteem is important given that moderate to high self-esteem is an important aspect of well-being. This study, in addition to future research, may bring important awareness to issues surrounding colorism and their effect on self-esteem among young Black women.

145. **Does Parental Support Moderate the Association between Peer Victimization and Depression in Children?**

*Leah Millard, Erin Brannan, Dept. of Psychology, with Dr. Wendy Kliwer, Dept. of Psychology*

The purpose of this study is to determine the extent to which parental support can buffer the relation between peer victimization and level of depression in children ages 9-16. Our study aims to expand on the limited literature examining parental support as a moderating variable between peer victimization and depression in youth. Although previous research has examined associations between peer victimization, depression, and parental support, the majority of that work has been conducted with Caucasians from middle- to high-socioeconomic backgrounds (Harper, 2011); very few research studies addressed this question in samples with low socioeconomic status. We will analyze data from Project Cope, a four-year longitudinal study which utilized a low income, urban sample comprised of 191 fifth graders and 167 eighth graders. In our sample of 358 students, ages of participants ranged from 9-16 (M=12.13, SD= 1.62), just under half (46.4%) were male, and most (91.9%) were African American. We anticipate that parental support will decrease the strength of the positive association between peer victimization and child depression. We plan to use multiple linear regression to test our hypothesis, as our variables are all continuous. We plan to control for age, as peer victimization may decrease as age increases. If our hypothesis is supported by the analyses of the data presented from Project Cope, the findings will validate the current views on the positive impact of parental support throughout childhood.

146. **Restoring Context to Art of the Moche**

*Daisy Matias, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology*

Due to the large amount of Pre-Columbian artifacts in existence, the archaeological context of many is lost. When this context is lost, very little is known about the artifact, and further research must be done to try and restore the context. In my research I restored the context of two Moche figurines in the collection of the Virginia Museum of Natural History. In order to gather the data I needed, I first 3D printed and painted replicas of the two artifacts. I then studied the uses and origins of similar Moche Artifacts, referencing the stylistic and formal attributes of the artifacts in the literature to my objects of study. Finally, I discussed my findings with a Pre-Columbian art historian, and together we assigned possible uses and places of origin to the two artifacts.
147. **White-Tailed Deer Activity and Preferred Habitat Type in and Around the James River Park System**

*Emma Davis, Dept. of Biology, with Dr. Anne Wright, Dept. of Biology*

The goal of this research project is to determine how White-tailed Deer are moving into the James River Park System (JRPS) in Richmond, Virginia, and if their activity within the system is linked to the wildlife corridors that they are using. Determining the areas that the deer are using to travel will allow us to better direct conservation efforts within the JRPS. Deer activity was determined for each wildlife camera site based on the number of visits to each site. Data was collected from November 2016 – January 2017, and memory cards were collected biweekly. The canopy cover surrounding the JRPS was quantified and visualized using GIS software. Preliminary analysis shows a large amount of deer activity in the Huguenot Flat and Pony Pasture sites, suggesting that there are canopy covered corridors being used by the deer to move into and out of those areas of the park. The results of this study can be used by the JRPS to pinpoint wildlife corridors that can be considered when determining specific conservation projects.

148. **Primate Natal Coats: A Comparison**

*Lisa Day, Depts. of Anthropology and History, with Dr. Amy Rector Verrelli, Dept. of Anthropology*

In some nonhuman primate species, young are born with natal coats, or fur that differs dramatically in color from adult pelage. Usually, bright natal coats will change throughout ontogeny until the young reaches adulthood. Some primatologists explain natal coat evolution as a mechanism to encourage parental care, by the entire social group not just by the mother. Several species have infants who have a bright coloration at birth, and these species are distributed across different habitats/phylogenetic groups.

In this paper and poster project I will compare natal coats across several taxa and discuss research on the benefits of being highly visible to predators as a vulnerable young primate. Results suggest that natal coats may serve a few purposes, for example deterring infanticide and ensuring adoption by another female if the mother dies. Future research could provide more details on both of these topics and give more insight into the evolutionary reasons for natal coat development.

**The pressures of male infanticide and ecological constraints on ovulation and reproductive strategies in female nonhuman primates**

*Christina McGrath, Dept. of Anthropology, Dr. Amy Rector Verrelli, Dept. of Anthropology*

One of the costliest activities in a female nonhuman primate’s life is likely gestation and raising offspring. Despite this cost to females, it is common for males of some primate species to commit infanticide to stimulate a female into ovulation so that they themselves might reproduce with her. Because female primates invest time, energy, and resources into their offspring, it is counterproductive for a female primate to lose an offspring which they have already invested resources in. Rates of infanticide vary across ecological contexts and phylogenetic groups, as does female response to infanticide risk.

In this project, we explore how female ovulation and reproductive strategies might have evolved to confuse male paternity and lessen the chance of infanticide, and how ecological and phylogenetic constraints may have influenced these female strategies. Results suggest that for female primates whose ovulation is concealed, a strategy could be copulating during fertile periods, the non-ovulatory period, and gestation. For female primates who advertise ovulation by having sexual swellings, there is a shorter amount of time for a female to confuse paternity, and thus a different strategy might be employed. The variation in these strategies also suggests that ecology plays a key role in how female nonhuman primates negate the risk of infanticide.
Analyzing the movement and evolution of simian and human immunodeficiency viruses in Cercocebus atys, Pan troglodytes, and Homo sapiens

Mounika Abbareddy, Dept. of Biology, with Dr. Amy Rector-Verrelli, Dept. of Anthropology

The human immunodeficiency virus (HIV) was not identified until the 1980s. In humans, there are two major types of HIV, HIV-1 and HIV-2. In the late 1990s, researchers found a strain of simian immunodeficiency virus (SIV) in chimpanzees that is similar to HIV-1 in humans. A strain of SIV in mangabeys has also been found, this one quite similar to HIV-2. This research project aims to condense the various research done on the strains of the virus in the different primates to come up with a theory for the evolution and cross-species transmission of the virus. The habitat, behavior patterns, and types of interactions of the primates was a major part of this process. These barriers are important in analyzing the number of times and possible ways the virus may have been transmitted from one species to the other. Many researchers believe that virus was originally transmitted from mangabeys to chimps when they killed and ate the mangabeys in their territory. This same theory has also been applied to the transmission of the virus from chimpanzees to humans. Research on the many different strains of SIV and their relation to HIV, however, shows that this cross-species transmission cannot have been a single event. Phylogenetic mapping shows the complexity of SIV and HIV and how HIV evolved many different times. Recently, theories have also been put forth that the virus was transmitted through either the polio vaccine or the hepatitis B vaccine. These theories have not been thoroughly researched, but may have given rise to one or more, though perhaps not all, of the HIV strains today.

Monte Carlo simulation of Fluoroquinolone treatment for urinary tract infection caused by Escherichia coli: Analysis of Canadian versus U.S isolates

Ahmed Noreddin, Dept. of Biology, with Dr. David Ombengi, VCU School of Pharmacy

This study aimed to assess the probability of Ciprofloxacin (Cipro) compared to Gatifloxacin (Gati) and Levofloxacin (Levo) achieving favorable activity for bacterial eradication and prevention of resistance development in E.coli. Cipro 500mg BID along with various doses of Gati and Levo were simulated, and target attainment potential was estimated in hospitalized patients. Previously described and validated population pharmacokinetic (PK) models of Cipro, Gati and Levo in hospitalized patients were utilized to simulate Cipro, Gati and Levo PKs. Free-drug Area Under the Concentration (AUC 0-24) was simulated in Plasma (P) using Cipro 500mg BID, Gati 200mg and 400mg OD as well as Levo 500mg, 750mg and 1000mg OD. E.coli susceptibility data were obtained from the North American Urinary Tract Infection Surveillance Study (NAUTICA). The NAUTICA study collected 2000 outpatient urinary isolates (1142 E.coli) from all geographic regions in Canada and USA. Use of Monte Carlo Simulation allowed for the full variability of susceptibility data and AUC 0-24 data for all patients. In hospitalized patients, Cipro 500mg BID, Gati 400mg OD and Levo 750mg OD showed high probability for target attainment of free AUC\textsubscript{0-24}/MIC of 125 or 250 against E.coli. Compared to Canada, U.S isolates showed lower probability of achieving a favorable outcome.

149. "To Tell the Truth I'm Terrified": The Concerns of Black Study Abroad Returnees and Interests about Study Abroad

Alexis Briggs, Depts. of Psychology and African American Studies, with Dr. Faye Belgrave, Center for Cultural Experiences in Prevention; Dept. of Psychology

The Concerns of Black Study Abroad Returnees and Interests about Study Abroad; According to the Institute of International Education’s Open Doors report, out of the 27% of college students that study abroad, only 5.6% are Black students. This study looks to examine the fears and concerns of Black students regarding study abroad. Survey data looks at Black students who are looking to study abroad as well as Black study
abroad returnees anticipated fears and concerns vs. actual fears and concerns about being and studying abroad.

**150. 3D Immersive Visualization of Biochemical Pathways**

*Bansri Rawal, VCU Honors College, Dept. of Computer Science with Dr. Dayanjian Wijesinghe, Department of Pharmacotherapy and Outcomes Sciences, and Ali Panahi, Garret Westlake*

Biochemical networks are extremely complex. As such their visualization and analysis as a whole is quite difficult. A primary reason for this difficulty is data sets to produce densely populated, complicated graphs, where it becomes extremely difficult to discern a pattern, structure, or understand relationships within the individual components of the network. Although many softwares, such as Cytoscape, have made great advances to help analyze such data, they are limited by the technological constraints of having to visualize dense networks in a two-dimensional (2D) environment. Such 2D platforms prevent researchers from properly visualizing the data by limiting them to simple “click and drag” types of interactions. This prevents users from achieving a more natural and organic approach to visualizing and interacting with networked data. In the age of virtual and augmented reality, it is advantageous and crucial for data scientists to have the ability to engage with biochemical networks naturally, follow the types of relationships between the nodes visually, and receive a simplified, but comprehensive perspective of those networks. To overcome the challenges and limitation of existing 2D technology, we are developing a 3D immersive augmented reality software platform based on the Microsoft Hololens architecture to better visualize, analyze, map, comprehend, and engage with biochemical pathways. This software platform has further utility in that it can be used to investigate any network related information in an immersive environment. Possible applications include the investigation of drug interaction networks, gene expression networks, and protein expression networks. The platform also has the capability to embed informative metadata that can be used as needed, thereby increasing the information density while keeping the overall visual interface simple and uncluttered. From a non-biological standpoint, this software platform has the capacity to investigate any type of highly networked information. In summary, this software framework will enable the immersive visualization of networked data in a manner that was never before possible and has the capacity to speed up biomedical research via increasing speed of data driven hypotheses generation and testing.


*Abir Malik, Dept. of Sociology, with Dr. Susan Bodnar-Deren, PhD, Dept. of Sociology*

Background: Epidemiological Transition is the shift in a society from mortality caused by infectious and parasitic disease and low life expectancy to one characterized by degenerative and chronic disease and high life expectancy, due to changing social conditions (Omran, 1971). The U.S. transitioned occurred over the course of the 20th Century (Wilkinson, 1998), however due to structural inequalities, not all subgroups of the U.S. population transitioned at the same time (Williams, 2003). De Jure and De Facto segregation has perpetuated social inequality and stratification (Bonilla-Silva, 2009) and is especially apparent in Richmond, where even burial grounds were segregated by race until the end of the 20th Century. Study Objective: To see if and when epidemiological transition occurred among a sample of African Americans in Richmond VA. Methods: Using primary data obtained from the East End Cemetery in Richmond VA, we recorded age at death for a sample of African Americans during the course of the 20th Century. We then linked the data obtained from the headstones with publically available death certificates, which contained cause of death. Focusing on mortality caused by cancer and cardiovascular disease, we compared this with similar mortality trends for the full U.S population during the period to see when African Americans, living in Richmond characterized this transition. We additionally examined causes of death among the sample by age and gender. Results: Similar to overall U.S. trends, we found that mortality caused by chronic illness was greater than by acute for most age subgroups, with the exception of those ages 19-34. We also found that among African Americans there were no gender differences in death caused by CVD in the middle of the
century (1950-1970); however women were more likely to die from cancer than were men during the period. For the latter part of the 20th C., among African Americans in our sample, women had higher mortality from both CVD and cancer than did men. We found that death by cancer and CVD was lower for African Americans in our sample during this period than it was for the total U.S. population, suggesting that African Americans in Richmond VA epidemiologically transitioned at a later period than did white Americans.

152. **Formulation of enteric pH-responsive nanoparticles for a model of drug delivery**

*Raven Smith, Dept. of Chemical and Life Science Engineering, with Dr. Christina Tang, Dept. of Chemical and Life Science Engineering*

Oral delivery is the most convenient for drug administration. pH responsive nanoparticles that facilitate specific intestinal release of oral dosages and prevent stomach irritation. We aim to develop pH-sensitive platform that remains intact at low pH (acidic environment) and dissolves at higher pH (~neutral). Nanoparticles were formulated from tannic acid, chitosan, and PEG-based stabilizer using Flash NanoPrecipitation (FNP). In FNP, tannic acid and PEG-based stabilizer were dissolved in acetone and rapidly mixing with aqueous chitosan using a confined impinging jet mixer. The tannic acid and chitosan are encapsulated due to a combination of hydrogen bonding and hydrophobic interactions with the stabilizer. Nanoparticle size and stability were evaluated using dynamic light scattering. The size of the nanoparticles can be tuned between 150 nm and 980 nm by varying the total solids concentration or the weight ratio of the block copolymer (P85bPEG) to the core materials (TA and chitosan). Nanoparticles formulated with a 1:1 mass ratio of stabilizer to core were stable with no appreciable changes in size for at least 1 week in a DI water reservoir. Ratios above 1:1 produced non-uniform nanoparticles with polydispersity indices above 0.6 and rapid, unpredictable changes in size. Nanoparticle solutions of total solids concentration below 4 mg/ml demonstrated high stability and changed very little in size or monodispersity over at least 1 week. The stability of the nanoparticles as a function of pH are currently under investigation.

153. **Effects of prescribed fire on aquatic macroinvertebrate community assembly across terrestrial and aquatic scales**

*Shanece Green1, Dominique Jean1, Logan McDonald2, Dr. James Vonesh3*

1. B.S. Biology, 2. Department of Biology Graduate Mentor, 3. Department of Biology Faculty Mentor

Abundance and diversity of organisms with complex life cycles may vary in response to disturbances. Fire is a disturbance that can alter both the terrestrial habitat and the embedded aquatic habitat that aquatic macroinvertebrates occupy. Studies exploring post-fire invertebrate communities have focused on either the terrestrial or the aquatic habitat, but have not determined if patterns of abundance and diversity are a result of changes to the terrestrial or aquatic habitat, or both. We examined aquatic macroinvertebrate community assembly by nesting mesocosms with burned and unburned leaf litter into replicate burned and unburned landscapes. We sampled aquatic macroinvertebrates from our aquatic mesocosms, after allowing communities to assemble, to determine diversity and abundance. Our preliminary results suggest that abundance and diversity may vary across burned and unburned treatments. Patterns of diversity and abundance in aquatic macroinvertebrate communities may also impact food web dynamics and have cascading effects. Understanding the role of fire on terrestrial and aquatic conditions will be critical in effectively managing for invertebrate communities and associated species.

154. **Effects of Military Branch Membership on Risk Taking Propensity and Alcohol Use**

*Brianna Georgea, Sage Hawn, M.S.a,b; Ruth C. Brown, Ph.D.b; Erin Berenz, Ph.D.; Scott McDonald, Ph.D.d; Treven Pickett, Psy.D.b,c,d; Carla Kmett Danielson, Ph.D.c; Suzanne Thomas, Ph.D.c; Ananda B. Amstadter, Ph.D.b*

*aDepartment of Psychology, Virginia Commonwealth University, Richmond, VA, USA*

*bDepartment of Psychiatry, Virginia Institute of Psychiatric and Behavioral Genetics, Virginia Commonwealth University, Richmond, VA, USA*
Combat exposure has been identified as a risk factor for problematic alcohol use (e.g., at-risk drinking, binge drinking) and increased risk-taking propensity (RTP) among military personnel. Rates of combat exposure have been show to vary across different branches in the military (e.g., Army, Navy, etc.). Problematic alcohol use and increased RTP are both associated with negative mental health outcomes (e.g., PTSD), warranting increased understanding of these outcomes within military culture. There is a paucity of research examining potential differences in combat-related mental health outcomes between military branches. This study sought to fill this gap in the literature by investigating whether problematic alcohol use and RTP differed according to military branch membership in a sample of 352 young veterans ($M_{\text{age}}=30.33, SD=4.55$). Three Analyses of Covariance (ANCOVAs) tests were conducted in order to investigate differences between branches on RTP, binge drinking and average number of drinks per week while statistically controlling for significantly associated demographic variables (i.e., age, marital status). RTP ($F(5, 311) = .626, p = .680, \text{partial } \eta^2 = .010$), binge drinking ($F(5, 344) = 1.017, p = .407, \text{partial } \eta^2 = .015$), and average number of drinks per week ($F(5, 344) = .627, p = .679, \text{partial } \eta^2 = .009$) did not significantly differ according to military branch. Similarly, PTSD symptom severity did not vary according to military branch membership ($F(5, 296) = .672, p = .645, \text{partial } \eta^2 = .011$). Variables that have otherwise been shown to be associated with combat exposure (i.e., RTP, alcohol use, PTSD) did not differ according to branch membership in the present sample. A notable limitation of this study is the exclusion of participants who meet diagnostic criteria for alcohol use disorder, therefore excluding individuals with more severe alcohol use. Potential clinical implications from these findings suggest that, despite differences in combat exposure between branches, availability of post-deployment resources may be consistent. Further investigation is needed to look into military veterans who suffer from alcohol use disorder in order to refine post-deployment care and resources.

155. Understanding the Effects of HIV and Drugs of Abuse on the Blood-Brain Barrier

Gopika Hari, VCU Honors College, Dept. of Biology, with Dr. Mary Peach McRae, Dept. of Pharmacotherapy and Outcomes Sciences

Despite effective systemic therapy, HIV-1 infection within the brain results in neuronal degradation and neurocognitive dysfunction. This neurocognitive dysfunction is worsened in the setting of opiate abuse. The central nervous system (CNS) is protected by the blood-brain barrier (BBB), a selective barrier regulating the passage of substances from peripheral circulation into the CNS. The BBB is composed of microvascular endothelial cells encased by basal lamina, pericytes, and perivascular astrocyte endfeet. Intracellular junctional complexes comprising of adherens and tight junctions are located between the endothelial cells and form tight barrier, preventing traffic of compounds between cells (paracellular flux). Clinical and in vitro data suggest that BBB integrity is compromised in HIV infection, which leads to a leaky barrier. Brain microvascular endothelial cells also express efflux transporters that are responsible for the extrusion of substances from the brain back into the blood. P-glycoprotein is a drug efflux transporter involved in the efflux of many antiretroviral drugs and overexpression of P-glycoprotein can limit therapeutic concentrations of substrate drugs within the brain. Additionally, P-glycoprotein expression and/or function may be altered in the setting of HIV infection and in the setting of drug abuse. In order to study the impact of morphine, a commonly used opiate drug of abuse, on drug-efflux proteins at the BBB, we measured the effects of morphine and the HIV-1 protein Tat on P-glycoprotein expression and function. hCMEC/D3 cells, which are human derived brain microvascular endothelial cells, were pre-treated for 24 hours with Tat (100nM), morphine (500nM), or Tat (100nM) + morphine (500nM). P-glycoprotein function was evaluated by measuring intracellular accumulation of the prototypical P-glycoprotein substrate, rhodamine-123. Compared to control,
statistically significant increases in cellular accumulation of rhodamine-123 were observed in both the morphine (mean±SEM; 118±6.5%, p<0.05) and Tat+morphine (118 ±13.1%, p<0.05) groups, suggesting decreased efflux activity of P-glycoprotein. Protein expression of P-glycoprotein was measured using western blot analysis. Significant decreases in P-glycoprotein expression was observed in all treatment groups as compared to control; Tat (63±4.2%, p< 0.05), morphine (64±13.5%, p<0.05) and Tat+morphine (69±15.6%, p<0.05). Understanding the factors that influence efflux transporter function and expression in the BBB are crucial in optimizing antiretroviral penetration into the brain, even in the setting of drug abuse.

156. Emotion regulatory deficits associated with depression and anxiety symptoms

Emily Murphy, Dept. of Psychology, with Dr. Ananda B. Amstadter and Dr. Lance M Rappaport, Dept. of Psychiatry

While considerable research has documented the role of emotional dysregulation in psychopathology, there is a need to examine the clinical importance of specific deficits in the emotion regulatory process. The present study looked at whether specific emotion regulation deficits, assessed at baseline by the Difficulties in Emotion Regulation Scale, predicted symptoms of depression, on the PHQ-9 (M = 6.47, SD = 5.83), or generalized anxiety, on the GAD-7 (M = 12.03, SD = 6.11), among undergraduate students (N = 148; 73% female; M_age = 18.96, SD_age = 1.73) 2 weeks later. Data analysis used structural equation modeling to examine the association of specific emotion regulatory deficits with symptoms of both depression and anxiety while accounting for the well-known correlation between the two internalizing disorders. Results indicated that the STRATEGIES scale, which describes limited access to emotion regulation strategies, predicted elevated symptoms of both depression, $\beta = 0.43$, p < 0.001, 95%CI [0.19, 0.68], and generalized anxiety, $\beta = 0.31$, p > 0.001, 95%CI [0.03, 0.59], whereas the NONACCEPTANCE scale, which describes an individual’s non-acceptance to emotional responses, also predicted elevated generalized anxiety symptoms, $\beta = 0.19$, p = 0.039, 95%CI [0.002, 0.37]. Symptoms of anxiety and depression were correlated, as expected, $r = 0.65$, 95%CI [0.53, 0.76]. Similarly, using an additional measure of symptoms of depression ($M = 3.66$, $SD = 4.91$), anxiety ($M = 2.68$, $SD = 3.77$), and stress ($M = 4.58$, $SD = 4.96$) on the Depression, Anxiety, and Stress Scales produced similar results. The STRATEGIES scale predicted elevated depression symptoms, $\beta = 0.50$, p < 0.001, 95%CI [0.26, 0.76], and results specify that the STRATEGIES scale predicted symptoms of anxiety, $\beta = 0.31$, p = 0.027, 95%CI [0.04, 0.60], whereas the NONACCEPTANCE scale predicted somatic symptoms of stress, $\beta = 0.24$, p = 0.022, 95%CI [0.04, 0.44]. Symptoms of depression were correlated with both symptoms of anxiety, $r = 0.84$, 95%CI [0.76, 0.90], and stress, $r = 0.76$, 95%CI [0.64, 0.83]. Results regarding additional scales representing other deficits in emotion regulation will be discussed. Results clarify the nature of the association of emotion regulation deficits with depression and anxiety symptoms among college students. Specifically, participants who reported limited access to emotion regulation strategies were at increased risk for depression symptoms and anxiety symptoms whereas participants who reported low acceptance of emotional responses were at increased risk for somatic, stress-related symptoms.

157. Porcupines and China Dolls: Exposing Trauma through Narrative Voice

Imari Santiago and Savannah Parker, with Cristina Stanciu, Dept. of English

This research endeavor is a literary analysis of a vital novel about the trauma of the residential school experience in Canada, Porcupines and China Dolls (2002). Written by Canadian First Nations novelist Robert Arthur Alexie, this novel is a raw, healing narrative that focuses on the reality of the residential school experience in Canada and the move toward reconciliation.

The residential school system in Canada originated in the 1870s. The Canadian government paired up with various churches (Anglican, Catholic, and other predominant religions) to assimilate Aboriginal people into Canadian society. If the families of the children failed to give their children to these residential schools, punishment and imprisonment were the consequences. Over a century there were over one hundred and
thirty residential schools in Canada and the last one closed in 1996. Alexie begins his novel by writing about this oppressive form of education in Canadian residential schools. He writes about First Nations children who experienced traumatic incidents such as having their hair cut, being forced to wear uniforms, and forgetting their native language. These children are the novel’s “porcupines and china dolls.” These children return in the later parts of his novel as adults and Alexie writes how they are continuously dealing with the hardships of their past due to the residential school system.

The novel is autobiographical as Alexie was a survivor of a residential school and resided in the North Western Territory part of Canada, where the people of Teet’lit Gwich’in still live. The author writes in a powerful way throughout the novel that connects itself like a web that has a destructive spider in it, which is the government’s residential school system. The impact of this narrative comes from the significantly distressing realities of the experiences of residential boarding schools for indigenous populations, specifically those of the Canadian First Nations communities. Alexie takes his personal experience and creates a powerful narrative with the raw emotion of the real history.

By examining Alexie’s use of narrative strategies to recreate that traumatic and violent history, we have found through research that voice and verbal tense create a new method for expression of an emotionally-intense topic. The voice of the narration presents an unreliability that emphasizes the trauma and the dichotomy between personal narratives and the broader ramifications/development of historical trauma. In this project, we will strive to shed light on Alexie’s writing as he displays the scars of the residential school experience over a century. The scholarship on this topic is limited, so further research and analysis is vital for advancing the knowledge. We break down the novel into the three parts and analyze the interconnection of narrative voice and verbal tense as their significance to understanding Porcupines and China Dolls.

158. **What Makes an Electron a Valence Electron?**

*Ashlyn Van Norman, VCU Honors College, Dept. of Chemistry with Dr. Sally Hunnicutt, Dept. of Chemistry*

In this experiment, the Guided Inquiry learning method was used to develop a concrete working definition of valence and core electrons, by analyzing energy trends and geometry. The software, WebMO, was used to determine the total electronic energy and atomic orbital energies by using the Hartree-Fock model. To study how the interactions between electrons of individual atoms lead to the formation of a diatomic molecule, geometry optimization was performed by analyzing the total energy of Li2 of bond lengths between 0.5 and 50 angstrom. The remaining homonuclear diatomic molecules were optimized using WebMO. Finally, the student reflected on the effectiveness of the Guided Inquiry learning method in aiding understanding of the material.

159. **The Association of Mothers’ Experiences of Perceived Discrimination and Daily Stress**

*Raven Ross, Dept. of Psychology, with Dr. Fantasy Lozada, Developmental Psychology*

Previous research has shown that people who experience age discrimination have higher levels of psychological distress than people who reported no discrimination (Marshall & Vogt Yuan, 2007). Another study found that experiencing lifetime gender and racial discrimination is predictive for experiencing other types of stressors (Perry, Harp, & Oser, 2013). In addition, previous research examined the effect of experiencing weight discrimination on cortisol levels which found that people who believed they faced weight discrimination had significantly higher levels of cortisol over a two month period compared to people who felt they did not experience weight discrimination (Jackson, Kirschbaum, & Steptoe, 2016). The results from these various studies show that the experience of discrimination has an effect on the experience of stress, yet many studies usually focus on one aspect of discrimination, the most common type assessed being racial discrimination. However, the present study incorporated various types of discrimination in its measures of
perceived discrimination (e.g., racial, gender, age, and physical discrimination) and its association with experiences of daily stress.

Participants were drawn from the longitudinal Durham Child Health and Development Study (DCHDS) during the children’s third grade year. Participants included 117 African American children, 82 European American children, and 4 biracial children. Mother participants included 117 African Americans and 82 European Americans.

Mothers completed the Daily Inventory of Stressful Events (DISE) (Almeida, Wethington, & Kessler, 2002) and the Perceived Discrimination Questionnaire on a laptop computer in the lab. The DISE assesses how many stressful events a person experiences in a day and included questions about stressors such as arguments with another person or workplace stress. The Perceived Discrimination Questionnaire is adapted from the Everyday Discrimination (ED) questionnaire (Williams, Yan, & Jackson, 1997), and the Daily Life Experiences of Racism (DLER) questionnaire (Harrell, Merchant, & Young, 1997). The Perceived Discrimination questionnaire asked mothers how often they encountered discrimination, why they believed they experienced discrimination, and how much it bothered them.

Correlations were conducted in order to determine if there were any significant associations of mothers’ daily stress and perceived discrimination. The results showed a positive association of daily stress and perceived age discrimination that was statistically significant ($r = .16, p < .05$). The associations of daily stress and mothers’ perceived racial, gender, and physical characteristics discrimination were not statistically significant.

The results of this study suggest that the experience of age discrimination leads to an increase in stress in the daily lives of mothers. The lack of statistical significance in the associations of race, physical, and gender discrimination and the experience of stress is in contrast to previous findings. It is possible that there was no relationship between race, physical, and gender discrimination and the experience of stress among our sample of mothers because they felt that these experiences of discrimination were not as impactful as age discrimination. In addition, since various type of discrimination were examined in this study, it is possible that previous research on discrimination yielded different results because it examined each type of discrimination individually. This would’ve allowed for a more focused and in depth study of the mothers’ experiences of stress related to their experiences of discrimination.

**The impact of socioeconomic status and socio-cognitive abilities on prosocial behavior**

Justin Lucas, Sierra Williams, Dept. of Psychology, with Dr. Fantasy Lozada, Dept. of Psychology

Prosocial behaviors are classified into several subcategories; helping, sharing and, comforting (Dunfield, 2014). In the current study prosocial behavior shall be defined as helping, sharing, and comforting behaviors that are intended to help/benefit another (Eisenberg & Mussen, 1989). Researchers have identified several contributors to prosocial behavior such as socialization, individual differences, and cognitive development (Dunfield, 2014). The cognitive or socio-cognitive model suggests that children develop particular prosocial skills due to individual socio-cognitive abilities and previous studies have demonstrated that socio-cognitive skills are related to children’s prosocial behaviors with peers (Kärtner, Schuhmacher, & Collard, 2014). On the other hand, socio-cognitive deficits may impede children’s prosocial behaviors (Kärtner et al., 2014). Additionally, children’s lived (i.e., socialization) experiences may also contribute to children’s prosocial behaviors (Dunfield, 2014). Current studies suggest that there is a difference in the prosocial behaviors of higher SES adults than lower SES adults (Piff, Kraus, Côté, Cheng, & Keltner, 2010). Therefore, parents of lower and higher SES may pass their prosocial tendencies to their children, impacting children’s prosocial development through their socio-cognitive abilities. This study explores how children’s socio-cognitive abilities and deficits relate to children’s prosocial behavior in 3rd grade and whether these relations differ by the SES status of a child’s family. We hypothesized that there will be a stronger relationship between children’s socio-cognitive abilities and their prosocial behaviors for children from lower SES families than children of higher SES families. Children’s 3rd grade teachers completed the Social Cognitive Skills Rating Scale – Teacher Version (SCSRS-P; Kupersmidt, Stelter, & Parker, in press) to report on children’s socio-cognitive strengths
and deficits and the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) to report on children’s prosocial behaviors. SES was determined from the demographic information provided by the participants. Separate correlation analyses were conducted to examine associations among teacher reported prosocial behavior and social cognitive strengths and deficits for low SES and high SES children. Correlation analyses revealed similar associations for low SES and high SES children. Prosocial behavior was positively related to children’s social strengths to both low SES (r=.76, p<.01) and high SES (r=.648, p<.01) children. Additionally, prosocial behavior was negatively related to children’s social deficits for both low SES (r=-.468, p<.01) and high SES (r=-.326, p<.01) children. Fishers’ r-to-z transformations revealed low SES and high SES children did not significantly differ in their associations among teacher reported prosocial behavior and social cognitive strengths and deficits. These results reflect previous studies in that socio-cognitive abilities are a strong indicator of prosocial aptitude. Socio-cognitive deficits and prosocial behavior being negatively related may indicate a lack of necessary understanding of the self and other-oriented thinking and how to most effectively apply this thought process. Additional research is needed to understand the means by which prosocial behavior is developed throughout the lifespan. The more that we are made aware of what impacts the developmental patterns of prosocial behavior, the more prepared we will be to facilitate the healthy development of these behaviors in our homes and school systems.

160. The Strong Black Woman: Stress and social support in African-American women participating in a community based health intervention

Camille Brenke, VCU Honors College, VCU School of Nursing, with Dr. Candace Johnson, VCU School of Nursing

African American (AA) women have been identified as a high-risk population for Metabolic Syndrome (MetS), a complex cluster of cardiovascular risk factors includes obesity, glucose intolerance, dyslipidemia and hypertension. Many AAs with MetS suggest integrating stress management content and social support elements when trying to assist them in making lifestyle changes. The goal of this study is to identify and test culturally informed lifestyle interventions with AA women who are at high risk for MetS.

Methods 28 women were enrolled in the study and 22 women completed the study as structured. It was a 6-week, Yoga-based video intervention (YogicDance) using activity trackers and other internet-based technology to increase healthy behaviors and lower risk for MetS in at risk AA women between ages 35 and 50 years. MetS profile measures (blood pressure, glucose, waist circumference and blood lipids) were drawn at baseline and post intervention. Three focus groups (total N=19) were used to assess and provide context for feasibility measures of the intervention and to explore barriers and benefits to participating in YogicDance (YD).

Results Themes that emerged from this exploratory research include the idea that social support would enhance participation in the YD program. Stress reduction and stress management were seen as motivating factors in engaging in and increasing YD activity. The participants of this study completed three evaluation surveys to quantify stress levels. These include the Perceived stress scale, the African American Women’s stressor scale, and the Strong Black Woman Scale. In addition to these, participants were invited to focus groups that investigated other stressors or barriers that may have been present throughout the study. It was found that as the participants became more engaged in their health management via the YD activity, they lost social support.

Conclusion When stress is sustained for extended periods, cognitive resources are depleted leading to psychological distress, depressive symptomology and cardiovascular disease. Health promotion interventions with AA women at risk for MetS should address ‘top-down’ approaches to enhance cardio-protective cognitive resources such as social support and meaning and purpose in life. The work done in this study will lay the foundation for translating population-specific self-management of physical activity and stress in high risk groups and will assist in determining the effect sizes necessary to appropriately power and test this intervention as well as methodologies that will be feasible and acceptable in a full-scale randomized controlled trial.
161. **Facebook Study**

Pavsee Gajjar, Calvin Hall, Deidre Miller, Alan Hart, Department of Psychology, with Dr. Jennifer Joy-Gaba, Dept. of Psychology

The importance of being egalitarian in business is evident (King, Dawson, Kravitz, Gulick, 2012). Despite this equal opportunity mindset, discrimination is still observed in the workplace with employers changing the judgment criteria to be in-line with the applicant they find appealing (Uhlmann & Cohen, 2005). Moreover, employers only look at a resume for approximately six seconds before attempting to searching for the person on social media sites (Riggins, 2012). The purpose of the current research was to examine the influence that race of the applicant and social media presence had on decisions to hire men (Study 1) or women (Study 2). Based on previous research, we hypothesized that participants would be more likely to hire a White applicant compared to a Black applicant (Bertrand & Mullainathan, 2004; Uhlmann & Cohen, 2005). We also hypothesized that this preference would be stronger when the applicant had a negative social media presence. Participants read a scenario and were shown photos of applicants in a neutral or party pose. Results showed that, surprisingly, race had no effect on hiring decisions. However, the type of pose the applicant presented to social media did, with neutral poses being more desirable.

162. **Mindfulness Dampens Emotion Sharing to Promote Empathy in Interracial Contexts**

Antoine Calfat, Courtney Fields, Jordan Schramm, R. Matthew Lee, Jazmin Anderson, Daniel Bustamante, Lauren Curran, Justin D. Tubbs, Kirk W. Brown, Daniel R. Berry, Dept. of Psychology

Although a great motivator of prosocial action, empathy is often lacking where we most need it – in interracial contexts (Cikara et al., 2011). Perceived differences between the self and other, as instilled by racial categorization, leads to an attenuation in emotion sharing. Research has shown that psychological traits such as empathy and mindfulness reduce the perceived psychological distance between oneself and others, while those like racism increase it (Berry & Brown, 2017). More importantly mindfulness can be trained (Baer et al., 2003). In the current study, we investigated whether (trait and trained) mindfulness would increase interracial empathy by increasing emotion sharing. White female undergraduates (N=79) were shown videos depicting sad ingroup and outgroup (defined by race) actresses. During these tasks, 64-channel EEG was recorded, and self-report measures of empathic concern for the actresses in the videos were taken. After the task participants completed psychological trait measures, and were randomized to either a 4-day mindfulness training (MT), or sham mindfulness (ST) training. Participants returned to the lab these complete these measures again after training. Participants showed less emotion sharing for racial outgroup members, relative to racial ingroup members (p < .05). Opposite of what was predicted, trait mindfulness was associated with lower emotion sharing (p < .05), and MT decreased emotion sharing toward both ingroup and outgroup members (p < .05). While these aforementioned results were unexpected, MT did increase empathic concern during interracial video observation. This indicates that mindfulness training increases interracial empathy, but why it does so requires some re-thinking.

163. **Intersectional evils: Experiences of discrimination within the Black LGBTQ population**

Zhara France, Depts. of African American Studies and Gender, Sexuality and Women’s Studies with Dr. Vivian Dzokoto, Dept. of African American Studies

People within the lesbian, gay, bisexual, transgender, and queer (LGBTQ) community face remarkably high levels of discrimination on a daily basis, and African Americans who identify as LGBTQ are disproportionately affected by this type of hatred. This study examines the intersection of race and sexuality or gender to obtain the perspective of these character’s experiences with discrimination. The research is a content analysis of 10 films with main characters that identify as both Black and LGBTQ. Three of the movies are documentaries,
and seven are dramas. The films were chosen because they show personal accounts of Black LGBTQ people that have a challenging time completing daily activities without hatred due to their intersectionality.

The types of discrimination that were presented in the movies were physical violence, verbal abuse, social exclusion, emotional trauma, and sexual harassment. Some examples of these are refusal to give care in a doctor’s office, being fired in the workplace, or being excluded from religious activities. The adversity faced by these characters has a negative impact on their quality of life, which keeps them from achieving their goals. Although some of the movies are fictional, they are still a direct representation of the obstacles that these people have to constantly overcome in order to survive. With the results of this study and other research supporting this concept, there should be more action taken to establish an improved quality of life for Black LGBTQ people.

164. **Cannabis use and romantic relationships in the Spit for Science sample**

*Jessica Kinney, VCU Honors College, Dept. of Psychology, with Dr. Amy Adkins, Dept. of Psychology*

Previous research has shown that exclusivity in relationships can serve as a protective factor against the development of substance use problems in older adults. Although substance use is prevalent on college campuses, little is known about the association between substance use and romantic relationships in college students. Spit for Science is a VCU-wide research project looking at protective and risk factors for behavioral health and substance use. Previous analyses of relationship status and one substance (alcohol) in the Spit for Science sample indicated that participants who dated multiple partners were at an increased risk for elevated alcohol consumption and related problems compared to those who were single or in an exclusive relationship with one partner (Salvatore et al., 2015). We are interested in overall patterns of cannabis use in the Spit for Science sample and whether there is a similar pattern between cannabis use and romantic relationship status. We hypothesize that students who have reported they are in an exclusive relationship or who are single will have lower rates of cannabis use compared to those who are dating multiple people. Spit for Science cohorts 1-4 (overall N=9889, 61.5% female) were asked each spring of their college career about cannabis use in the past 12 months. Romantic relationship status in spring of the first year of college was also queried. The answer choices included not dating, dating several people, dating one person exclusively, engaged, married, married but separated, and I choose not to answer. Participants who skipped the question, answered married but separated, or elected not to answer were recoded to missing and the remaining collapsed into three categories: single (54.7%), in an exclusive relationship (39.5%), and dating several people (5.8%). In on-going analyses, we will investigate the rates of cannabis use as a function of relationship status. This research can be used to help identify collegiate populations at risk for substance abuse and thus inform prevention and intervention programming.

165. **A Closer Look at Students in Recovery in the Spit for Science Sample**

*Yusrah Hasan, VCU Honors College and Jacqueline Roth, Depts. of Biology and HPEX, with Dr. Amy Adkins, Dept. of Psychology*

**Objective:** Colleges often provide environments tolerant of heavy substance use, resulting in more binge-drinking and a higher risk for substance abuse among college-aged individuals. To combat the dangers of substance abuse, many colleges and universities have established collegiate recovery programs. The purpose of this study was to examine how individuals in recovery compare to the VCU student body in terms of mental health, substance use, academics and background characteristics.

**Methods:** Using the fall, freshman wave of Spit for Science Sample across all cohorts (2011-2014, N = 7,958), we divided students into four categories: non-initiators, drinkers, those with an AUD diagnosis and those who self-identified as in recovery. One Way ANOVAs were used to compare mean differences among the four groups in the categories of Mental Health, Substance Use, Pre-VCU experiences, and other outcomes.

**Results:** Students with AUD (Alcohol Use Disorder) symptoms and those in recovery have higher levels of
anxiety, depression, SLE (stressful life events), ASB (antisocial behavior) and lower GPAs. Drinkers and those in recovery reported the same alcohol usage. Additionally, those with AUD symptoms drink more than students in recovery.

**Conclusions:** Students in recovery show similar symptoms to those meet criteria for an AUD. Students in Recovery face emotional and behavioral challenges even before arriving to VCU, demonstrating a need for support services.

### 166. Respirable particles in desktop 3D printer workshops

*John Cuddehe, Dept. of Chemistry, with Dr. Nastassja Lewinski, Dept. of Chemical and Life Science Engineering*

Since the advent of desktop 3D printers and their subsequent rise in popularity, workshop style spaces have opened up to provide broader access to these devices. While exposure concerns revolving around 3D printers are being explored, most emission studies are performed using controlled exposure chambers, which less accurately represent a real world situation. To explore the exposure concerns of workshop environments, we measured particle emissions generated from three commercially available 3D printers located in The Workshop of Cabell library. A scanning mobility particle sizer, optical particle sizer, transmission electron microscope, and gravimetric analysis were used to determine the physical characteristics of the particles emitted. The influence of filament type was examined by printing with polylactic acid (PLA), acrylonitrile butadiene styrene (ABS), and high impact polystyrene (HIPS). It was found that the emitted particle sizes ranged between 11 nm - 300 nm. Particle concentrations varied between 2,000 particles per cm$^3$ to 14,000 particles per cm$^3$ depending on the 3D printer in operation. When all three 3D printers were in use, particle concentrations exceeding 20,000 particles per cm$^3$ were measured. Future work will examine the effectiveness of strategies to reduce particle emissions (e.g. enclosures, local ventilation).

### 167. The Use of Bacterial Community Succession Associated with Oral Region of Porcine Remains for Postmortem Interval (PMI) Estimation

*Daniel Malyn, Dept. of Forensic Science, with Dr. Baneshwar Singh, Dept. Forensic Science*

Currently, deaths that occur unobserved do not have an accurate method of determining long-term postmortem interval (PMI). Though this has been a focus of the forensic community, methods for long-term PMI have not proven to be precise. In this study, 16S rDNA MiSeq® sequencing (V3-V4 region) was performed on bacterial samples collected from the buccal region of porcine remains. Data suggests that proteobacteria is present at high levels during the early stages of decomposition and over time, the abundance of proteobacteria decreases and firmicutes becomes more prevalent. While still observed at high levels, firmicutes abundance decreases while actinobacteria abundance increases over time. Analysis of the data obtained from this study will help with the development of a model for prediction of long-term PMI.

### 168. The Attenuation of High-Energy Photons using Carbon Nanotubes in an Epoxy Matrix

*Aaron Lam and Nicholus Radcliffe, Dept. of Mechanical Engineering; Nuclear Concentration with Dr. Jessika V. Rojas Marin, Dept. of Mechanical and Nuclear Engineering*

High energy photons in the form of X-rays and gamma rays have a wide range of applications. As such, they are encountered in many industries, including medical, power production, and aerospace. Thus, the use of shielding is required to prevent damage from these high energy photons and other ionizing radiation to equipment and personnel. Currently, industries employ the use of heavy shielding materials, such as lead and concrete. However, as the use of high energy photons becomes more common, the need for
new, lighter, and more versatile shielding materials is increasing. Recent studies have indicated that nanocomposites possess unique qualities with the potential to fill this need. The purpose of the research reported herein is to examine and quantify the unique shielding characteristics of a carbon nanotube-polymer (CNT-p) nanocomposite to evaluate its viability as a shielding material.

The current theoretical model used in the quantification of radiation shielding is given by the Beer-Lambert Law. This law states that, for a given photon energy, the intensity of a penetrating beam of photons will decrease exponentially with increasing sample thickness. The relationship between the shielded and unshielded beam intensity is dependent upon a material property called the attenuation coefficient, a correction factor called the buildup factor, and the thickness of the shielding material. The attenuation coefficient is a material property that is expected to be independent of the geometry of the shielding material. The buildup factor adjusts the penetrating beam intensity through the incorporation of secondary radiation and photons that have been scattered in the shielding material. Recent literature has reported that the observed attenuation coefficient of multi-walled carbon nanotubes (MWCTs) decreased with increasing thickness. Confirmation of this claim would imply the existence of processes by which high-energy photons interact with MWCNTs which are not currently included in the theoretical model.

In this work the attenuation coefficient of CNT-polymer nanocomposites was measured and its dependence on sample material thickness was evaluated. Samples of an epoxy matrix and MWCNT filler were prepared with the weight percent of the filler varying from 0 – 2.5% in 0.5% increments. The samples were subjected to preliminary tests using 662 keV photons from a cesium-137 source in a broad beam configuration. The results of these tests indicated that there was a relation between the attenuation coefficient and sample thickness. Although, the current theoretical model allows for such a relation in the case of broad beam geometry via the buildup factor, the observed effect was more pronounced than expected. To preclude the contribution of a buildup factor in further testing, a collimator was constructed for use with a high-purity germanium (HPGe) detector. The collimator was designed to prevent any scattered photons from reaching the detector. And, use of the HPGe detector allowed for the discrimination of specific photon energies. Currently, the HPGe is being used in conjunction with the beam collimator to measure the intensity of a beam of 662 keV photons for varying thicknesses of the nanocomposite samples. According to the current theoretical framework, this should result in a constant attenuation coefficient. However, based on recent literature it is expected that there will be an observable decrease in the attenuation coefficient with increasing sample thickness. This effect is also expected to become more pronounced as the weight percent of MWCNTs is increased.

169. **The Influence of Social Hierarchies on Rates of Inbreeding in Primates**

Courtney Fields, Depts. of Psychology and Anthropology with Dr. Amy Rector-Verrelli. Dept. of Anthropology

Non-human primate social structures vary across species and ecological contexts. We are interested in non-human primate inbreeding because of what it may mean for primate cognition. The mechanisms which are used to not only determine which primates are too closely related but also to then decide the best way to avoid or not avoid relations amongst relatives can potentially reveal high cognition amongst non-human primate species that has not yet been explored. Additionally, if species are engaging in inbreeding, they may pass down maladaptive traits that would result in their ultimate extinction regardless of conservation efforts.

Rates of inbreeding are relatively rare in nonhuman primates. In this study, I explore how social group pattern influences rates of inbreeding within social units. I hypothesize that when primates are organized with one dominant male or female, there will be more instances of inbreeding due to limited access to other, non-related primates of the opposite sex with whom they could mate.

Results across taxa suggest that rates of inbreeding seem to be uniform regardless of social structures and hierarchies, and thus that the mechanisms that have evolved to decrease inbreeding are working across primate societies. Ultimately, this is telling of the mechanisms used to create inbreeding avoidance. This research will open the door for other studies to elaborate on the processes of inbreeding avoidance be they
genetic or cognitive. As for species conservation efforts, genetic diversity should always be taken into account in order to produce the best individuals to release into the wild. This should be done regardless of evidence of “natural” rates of inbreeding in the wild.

**The Development and maintenance of social hierarchy in Japanese Macaques: The influence of social interactions with mothers within the society**

*Audrey Ann Lois Villanueva, with Dr. Amy Rector-Verrelli. Dept. of Anthropology*

Dominance hierarchies exist in males and females in many primate species. How these hierarchies are maintained differ across taxa. The purpose of this research is to identify the different behaviors and interactions that mothers portray within the social structure of Japanese macaques, *Macaca fuscata* that help maintain hierarchies.

Dominance hierarchy exists in the matrilineal groups of Japanese macaques, among females and males. The ranking status of hierarchy in males in Japanese macaque groups is known to be distinct and is attained through birth. Similar to males, the ranking hierarchy in females is innately influenced by the ranking status of the mother. Social behaviors among Japanese macaques are dominated by the social interactions of the mothers within the society. This research focuses on the social behaviors of mothers through the different ways in which Japanese macaque groups interact. Japanese macaques use grooming, mating strategies, and vocalization to fortify their social bonds.

This research will provide beneficial information on the importance of the role of mothers in Japanese macaque society, in regards to their influence on hierarchy through social behavior. These findings may be useful in analyzing the effects and possible conclusions through the social actions of mothers in Japanese macaque societies, and how they can allegedly alter their ranking in dominance hierarchy.

**Meta-analysis of the origin of the different facial morphology of orangutan males**

*Mina Adnan, Dept. of Biology, with Dr. Amy Rector-Verrelli. Dept. of Anthropology*

Unlike any other primate species, orangutans exhibit extraordinary sexual differences in their facial morphology. Two different strategies are available for males that reach sexual maturity: either become fully “flanged” and develop secondary sexual characteristics, which is known to be only developed by the dominant male, or remain “unflanged” and not develop secondary sexual characteristics. The mechanism for how this bimaturism evolved and how occurs is poorly understood, but both flanged and unflanged males are reproductively successful.

This project explores the physiological mechanism behind bimaturism in orangutan males; namely, are there genetic differences between flanged and unflanged males such that the strategy is inherited, is bimaturism a result of hormonal differences, and how do the two strategies influence reproductive success in male orangutans? Previous studies have shown that males that develop these “flanges” or cheek pads are more likely to have a high reproductive success than the ones who do not develop them. Results suggest that males with flanges emit a loud vocalization calls, also known as long calls, that give them higher opportunity for mates.
Reproductive Synchrony Among Group-Living Females in Nonhuman Primates

Caitlin Williams, with Dr. Amy Rector-Verrelli, Dept. of Anthropology

A strategy is any behavioral pattern that appears to increase fitness because that behavior is adaptive to the given environment, while reproductive ecology relates to the social interactions of primates and the impact on food distribution and reproductive success. There are various strategies primates find adaptive to their ecological context such as reproductive synchrony, which occurs in several taxa among nonhuman primates. Generally, synchronic ovulation that occurs in group-living, nonhuman primate females is often due to ecological and phylogenetic constraints. In this research, we evaluate the behavioral ecology and reproductive success of females in three closely related Cercopithecidae species, such as Chlorocebus aethiops, Macaca fascicularis, and Papio ursinus, to explore the influence of group strategy, life history, and ecological context on rates of reproductive synchrony. In this comparative analysis, results suggest that ecology and grouping strategy do influence reproductive synchrony because distributions of resources highly affect social structure and reproductive strategies across taxa.

Primate Vocalizations and the Development of Human Speech

Raquel Wetzell, Dept. of Biology and Anthropology with Dr. Amy Rector-Verrelli, Dept. of Anthropology

Nonhuman primates communicate in a variety of ways, much of which encompasses vocalizations. The amount of vocalizations used by different species, differs across taxa and habitat, and sometimes even between different populations of the same species. Exploring nonhuman primate vocalizations gives insight into the complex communication systems that exists between humans and how rudimentary language might have arisen in early hominins. Human language is characteristic of having social elements to its development and use and, therefore, in regards to the evolution of language, it is important to consider how different levels and types of vocal communications in nonhuman primates relate to sociality. Additionally, questions form over the ability of nonhuman primates to grasp human languages and use them towards creative ends.

This study will look at the vocalizations of orangutans, gorillas, gelada baboons, chimpanzees, and macaques, both in wild and captive settings, to assess the influences of taxonomy, ecology, and sociality on types of vocal communications. Results suggest that there are certain types of primate vocalizations that more closely resemble human communication, and that social settings greatly impact use and development of vocalizations, as is a trend also found in early human speech development. These studies can give us more information about the evolution of language and the fundamental basics of human speech, furthering our understanding of vocal communication through various approaches.

170. Automating Domain Recognition in Nanotechnology Research

Joshua Ramer, Interdisciplinary Studies, with Dr. Nastassja Lewinski, Dept. of Chemical and Life Sciences Engineering and Dr. Bridget McInnes, Dept. of Computer Science

Background: The body of nanotechnology research is growing at a rate that far outpaces our ability to utilize it by reading abstracts in order to select useful papers for further investigation. Google scholar produces 1,730,000 abstracts when queried for nanotechnology. This issue will increase the time between discovery and production of life-saving drugs and other important technologies.

Method: Documents are being classified into subdomains by trained annotators. Then, the process of annotation is being automated using techniques in natural language processing. The approach that this poster focuses on is document classification using Latent Semantic Indexing, a method that places documents into high dimensional space as vectors that are closed under basic operations. The annotated
documents are vectorized, the new unclassified document is vectorized, and then a classification is chosen according to the highest degree of similarity among the annotated documents.

**Results:** Pending completion.

**Future Work:** The body of training data is increasing due to annotation and potentially due to the creation of an annotation game to get the masses involved. Other methods of document classification and preprocessing are under testing and will eventually be included in a multifaceted approach aimed at improving classification results. Further efforts are being directed toward automatically identifying specific molecular properties in research.

### 171. Nostalgia and Interpersonal Emotions and Behavior

*Katherine Werner; Adriana Bos; Kristen Tully; Athena Cairo; Dr. Jeff Green, PhD, Dept. of Psychology*

Nostalgia is defined as "a sentimental longing for a personally experienced and valued past" (Zhou, Wildschut, Sedikides, Shi, & Feng, 2012, p. 300). Although nostalgia entails a bittersweet feeling that may sometimes prompt sadness, nostalgic emotions have been shown to have positive other-oriented emotions and behavior. Sedikides and Wildschut (2016) have found that nostalgia proneness is strongly, positively related to empathic empathy (the tendency to experience other peoples' emotions). Additionally, Zhou, Wildschut, Sedikides, Shi, and Feng (2012) found that when participants induced to recall a nostalgic compared to an ordinary memory, they were more willing to volunteer time and money to charitable organizations.

One way in which nostalgia may also promote positive behavior is through stifling anger and anti-social motivations. If nostalgic memories have a psychological function of enhancing social connectedness and buffering against loneliness, nostalgia may also buffer against frustration and anger even under provocation. We present the results of ongoing research examining whether participants who have just recalled nostalgic memories are less defensive and likely to get annoyed after receiving negative feedback on a test, and less likely to critique the person who gave them that feedback.

### 172. Smart Fabrics for Colorimetric Chemical Detection

*Breland Edwards, VCU Honors College, Dept. of Chemical and Life Sciences Engineering with Christina Tang, Dept. of Chemical and Life Science Engineering*

Due to the prevalence of chemical warfare, soldiers often carry chemical sensing devices, to warn of oncoming nerve agents. However, these devices are cumbersome, so a lightweight, wearable chemical sensing fabric that also protects against toxins would be beneficial. This fabric can be created by incorporating (1) organophosphate hydrolase, an enzyme capable of degrading organophosphates and releasing an acidic byproduct, and (2) polyaniline, which changes color from purple to green in the presence of acid, into nylon or polyvinyl alcohol nanofibers. The first step is to produce fabrics containing polyaniline and demonstrate the fabrics’ change color in the presence of an acid, in this case hydrochloric acid (HCl). We have grafted polyaniline (PANI) onto the surface of acid-treated nylon nanofibers. Using visual detection, the lowest HCl vapor concentration that was detected within 5 minutes was 95.2 ppm HCl. However, the lowest HCl vapor concentration increased from 95.2 ppm to 632 ppm after the fabrics were reset in ammonium hydroxide nine times. To investigate the cause, the fabrics after 0 resets and 10 resets were compared using Infrared Spectroscopy (IR) and elemental analysis. IR graphs did not show significant change when comparing peaks at 0 resets and 10 resets. However acid treated fabrics were compared to nonacid-treated fabrics and the peak ratio of 1440 cm$^{-1}$ to 1477 cm$^{-1}$ was smaller for acid-treated than for nonacid-treated fabrics at all resets, implying that the higher peak at 1477 cm$^{-1}$ correlates to higher concentration of PANI. Elemental analysis indicates a 2-fold decrease in Cl content in the emeraldine base form of PANI after ten resets. A loss of
173. **The effects of Neighborhood Cohesion and Parental Control on Child Emotional Regulation**

*Isabel B. Rose and Geri Beamer, Dept. of Psychology, with Dr. Wendy Kliewer, Dept. of Psychology*

Children have varied responses to the neighborhoods where they live, ranging from quite positive to quite negative. Researchers have found that neighborhood cohesion – the perception that neighbors care and look out for one another -- is a protective factor against harsh family environments, and can moderate the influence of a negative family environment, in turn helping a child develop healthy emotional regulation and positive behaviors (Silk, Sessa, Morris, & Steinberg, 2004). Parental control moderates child emotional regulation as children often depend on the influence and decisions of their parents and this parental control also affects neighborhood exposure (Kim, Hetherington, & Reiss, 1999). In the present study, we evaluate the joint contributions of neighborhood cohesion and parental control on child emotion regulation. Parental control was examined as a moderator of the relation between neighborhood cohesion and child emotion regulation. Data will be derived from Project COPE, a study of 358 low-income families. Both parenting practices (Parental Control subscale, wave 1) and emotional regulation (a subscale from the ERC, wave 2) were parent reported. Neighborhood cohesion (wave 1) is child reported. Emotional Regulation was assessed in wave 2 rather than wave 1 to see the effect of the Parental Practices and Neighborhood Cohesion after year. Results from this study will help develop and clarify the roles of parental control and neighborhood cohesion in predicting youth emotional regulation development.

174. **Using Eye Movement Measurement and Analysis During a Reading Task to Assess the Effect of mTBI on the Saccadic System**

*Zoe Villamar, VCU Honors College, IMSD Research Scholar, Dept. of Biomedical Engineering, with Dr. Paul Wetzel, Dept. of Biomedical Engineering*

**Purpose.** Eye movements originate from and involve different areas of the brain. Brain injuries and certain neurological diseases can affect these highly sensitive areas resulting in abnormal eye movement behavior. In this study, objective eye movement measurement and analysis was used to assess individuals with mild traumatic brain injury (mTBI) during reading. To read, requires voluntary discrete control of the eyes through the saccadic branch of the oculomotor system including cognitive processing. Between saccades, which move the eyes along a line of text, the eyes are fixated and remain stable as the letters and words are processed. Besides oculomotor dysfunction, individuals with mTBI may also experience cognitive impairment which may not be apparent compared to other much simpler visual tracking tasks. **Methods.** Five texts ranging in difficulty from elementary to twelfth grade reading level were presented to each subject via computer display positioned 70 cm from the subject. Each text was composed of 10 lines and contained roughly the same number of characters per text. Subject’s eye movements were measured at 500 Hz using either the EyeLink II or EyeLink 1000 (SR Research) binocular eye tracking systems. Subjects included individuals with mTBI and normal college aged students. Recorded data were analyzed for the number of saccades; saccadic amplitude, peak velocity, and acceleration; position accuracy; and fixation duration. Regressions to previous words and blinks were also considered. **Results.** Findings show that the mTBI group has significantly more regressions compared to the normal college-aged group. Individuals with mTBI also produced more fixations with smaller amplitude saccades than the normal group. The mTBI group has a higher variance within all these measures, suggesting that the way mTBI affects eye movements isn’t consistent. **Conclusions.** Significant differences between the mTBI group and the control group suggest that mTBI can result in measurable changes in saccadic eye movement behavior and potentially cognitive effects as well.
175. FEASIBILITY OF COMMUNITY-BASED YOGA VIDEOS FOR REDUCING TYPE 2 DIABETES INDICATORS IN AFRICAN AMERICAN WOMEN

Pascaline Ezouah, IMSD Research Scholar, with Dr. Candace Johnson, PhD, MPH, RN, VCU School of Nursing, Virginia Commonwealth University

In 2012, 29.1 million Americans were diagnosed with type 2 diabetes (T2D). The risk of developing T2D rises with older age, obesity, family history of diabetes, physical inactivity, stress, and race/ethnicity. Though African-Americans make up 13.2% of the U.S. population, they are 1.7 times more likely to have T2D as non-Hispanic whites and are at a significantly higher risk of death from conditions resultant of T2D such as cardiovascular and kidney diseases. Although there are various conventional pharmacological treatments for T2D, there has been a growing interest in the use of complementary therapies for adjuvant treatment, health maintenance, and prevention of diabetes. Yoga, a mind-body therapy, has been shown to reduce pre-diabetes--elevated fasting blood glucose levels---thereby positively effecting type 2 diabetes by demonstrating favorable trends in decreasing type 2 diabetes-related outcomes in as few as one session. The purpose of this 6-week feasibility study was to explore the preliminary effects of a culturally tailored, community-based yoga video intervention, YogicDance, on T2D-related health outcomes, specifically, pre-diabetes, in African American women, ages 35-50 years, living in a metropolitan urban area. Other metabolic indicators, HDL cholesterol, triglycerides, blood pressure, waist circumference, stress, and physical activity were also measured. Descriptive statistics were used to determine size and availability of potential eligible pool, accrual, reasons for refusal/attrition, completion rates of screening surveys, data collection procedures, and completion of biological/physical data. T-tests and Wilcoxon-Sign Rank tests were used to compare pre-and post-intervention metabolic syndrome measures. Focus groups were used to assess the feasibility of the intervention and to explore the contextual meaning and experiences of yoga in the lives of the study participants. This culturally-tailored mind-body therapy in this understudied group was determined to be feasible, Behavioral interventions like YogicDance can offer a supportive therapy to the current conventional treatments for type 2 diabetes.

176. Size- and density-dependence of flatworm predation on a freshwater snail

Caroline Sorey, Dept. of Biology with Dr. James Vonesh, Dept. of Biology

Predation plays an integral role in shaping species distributions and community structure in aquatic systems. Classical theory often assumes that the strength of interactions between predators and prey are constant across prey abundance and prey phenotypes. However, empirical studies often show that per capita predation rates decline with (1) increasing prey density as consumption becomes limited by handling time rather than encounter rates, and with (2) increasing prey size as prey attain size refugia where they become invulnerable to specific predators. Here we examine the degree to which prey density and size determine the strength of predator-prey interactions between the predatory flatworm (Planariidae: Dugisia tigrina) and the freshwater ramshorn snail (Planorbidae: Planorbis sp). These taxa commonly co-occur in rock pools along the James River in Richmond, Virginia. To quantify size and density dependence in predation, we conducted a laboratory experiment where we manipulated snail size and abundance in presence and absence of flatworm predators and measured survival and egg production over 14 days. Initial results suggest there may be size dependence in predation with smaller snails being more vulnerable. Understanding the degree to which predation is size and density dependent in these taxa will facilitate the development of more accurate models of predator-prey interactions between these taxa in freshwater systems.
177. Comparative genomics and functional annotation of six Bacillus phages

Alexa Cro, Dalton Huey, Danarubini Ramanan, on behalf of the Spring 2017 VCU Phage Hunters, Dept. of Bioinformatics, with Dr. Allison Johnson, Ph.D., Center for the Study of Biological Complexity

As part of the Fall 2015 and 2016 VCU Phage Labs, students discovered and purified six new Bacillus-infecting viruses, or bacteriophages. Four phages were isolated using Bacillus thuringiensis kurstaki as the host bacteria (Janet, OTooleKemple52, Zainny, and PPisBest), and two phages were isolated using Bacillus thuringiensis 350 (AaronPhadgers and Bubs). Sequencing of the phage DNA revealed that the six genomes had lengths ranging from 159149 bp to 162692 bp with a mean GC content of 38.5%. The Spring 2017 Phage Lab focused on the computational analysis of gene sequences and functional predictions of the proteins in these phages to better understand the genetic relationships between the viruses. Students annotated the open reading frames of each genome for the best starting position and predicted function. The annotation and comparative genomics results of these six phages will be shared. For the second half of the semester, students participated in the CACAO functional annotation competition. We focused on submitting ‘standard annotations’ for proteins with published experimental results supporting endolysin, capsid and holin function, and then submitted ‘transfer annotations’ for our phage protein sequences with sufficient homology. Combined, our work will be submitted to Genbank and Gene Ontology databases for access by other scientists.

178. Analysis of protein-protein interactions of mycobacteriophage Giles

Rashmi Naidu, Adithya Balu, Yonel Beaulieu, Rebecca Garling, Zainab Gbadamosi, Brittany Hazard, Krishna Karamsetty, Karun Rajesh, Cove Soyers, Zachary Varilla, Mitchell Vu and the Fall 2016 VCU Phage Hunters, with Dr. Allison Johnson, Center for the Study of Biological Complexity

All proteins serve a variety of functions: from energy production, to interactions with enzymes, and transportation and storage of molecules. Proteins can also perform as a complement to bacteriophages, thus giving the phage a certain function in addition to impacting the bacterial host. Mycobacterium tuberculosis is a bacteria strain that is found within patients who exhibit tuberculosis. Due to the increasing resistance of M. tuberculosis to regular antibiotics, alternate ways are needed to control M. tuberculosis infections. One potential method to control the M. tuberculosis infection could be to employ the use of mycobacteriophages for treatment or therapy. As a course project, we investigated the mycobacteriophage Giles protein-protein interactions as a way to predict possible protein functions. In order to decipher the possible protein functions of mycobacteriophage Giles, a set of Giles proteins was tested for protein-to-protein interactions (PPI) for the virus was tested to discover functions of the protein that wouldn’t be accomplished if proteins were studied individually. For example, these PPI’s may link uncharacterized proteins to well-known and studied proteins. For this specific experiment, a combination of two yeast two-hybrid (Y2H) vectors was used to in bait-and-prey array construction. Our results provided examples of positive, negative, false positive and control results. Each type of result will be displayed and the implications of true interactions will be discussed.

179. Host Range Testing of Bacillus Phages

Emaan Chaudry, Shradda Adhikari, Ahmed Alqaffas, Ayshah Asmat, Brenna Kent, Srikethan Mahdavadi, Sarah Otih, Samuel Portillo, Isabella Testoni, Zachary Varilla, Shravani Wadwekar, on behalf of the Fall 2016 VCU Phage Hunters, with Dr. Allison Johnson, Ph.D., Center for the Study of Biological Complexity

Bacillus thuringiensis is a bacterium that is a part of the “ACT” family (includes the species B. anthracis, B. cereus and B. thuringiensis). This bacterium is one of importance as it is commonly used as biological pesticide, to control infestations of gypsy moth and larvae that impact agriculture. The Bacillus
*thuringiensis* subspecies *kurstaki* (BTK) strain was used in our class, and it is a bacteria that is known for its commercial use in protecting agricultural crops, fruit trees, and more. Viruses that infect bacteria, or bacteriophages, are useful as a tool to understand more about their host bacteria. Through our work, with the use of techniques such as pipetting and aseptic protocol, 33 novel bacteriophages were isolated and purified. Students evaluated the ability of their phages to effect multiple species and strains of *Bacillus* to test the host range of these phages. The phages were spotted onto lawns of nine different bacteria and plates were examined for lysis of the host bacteria. Seen through the results, phages were characterized with a narrow to broad host range. A variety of plaque morphologies was observed. Finally, several experiments to confirm lysis occurred through cycles of virus replication and lysis rather than through the action of free endolysin will be discussed. The impact of such knowledge gives insight into the diversity of viruses discovered by our class as well as the extent of their effectiveness against related species and strains of bacteria.

180. **The Misconceptions of the Health Risks associated with Tobacco Filters**

Brian G. Jones, Dept. of Chemistry: Biochemistry, with Prof. Maggie Tinsley, VCU Honors College

I have researched the misconceptions that tobacco filters reduce health risks in order to better understand the marketing techniques used by the tobacco industry and how they affect the public health. Approximately 443,000 people die in the United States each year from smoking, so it is crucial to understand the psychology behind cigarette addiction and smoking behavior in order to reduce this statistic. Most people believe that cigarette filters lower the risks caused by smoking. However, review of scholarly documents suggests otherwise. I analyzed sources explaining how a cigarette filter works, the history of its development, the health risks of smoking, and several comparative studies that determine the variance in health risks between different degrees of filtration. Many sources detailed compensatory smoking “which is the unconscious change in smoking behavior that negates any positive effects from filtration,” such as blocking ventilation holes, taking deeper or longer puffs, and smoking more cigarettes per day. For example, smokers were found to smoke more daily when smoking low-tar cigarettes compared to high-tar cigarettes. Use of filters may also increase the prevalence of introduction to smoking in children and adolescents due to a “smoother” product. The tobacco industry originally created the filter to reduce risk; however, they discovered in the 1950-60’s that filters do not reduce health risk and then turned to using the filter as an incredibly successful marketing tool.

Analysis of government sources shows that package warnings and educating smokers on health risks is also successful in smoking cessation; however, the behaviors and psychology of smokers must be further researched in order for previously effective programs to be advanced to be more effective than the tobacco industry’s marketing tools and the addictive properties of nicotine.

181. **The Use of Rhyme, Rhythm, and Melody as a Form of Repetition Priming to Aid in Encoding, Storage, and Retrieval of Semantic Memories in Alzheimer’s Patients**

Faiz Plastikuwala, Dept. of Biology, with Prof. Mary Boyes VCU Honors College

Millions are diagnosed with Alzheimer's disease annually which can have debilitating effects on patient memory. Thus, finding new ways to help facilitate memory in these patients, especially through non-pharmaceutical means, has become increasingly important. I examined the use of melody, rhyme, and rhythm as encoding mechanisms to aid in the retrieval of long term semantic information by juxtaposing scholarly articles detailing experiments, each of which examined the effects of various facets of memory facilitation; this helped produce an idea of which devices are most effective. Additionally, I surveyed studies highlighting limitations of song implementation to craft an effective plan to aid Alzheimer’s patients.

Melody, rhyme, and rhythm provide an organizational structure to facilitate the encoding of information. Specifically, chunking, the grouping of smaller units into larger ‘chunks’, helps facilitate long term encoding
in patients, and is the byproduct of the organizational structure of a text. A major drawback of using these devices is the loss in the depth of encoding semantic information; however, it is important to recognize music still assists general content memory. Therefore, Alzheimer’s patients would benefit from the use of melody as it would provide a moral support, helping familiarity with their surroundings, although they would not benefit from instructional song. Future experiments may study the combination of discussed factors in various settings to examine the unique benefits of music on memory in Alzheimer’s patients.

182. Kinetic Analysis of alpha-N-terminal Methylation on Oncoprotein SET

Kathryn Marshman, Dept. of Biology, with Brie Mackie, and Rong Huang, VCU School of Pharmacy

N-terminal methyltransferase 1 (NTMT1) is a writer protein that catalyzes the addition of a methyl group onto the alpha-N-terminus of its protein substrates. Protein α-N-terminal methylation by NTMT1 has shown to play a significant role in protein-protein interactions, protein-DNA interactions and cell mitosis. Recently, oncoprotein SET, a known potent inhibitor of protein phosphatase 2A (PP2A), has been identified as a substrate for NTMT1. The inhibition of PP2A by SET plays a vital role in cell differentiation in humans, and has been linked to multiple forms of cancer such as B-cell non-Hodgkin lymphoma (NHL) and Wilms’ tumor. However, there is no information about the function of alpha-N-terminal methylation on the SET protein. Given the significance of oncoprotein SET, we aim to characterize the alpha-N-terminal methylation of SET protein. We synthesized three peptides that are derived from SET by solid-phase chemistry using an automatic microwave peptide synthesizer, followed by purification via HPLC and characterization through MALDI-MS. The recombinant SET protein was purified via affinity chromatography and the concentration was quantified after analysis through SDS-PAGE gel electrophoresis. We applied an SAH hydrolase-coupled fluorescence assay to monitor the production of SAH by a ClarioStar plate reader. All assays were performed in triplicate. Data analysis was done using GraphPad Prism 7 and fit to the Michaelis-Menten equation. Our results showed that $K_m$ values were $3.8 \pm 0.3$ μM and $6.3 \pm 1.3$ μM for the 6-mer peptides and $1.9 \pm 0.2$ μM for the 10-mer peptide. Preliminary results show the full-length SET protein having a lower $K_m$, initially than the 10-mer and 6-mer peptides. However, gel concentrations of TAF1a show multiple bands, indicating further purification is necessary. After additional purification, studies will be run in triplicate to confirm preliminary data. These results would be the first to elucidate information on the kinetic mechanism of NTMT1 and the oncoprotein SET.

183. The Bamboo Ceiling: A Study of Barriers to Asian American Advancement

Emily Cheng, Dept. of Biomedical Engineering, with Prof. Maggie Tinsley, VCU Honors College

The idea of cultural diversity in the workplace is a popular one, generating much discussion about the inclusion of and affirmative action toward minorities. However, these conversations rarely involve Asian Americans, who despite above-average levels of educational achievement, household income, and employment, find themselves underrepresented in and shut-out of upper-level management positions. In this project, I investigated the stereotype of East-Asian Americans as a model minority (created by non-Asians) to find out why East-Asian Americans are underrepresented in upper-level management in corporate workplaces, a phenomenon known as the “bamboo ceiling.” I explored a variety of scholarly sources that analyzed the historical implications of the “model minority” stereotype as well as factors believed to contribute to the aggregation of Asian Americans in technical rather than managerial roles in the workplace.

I determined that the Asian American experience and ensuing model minority myth is strongly tied to America’s poor history with prejudice and discrimination against racial minorities. Asian Americans are consistently stereotyped as perpetual foreigners with poor language and communications skills, and they are excluded from networking, mentoring, and training pipelines to promotions to management. These barriers
result in a “bamboo ceiling,” preventing East-Asian Americans from proportionally rising to management or major decision-making roles within an organization.

The aim of this project is to bring attention to the role of implicit and institutional discrimination in hiring and promotional practices within American corporations as they concern Asian Americans, who are not traditionally considered victims of racial and ethnic discrimination. My research has also shown that the “model minority” stereotype is a harmful myth that masks deep-seated social and racial issues that continue to plague our nation today. I hope that continued dialogue concerning stereotyping and discrimination will bring more awareness to the issue and contribute toward the attainment equality for all.

184. Creating Nursing Home Living Environments that Prioritize Safety and Quality of Life

Jessica Nguyen, Dept. of Biomedical Engineering, with Prof. Maggie Tinsley, VCU Honors College

Nursing home residents exhibit high rates of depression after entering the nursing home environment, often from loneliness, loss of purpose, and loss of individualism. Under the culture-change revolution, the idealized nursing home has progressed away from health care institution to long-term living facility characterized by holistic person-centered care that prioritizes patient preference and quality of life. Previous research has shown that the adoption of person-centered care is often accompanied by increased exposure to risk and illness.

I compared safety climates in long-term care nursing facilities and compared nursing home models of person-centered care in order to determine how American nursing homes can create environments that simultaneously balance the objectives of safety and health with personalized care to preserve the wellbeing and quality of life of elderly patients. My research demonstrated that standards of safety can be maintained in a person-centered care nursing model by involving the entire facility in a paradigm shift through safety education, workshops, and participation of nursing home staff in developing facility-specific approaches to personalized care. Strong leadership and active involvement of staff in culture change were key predictors of success in person-centered care implementation and safety adherence.

Currently, one of the predominant deterrents to adopting person-centered care is the fear of litigation from risks evolving from removing the safe, institutionalized element of the nursing home; nursing home administrators often view safety and person-centered care as opposing goals. By implementing safety education and facility discussion of safety measures alongside person-centered care, nursing homes can preserve the quality of life and promote mental and physical wellbeing in elderly patients.

185. The Effects of a Mutated MC4R Gene Can Be Limited by Melatonin

Chandni Patel, Dept. of Biology, with Prof. Maggie Tinsley, VCU Honors College

Obesity is a disease that is becoming increasingly prevalent in the human population. Obesity, which is defined as the excess of adipose tissue due to a positive energy balance, can be caused by many factors, including genetics, diet, and the environment. I am studying the mutations of the melanocortin 4 receptor gene (MC4R) because I want to find out how the effects of a mutated MC4R gene can be limited through the use of melatonin in order to help my reader understand one of the genetic causes of obesity and how to prevent obesity in the presence of a mutated MC4R gene.

In order to learn more about the relationship between obesity and the MC4R, I researched journal articles about studies conducted on obese individuals with mutations of the MC4R. These experiments concluded that mutations of the MC4R cause monogenic obesity in humans because the MC4R was unable to maintain a balance between food intake and energy expenditure. I then ventured into scholarly sources that introduced new and different perspectives of the MC4R. I discovered that there is a relationship between the MC4R and the circadian rhythm. In animals, melatonin can be used to decrease food intake and regulate other hormones associated with hunger and satiety like ghrelin and leptin.
Even though more research needs to be done, melatonin can be used as a potential treatment option for individuals with obesity due to mutations of the MC4R gene as melatonin not only helps to regulate the circadian rhythm but it also plays a role in appetite control.

186. **Mindfulness Implementation in Elementary Schools: Improving Student Mental Health**

*Tiffany Phan, Dept. of Psychology, with Prof. Mary Boyes, VCU Honors College*

Urban elementary school students are exposed to increasing levels of stressors due to many factors including academic rigor and poverty, which have contributed to the prevalence of anxiety, depression, suicidal cognition, and decreased physical and mental health. Although schools advocate for the reduction of negative behavior such as bullying and antisocial behavior there has been little research or action to improve children's overall well-being which includes health, academic achievement, and happiness. I am focusing this study on the benefits of implementation of mindfulness meditation curriculum for students in low income areas who suffer from stress and depression in order to find out if mindfulness may be a means to improve overall well-being of students. I have reviewed published works on research looking at brain structure changes as a result of mindfulness meditation, pilot mindfulness curriculum in elementary schools, and stress reduction with mindfulness. I have found that many of these studies on mindfulness show an increase in positive behaviors and functions such as enhanced self-regulation and awareness, as well as a decrease in negative behaviors and functions such as stress, depression, anxiety, and suicidal cognition. Although none of the current mindfulness programs in schools have a uniform curriculum, many of the relatively successful programs emphasize yoga, mindful walks in nature, mindful discussions, or gratitude activities. Implementation of a short, daily mindfulness curriculum, which includes an amalgamation of the aforementioned physical, mental, and spiritual practices of mindfulness in urban elementary schools in the United States will be most beneficial to the overall well-being of students.

187. **Adipose Stem Cells and Their Potential as Healing Agents for Burn Victims: Abstract**

*Delaney Savedge, Health and Human Performance, with Prof. Mary Boyes, VCU Honors College*

Burn wounds are typically treated with debridement and bandaging or with skin grafts from skin flaps or organ donation. Such treatments often lead too scarring, decreased mobility, and necrosis. There is currently no established and consistently positive treatment for burn wounds. I am studying the use of adipose-derived stem cells (ASCs) to assist the healing of burn wounds because I want to find out how ASCs compare to other stem cell types for the treatment of burns in order to determine where stem cell/burn research should be focused in the future. I examined several studies that used mainly mouse models to test ASCs for their influence on aspects of the wound healing process such as growth factors, cell proliferation rate, and angiogenesis. The ASCs were used in various techniques including injection under skin grafts, in vivo and in vitro graft formation, and injection into a wound site. In all studies I examined, ASCs increased the VEGF growth factor, cell proliferation, and angiogenic factors which encourage even and faster wound healing. These factors, along with the availability, ease of retrieval, and the ability to differentiate into multiple tissue types, make ASCs the ideal stem cell type to use for regenerative medicine. After considering the results of my research, I have concluded that the next step for stem cell research on epidermal and dermal regeneration should be focused on adipose stem cells in human models. ASCs have shown positive effects in animal models, however the research on their affect on human skin is lacking.

188. **Black-Korean Conflict: The Influence on Korean American Involvement in Black Lives Matter**

*Malia Bates, Dept. of Culture and Extended Media, with Prof. Faye Prichard, VCU Honors College*

There is a current lack of visible action and involvement of the Korean American community in the Black Lives Matter movement, even though the issue relates to many ethnic groups and affects the Asian
community in the US. I want to know if the Black-Korean conflict of the late 80’s and early 90’s negatively affected the current level of involvement from the Korean community in the BLM movement in the US today. I examined articles discussing the different contributing reasons behind the tensions that led to the Black-Korean conflict, such as economic and social status, merchant and customer relations, cultural differences and perceptions, and media interpretations. I also investigated the influence of the media and the different political views of South Asian immigrant elders and second generation youth on the involvement of Koreans in BLM. My current research appears to show that the second-generation Korean immigrant youth actively support the BLM movement and aren’t negatively influenced by the Black-Korean conflict. I am still exploring whether the Black-Korean conflict has affected the involvement of the older generation of Koreans in the US. Further research and data must be gathered on the current views of the Asian American community on the BLM movement and specific groups within the community, such as Korean Americans and comparison of different age groups. It is difficult to determine the level of support and involvement until then.


Abigail Byram, Dept. of Computer Science, with Prof. Mary Boyes, VCU Honors College

Natural Language Processing research has traditionally been focused on English and lexically-similar languages, but has recently shifted to include non-western languages such as Mandarin Chinese. Chinese language is becoming increasingly significant worldwide, indicating a need for improved automatic recognition and understanding of Chinese text for applications in machine translation, information extraction, and automatic summarization. Most challenges in Chinese text processing stem from lexical and syntactic differences from English and the high rate of ambiguous words. Word sense and part-of-speech ambiguities are a significant cause of error in Chinese text processing especially for compounds and function words such as Determinative Measure (DM) compounds. This study aims to create an optimal combination of word sense disambiguation (WSD) and part-of-speech tagging (POS) methods for DM compounds. In this study, existing approaches to POS tagging and WSD of DM compounds were analyzed to discover which methods promotes accuracy and are most compatible with other models. Published POS ambiguity resolution methods utilizing statistical taggers trained on large, unannotated corpora were compared with methods relying on supervised taggers trained on manually-annotated data. Pre-existing rulesets and statistical methods for WSD were evaluated to identify methods providing the greatest improvement in parsing accuracy of DM compounds. Open-source sense representation frameworks were also analyzed and assessed in combination with other disambiguation methods. The contrast and consolidation of these methods indicated that by aligning and combining models, disambiguation accuracy rates can be compounded. Consolidating the above models into a comprehensive model may significantly improve DM compound disambiguation accuracy. The model must be implemented to quantify accuracy improvement and be altered to promote efficiency. Because this model utilizes several disambiguation methods, it would likely be excessively processing-intensive. Future work may require a focus on maintaining optimal accuracy while limiting processing requirements.

190. Can a layer of antimicrobial agents be placed around breast implants to prevent staph infections from occurring?

Valerie Tran, Dept. of Computer Science, with Prof. Faye Prichard, VCU Honors College

The most common infection that occurs after breast augmentation is a staph infection. Currently, there are only three ways to treat this type of infection, all of which treat the breast implant after the infection has developed. The first option is to treat the infection with an oral antibiotic. If this doesn’t completely rid the infection, then intravenous antibiotics are used. If this too doesn’t remove the infection, then surgery will be performed to remove the breast implant and a new implant will be inserted. Although, these options have a low mortality rate, the success rate of completely getting rid of the infection, within the first try, is low.
Therefore, there needs to be a way to completely stop the occurrence of staph infections, within the first try. That is why a literature review of research is being conducted to see if a thin layer of antimicrobial agents can be placed around the breast implant to prevent staph infections from occurring. If this is possible then staph infections can significantly decrease, and the cost of having the patient to undergo more surgery or treatments options will also decrease. Currently, a variety of scholarly sources from a range of authors will be evaluated to compare which antimicrobial agents would correspond best with the proposed solution. In addition, other scholarly sources will be used to see if other methods are available or more efficient than what was originally presented. Furthermore, other sources that have studies that oppose the use of an antimicrobial agent around an implant will also be taken into consideration as well. This is implemented in the literature of research, to combat any possible challenges and introduce solutions to these issues. As of now, the current trend from my research shows that the use of antimicrobial agents around breast implants surpass the efficiency and effectiveness of other methods that are currently being proposed to combat staph infections. Future implications that can arise from this, is the ability to conduct further research on other implants, to see if a layer of antimicrobial agents can also be used.

191. Evidence-Based Interventions and Psychotropic Medication Use Among Foster Care Populations

Leena Penumalee, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

Research surrounding psychotropic drug use and mental health of foster care youth is very relevant because foster care children are one of the most vulnerable populations in the United States. Individuals in child welfare not only have higher incidences of mental health disorders but they are also often prescribed too much psychotropic medication. An innovative approach to enhance mental health is evidence-based interventions, treatments that focus on a helping a child in a specific area of their health. I want to find out how evidence-based interventions can be used to supplement psychotropic medication to improve mental health outcomes for foster care children. To answer this question, I analyzed rates of psychotropic drug use among foster care children in many states. I also examined current ineffective mental health treatments in foster care settings. I investigated the implementation science of evidence-based interventions and how EBIs affect individuals of different ethnicities. My research suggests that evidence-based interventions can greatly enhance mental health outcomes for foster care children. I am still exploring the effects of psychotropic medication on EBIs. More foster care settings should incorporate EBIs into mental health treatment regimens. Additionally, future researchers should investigate the long-term implications of psychotropic medication use during youth.


Matthew Helton, Interdisciplinary Studies, with Prof. Faye Prichard, VCU Honors College

As a member of the LGBTQIA+ community, I am fascinated by the intersectionality of my own identity and belief system. I am captivated by my cultural history and by the evolution of my own community. I need to know where I’ve been so I can better advocate where I need to go. The HIV/AIDS epidemic, which viciously attacked subsets of the American population from seemingly nowhere, devastated the American queer community starting in the early 1980s. To date, hundreds of thousands of queer people have died from AIDS-related illnesses. I am interested in researching what, besides the facts of basic biology, culturally facilitated the spread of HIV through the queer community. The outbreak and diffusion of HIV/AIDS through the American queer community occurred following the gay liberation movement and sexual revolution of the 1960s-1970s within American culture. This begs the question of whether subversive drag culture in the American queer community facilitated the sexual revolution of the late 1970s that led to the outbreak and diffusion of the HIV/AIDS epidemic, and if so, how? I have extensively researched queer history, examined academic articles detailing drag culture and performance along with gender and sexuality presentation, and I
have explored anthropological and ethnographic data regarding the HIV/AIDS epidemic. My current research shows that the subliminal and intrinsic marketing of subversive drag culture impacted the way the American queer community conceptualized the deconstruction of the binary construct of gender through the gay liberation movement, facilitating participation in the cultural sexual revolution of the late 1970s that led to the outbreak and diffusion of the HIV/AIDS epidemic. It is important to note that drag culture in no way caused the spread of HIV/AIDS; however, drag serves as a metaphor for the breakdown of the construct of gender roles that helped contribute to the spread of the epidemic. It is impossible to know the full effect that subversive drag culture had on the American queer community, but this area deserves further research as it is a crucial portion of intersectional American history that contributes to our modern understanding of the world.

193. Nuclear Power and Pumped Hydroelectric Energy Storage as a Response to Global Climate Change in the Andean Nations

James Robinson, Dept. of Electrical Engineering, with Prof. Faye Prichard, VCU Honors College

Hydroelectric power is a crucial element of the infrastructure of the nations of the Andes mountain range, providing from 33 to 68 percent of the total generation capacity, depending on the nation. However, over the next eighty years, global climate change is projected to have a major detrimental impact on hydroelectric generation capacity, forcing those nations to search for alternatives to fill the emerging gaps in their electricity supply. If renewable energy is to truly replace hydroelectric power, some storage method will be necessary and, at the moment, the only truly practical method is the pumped hydro storage (PHS) system. I intend to compare the technological, economical, and ecological impacts of the PHS system with the introduction of nuclear power plants in the nations of the Andes by means of environmental impact, siting factors, cost per unit energy over facility lifetime, and contributions to power grid features such as stability and dispatch response time. At this point, it appears that while nuclear systems would be more ecologically sound, more stable as a power source, and possibly cheaper, it would also be much more technologically intensive, could face political backlash, and could be more expensive. These results remain tentative, as more data is needed regarding the existing technological capacity of these nations to build the nuclear plants, along with the viability of PHS with regards to the impacts of climate change. It will be critical for these nations to resolve the issue of power production methods in the coming decades in order to not only maintain existing levels of demand, but also keep up with the expected dramatic expansions in demand over the next several decades.

194. The Relationship Between Off-Gridders and the American Dream

Brenna Kent, Dept. of Bioinformatics, with Prof. Faye Prichard, VCU Honors College

A subset of Americans is choosing to disconnect from the electrical grid in order to live a more simplistic life and become self-sufficient. Although this may seem contrary to the ideals of the American Dream such as home-ownership and the acquisition of goods, it provides individuals with independence and the opportunity to make new connections with others without the trivial pressures of modern society. My research question is: How has the increasing difficulty of achieving the American Dream contributed to people’s choice to live off the grid. In order to answer this question, I have examined both sociological and economic articles discussing the evolution of the American Dream and whether or not it is still attainable in today’s society. I also reviewed primary sources from off-gridders and ethnographic data based off of interviews conducted at 175 different off-grid sites in Canada. Sources that studied similar movements such as the back to the land movement or voluntary simplicity were also investigated. All of these articles were then synthesized in order to reach a conclusion. Although I originally believed that economic reasons would be the main contributing factor to choosing to leave the grid, after conducting research I now believe that leaving the grid is simply the next iteration of inner-dependent people as described by sociologists Reisman, Glazer, and Denney. These self-motivated people have chosen to redefine the American Dream in a way similar to those who participated in the back to the land movement. In order to support this claim, more research needs to be conducted on American off-gridders. The majority of scholarly research on off-gridders comes from Canada or other
countries, leaving the United States underrepresented. With more research, the relationship off-gridders share with the American Dream will become more clearly defined.

195. **Addressing Laterality to Prevent Injury in Dance Education: Teaching Methods to Compensate for the Right Bias and Asymmetry**

*Olivia Alsamadi, Dept. of Dance and Choreography, with Prof. Mary Boyes, VCU Honors College*

Despite the vast knowledge available about proper alignment and safe dance training, the growing demands for university dancers have plagued them with increasing rates of overuse injuries stemming from an imbalance in their practice often influenced by their professors. The purpose of this review is to study teaching methods in dance education and the right bias in university dance classes to learn how unbalanced teaching methods and dancers’ asymmetric physicalities cause injuries. This research will help professors understand how to effectively communicate with their students to promote safe, injury preventing practice. The research explores the various roles present in the problem, including the involvement of the student, professor, and even the physical therapist. This review investigates the influence the professor’s language and actions have on the student’s behaviors. For instance, how the student may interpret the language differently from the professor’s true intentions. Also considered in the research is the implementation of screening students for any physical asymmetries or weaknesses at the beginning of each semester to develop a basis for individual conditioning programs to work toward evolving a more balanced body. In addition to these programs, the research examines the dancers’ attitudes toward the implementation of these programs as well as fully complying with their physicians’ requests during injury. The current research shows that students are more likely to learn about proper alignment and human anatomy than they are to actually embody the information and change their technique habits that are causing these injuries. There is a low percentage of physical therapists who treat dancers and understand how unique dance injuries are and how dance culture influences the prescribed treatment and recovery periods. The research done on university dance programs demonstrates that many schools do not offer an injury prevention course in their core requirements. Universities should strengthen their relationships between their dancers, professors, and physicians, which includes a required injury prevention course that is integrated into their other courses.

196. **The Arc Model: Utilizing Distributed and Emergent Narrative Structures to Preserve Immersion Within Alternate Reality Games**

*Benjamin Dalton, Dept. of Forensic Science, with Prof. Mary Boyes, VCU Honors College*

Alternate reality games (ARGs), a relatively new sub-genre of pervasive gaming, have historically been used within advertising campaigns. Since 2009, the popularity of film-based ARGs has increased greatly and has been accompanied by inconsistent pacing, poor character development, lack of meaningful symbolism, and a great number of plot holes within these created games. This study examines the ability of distributed narrative structure and emergent narrative structure to preserve immersion within film-based ARGs. The games *Marble Hornets, Everyman Hybrid*, and *This House Has People in It* provided primary insight into the narrative structure and pacing of ARGs. Alan Resnick’s *This House Has People in It* represents a case of asynchronous temporal trajectory, *Marble Hornets* created many of the tropes which now permeate the genre, and *Everyman Hybrid* emphasizes player agency and the emergent narrative to a greater extent than other cases. Ten additional articles provided preexisting models and theory including but not limited to: a developed metric for player enjoyment, the ludic notion of “this is not a game”, the collective intelligence and creation of the emergent narrative, and the ARG world model (proposes a branching narrative structure and limited player agency). The analysis of these sources suggests that major narrative structure flaws can be solved via a proposed arc model for ARG creation. The model posits that consistent temporal trajectory, focus on player agency, a distributed narrative based around short form arcs, and the promotion of the emergent narrative will result in the most immersive film based ARG experience. In order to confirm that the model successfully fixes issues within narrative structure and pacing a film-based alternate reality game must be created using the arc model as a template.

197. **Hormonal Secretion Responses During and After Continuous and Interval Training**
I had never been a person who looked at physical activity with much interest. However, like many others, I became interested in bodybuilding after my friends introduced me to it. When working out with different friends, I was exposed to different regimens, and the workouts could be grouped into two categories, high intensity and rest, known as interval training, and a continuous intensity with little to no rest, known as continuous training. I always wondered which method was better in building muscle and if there was any correlation between the different methods, hormonal secretions, and muscle growth. My question for my research is “How do different types of exercise, interval vs. continuous, result in the different levels of secretion of hormones, during and after a workout?” In order to test this question, I looked at studies in which tests were conducted comparing hormonal secretions in multiple types of exercises, including running and weightlifting. In the studies I look at, the subjects were at the same standard and the experimenters were for the most part, graduates with doctorates. Furthermore, I looked at the research coming from a perspective that goes past my area of expertise: weightlifting. This question and research would thus include other methods of exercise like running. This will provide results that can then be used to enhance performance in all areas of athletics thus making the research more impactful. I expect the result of this research to support the hypothesis that interval training will cause more hormonal stimulation. This is because more research is being conducted revealing the many advantages of the practice. This research can then be used to help athletes and common people exercise in a manner that is efficient and reaps the most reward in terms of performance and overall well-being.

198. Desmosomal Gene Expression During Embryological Development In Xenopus laevis

Morgan Van Driest, VCU UROP Summer Research Fellow, Dept. of Bioinformatics, with Navaneetha Krishnan Bharathan and Dr. Amanda Dickinson, Dept. of Biology

The main purpose of this experiment was to investigate the desmoplakin protein. It is one of three major components that make up the desmosome-intermediate filament complex (DIFC). This particular complex is thought to play an important role in adhesion of epithelial cells in both the heart and skin. Without proper functioning of the DIFC and its protein components, there is potential for many physiological defects to occur. Such defects include skin lesions, loss of cardiac cells and in severe cases death may occur. In order to gain a better understanding of these defects, desmoplakin was chosen as the protein of focus. Characterization began with a qualitative analysis of its functional domains. The desmoplakin protein sequence of the model organism Xenopus laevis was compared to the desmoplakin proteins of Homo sapiens, Mus musculus, Danio rerio, and Xenopus tropicalis. From the results of this analysis, it is thought that protein domains of desmoplakin are largely conserved in humans. Based on this, further experimentation was carried out on the protein using Xenopus laevis embryos. A current PhD candidate in the Dickinson Lab performed a knockdown of the desmoplakin gene within the embryos. The protein was no longer expressed and this project then aimed to characterize the phenotypes that resulted. A statistical analysis was performed on the knockdown data and showed that loss of desmoplakin resulted in minimized growth within the embryos, as well as cranial facial abnormalities and tearing of the epidermis. These findings provide some insight on the importance of desmoplakin within the DIFC and how its loss of function may influence the development of many complex disorders within humans. Future directions of this study include investigation of other DIFC components and their interactions with desmoplakin.

199. How has American Media Shifted the On-Screen Image of Asian Americans from Stereotypical Roles to Lead Roles?

Sohail Syed, Dept. of Bioinformatics, with Prof. Faye Prichard, VCU Honors College

In American film and television, there is a lack of Asian characters in a lead role who are also not stereotyped. Growing up in America, this lack of lead Asian characters often lead to many Asian American children deficient of role models whom they could strive to be. But in recent years there has been a spike in the number of lead Asian roles and a downfall in the number of stereotyped Asian roles. This study focuses on
determining how American media has shifted the on-screen image of Asian Americans from stereotypical roles to lead roles. I investigated articles that looked at the different time periods surrounding stereotypes of Asians and treatment of Asian Americans. I examined scholarly sources which defined the stereotypes present in film and television media. I also analyzed primary sources of Asian American in lead Hollywood television and film roles. My current research shows that more non-stereotyped representation with real Asian actors and actresses allows for social stigmas against Asian Americans to become less prominent. It is currently impossible to determine whether or not this introduction of more Asians on screen has resulted in the on-screen shift until further research is made on Asian American stereotypes and media. Further research is necessary for more in depth analysis.

200. **Abstract: Breastfeeding as a Mechanism to Reduce Postpartum Depression in Hispanic Women**

*Celia Wilson, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College*

Postpartum Depression (PPD) is the most common childbearing-related illness around the globe affecting both mothers and their children, yet very minimal longitudinal research has been done to study the effect of depressive symptomatology on breastfeeding. This study analyzes how the benefits of breastfeeding past six months, postpartum, can be used as a treatment mechanism for postpartum depression (PPD) with the major contributing factor of gestational weight gain (GWG) in Hispanic women recently immigrated to the United States. I investigated journal articles in four main domains: the likelihood of women presenting with depressive symptomatology as a result of weight gain to initiate and continue breastfeeding, the negative association between increasing maternal antepartum weight and breastfeeding, the possible biological explanations for PPD in women who don’t breastfeed, and the benefits that breastfeeding past six months postpartum can have on MDE and GWG in women. I identified that correlations between antepartum weight and GWG increase the rate of MDE among women, which has an inverse relationship on women’s likelihood to initiate and continue breastfeeding. Cessation of breastfeeding can put women at risk for increased weight gain and toxic levels of retinoids (Vitamin A) that can lead to cognitive disturbances. Since no longitudinal studies have been conducted specifically examining this comorbidity, more data needs to be collected to support the hypothesis. However, using principles of biopsychology to bridge the gap between the biological explanation for a major depressive episode (MDE), a culturally appropriate educational plan could be effective in making women aware of potential risks factors of PPD before pregnancy.

201. **Emphasizing Common Childhood Anxieties in Children’s Fantasy: An Analysis of the Illustrations in Matilda and Charlotte’s Web**

*Ellie Erhart, Dept. of Communication Arts, with Prof. Mary Boyes, VCU Honors College*

The factors that make books appealing to children are relevant not only to creators of children’s literature, but to anyone involved in children’s reading education. However, there is little research on how a book’s illustrations, specifically, contribute to the book’s ability to remain relatable across multiple generations of children. This lack is surprising, as illustrations have a huge impact on the way children interpret a book’s story. To fill this gap, research on recurring themes in children’s fantasy literature was examined in order to identify patterns in the types of stories that last and see how they apply to the illustrations of those stories. An analysis of the illustrations of two books aimed at upper elementary school students, *Matilda* by Roald Dahl and *Charlotte’s Web* by E.B. White, demonstrates how illustrations emphasize these common patterns in children’s fantasy.

Many common patterns in children’s fantasy—such as placing the protagonist in exaggeratedly dangerous situations or emphasizing the divide between children and adults, especially by giving the child characters magical powers—are exaggerations of the fears and challenges inherent in the experience of growing up. Children’s fantasy also tends to make a point to ultimately provide reassurance to the reader, often by adopting a soothing tone or having an ending that reassures the reader that the main conflict has indeed been resolved. Not only do the texts of both *Matilda* and *Charlotte’s Web* follow these patterns, but the way each individual book interprets these patterns is reflected in the stylistic choices of the illustrators. The
relationships between illustration, text, and the childhood experience reveal how all these separate components are dependent on each other in order to create an enduring piece of children’s fantasy.

202. Urbanization and Domestication: Behavioral and Morphological Changes in Wild Animals Inhabiting Urban and Anthropologically Shaped Environments

Abhishiktha Kasanagottu, Dept. of Psychology, with Prof. Faye Prichard, VCU Honors College

As human and animal populations grow with areas of human land use expanding, we must confront our encroachment on wild invertebrate habitats through urbanization. Domesticated or urbanized animals including rats, raccoons, birds, and squirrels undergo behavioral and morphological changes in relation to their wild counterparts. This increase in interaction between urban or domesticated invertebrates and humans can lead to the spread of infectious diseases. Additionally, wild animals interact with domesticated household pets and livestock in manners such as predation and spread of disease. In order to understand aforementioned behavioral and morphological changes, I investigated the consequences of human interaction and the change in environment on wild invertebrate behavior approaching domestication and how invertebrates situated in urban environments impact animal population, ecology, and invertebrate behavior. I explored scholarly journals, focusing on studies involving comparisons between certain domesticated or laboratory animal species and their wild counterparts, and research articles concerning invertebrate behavior modification induced by human stressors and urbanization. These behavior modifications included movement and activity, diets, reproduction, mortality, disease, and pollution. In my research, I found differences in aggression and avoidance learning in laboratory rats and their wild equivalents, along with negative changes in anti-predator response in the urbanized Eurasian red squirrel. In addition, I discovered that domestication can increase the reproductive frequency of the silver fox. With regards to urbanization, my research indicated the urban blackbird lives longer than the rural blackbird due to nesting habits and availability of resources. After finding that urban landscapes may have favorable conditions compared to wild habitats, scientists successfully reintroduced the peregrine falcon into an urban environment with the intention of recovery and species conservation. My results demonstrate both positive and negative consequences of domestication and urbanization in invertebrates, thus further research on specific species conducted by the scientific community could guide beneficial action.

203. The effect of the physical hospital environment on the mental and physical well-being of patients

Hannah Ngo, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

A visit to the hospital can oftentimes be a stressful experience for patients who suffer from serious illnesses and must stay for an extended period of time. Not only can it be physically draining, but it can also be emotionally and mentally draining, especially for patients who are constantly being moved in and out of treatments and surgeries. A patient’s experience varies drastically depending on where he or she goes. It might seem as though experiences at the hospital are solely dependent on the care received from doctors and nurses, but physical aspects of the hospital space can play an equally important role as well. I want to know whether physical elements of the hospital room have a significant impact on patients’ well-being and healing process. I researched for specific components of hospital rooms that have been found to promote patient healing, as well as components that have hindered or impaired it. My current research shows that there are three main components of the hospital that significantly affect patients’ well-being: noise/sound, nature, and architectural designs. The presence of certain aspects in the hospital room such as music, sunlight, and plants can significantly improve patients’ comfort and help to promote a healing environment. Whereas, the presence of aspects such as excessive noise and curve contours can trigger increased stress and fear. Based on the research I have gathered that illustrate the significant impact of the physical hospital environment on patients, there are inexpensive and feasible alternations that can be and should be made to hospital rooms. Hospitals should work towards adjusting their rooms to incorporate aspects that have been shown to promote patient health, as well as minimizing negative aspects that have been shown to delay healing.
204. The Effect of the Internet on the Physician-patient Relationship
Mallika Dammalapati, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

In the Information Age, there is a growing integration of technology and healthcare and the Internet is a primary tool for many healthcare consumers. From online-patient helpers to first hand blogs and experiences, the Internet has much to offer when it comes to health-related information. My research looks to expand upon the many conversations already occurring about how the Internet is changing patient interactions with doctors through the information it provides patients. The majority of the research I found was conducted using surveys as well as discussions with multiple patients. Although some sources provide evidence that the Internet could be detrimental to the physician-patient relationship because of its vastness and unreliability, many other sources point out that the proper use of the Internet has the ability to create a new generation of informed patients that can become more active in decision-making regarding their healthcare. However, many sources also say these kinds of effects are minimal and difficult to observe, and therefore, more research is needed to target large and representative audiences to examine what kind of effects the Internet plays in ultimate encounters with physicians. This research must encompass those who have difficulty accessing the Internet whether because of socio-economic constrains or educational restrictions. More research must also target how physicians view the Internet's role in healthcare, especially with comparisons between younger and older generations of physicians. This research is necessary as we may be in the midst of a healthcare revolution that can harness the benefits of the Internet in healthcare with minimal drawbacks to the existing physician-patient relationship.

205. A Study of Media Portrayal of Schizophrenics to Develop Solutions on How Media can be Used to Reverse the Stigma Associated with Schizophrenia
Rainielle Cua, Dept. of Biology, with Prof. Maggie Tinsley, VCU Honors College

The news media are one of the most influential sources of information regarding mental illness for the general public. Schizophrenia is one of the most stigmatized mental illnesses and media coverage tends to be negative, focusing on schizophrenics’ high risks of violence, failure, and unpredictable behavior. Such perceptions may cause a detrimental impact on the mentally ill and cause them to internalize a stigmatizing stereotype and may hinder the public’s understanding of mental illness. I studied how media portrayal in newspaper coverage of those who suffer from schizophrenia has evolved since the 1990s, because I wanted to find out how nonfiction media representation has affected people’s perceptions of and attitude towards schizophrenics over time in order to propose an implementable solution to reduce stigma by utilizing the media. I explored scholarly sources that analyzed the changes in reporting of schizophrenia in high-circulation newspapers in different countries and how renaming schizophrenia in Japan and China reduced the associated stigma and changed newspaper coverage. I examined sources that performed content analyses on major newspapers and categorized articles to determine how reporting had changed over time. I also investigated successful solutions that have been implemented in other countries that have helped decrease the stigma associated with schizophrenia and how self-stigma reduction programs may aid schizophrenics with managing their disease. My research has shown that the media does play a role in the stigmatization of schizophrenia in multiple countries. Currently in other countries, destigmatization efforts are mostly directed at providing more accurate information. An appeal for the government to provide opportunities to discuss and reflect on media contents may also be successful in decreasing the association between mental illness and violent crime. It is imperative that the U.S. creates and implements solutions that may decrease mental health stigma and also discover other possible solutions. This will not only help the predicaments of those suffering from mental illness, but may also educate the public on such mental health problems as to prevent further misinformation.
206. **Projecting Religiosity Trends in Muslim and Sikh Americans**

Gurbani Jolly, Dept. of Psychology with Prof. Mary Boyes, VCU Honors College

The Muslim and Sikh American communities have been significantly affected post the September 11th, 2001 terrorist attacks, but not much research has been conducted on the changes in religiosity amongst these groups post the terrorist attacks. As such, this study specifically examines Muslim and Sikh American adults’ behaviors post 9/11 to project a trend in religious identity, involvement, and adherence to the Muslim and Sikh faith post the 2016 Presidential Election to demonstrate the need for further research regarding changes in religiosity in Muslim and Sikh Americans. Sources that specifically had quantitative reports regarding religious identity, involvement, and adherence to the Muslim and Sikh faith and hate crime statistics were examined. Upon further investigation, there was minimal research on Sikh Americans on this topic; as such, a poll on Sikh Americans was created by contacting Gurudwaras (Sikh temple) across the nation to distribute the poll in weekly email updates. Various social psychology theories that may have been a factor in changes in religiosity and/or hate crimes were also investigated. Currently, the sources found suggest that there is inconclusive information regarding changes in religiosity as involvement at mosques decreased while wearing the hijab everyday stayed constant, and mosque attendance everyday decreased post 9/11. In Sikh Americans, involvement at the Gurudwara decreased slightly while Gurudwara attendance, wearing of religious head coverings, and religious identity stayed about the same post the election. Based on the findings available, it is difficult to project a trend post the 2016 Presidential Election, thus, further research needs to be conducted regarding changes in religiosity, specifically looking at involvement and attendance at places of worship, religious identity, and frequency of wearing religious head coverings in both Muslim and Sikh Americans.

207. **Does the structure of off-brand shoes have any negative impact on the musculoskeletal system in the knee or foot?**

Yashwant Mirajkar, Dept. of Biology, with Prof. Faye Prichard. VCU Honors College

I have never really been that interested in shoes so I always bought shoes that weren’t necessarily name brand. My friends often jokingly made fun of the fact that I never bought name brand shoes from Nike and Adidas, but I never really saw the point in spending $100 on a pair of shoes that I could fine for $20. For about a year now, I have been experiencing moderate tendonitis in both of my knees. It recently dawned on me that perhaps the type of shoe I had been wearing while running or other sports had played a role in the damaging of my knees. Perhaps there was something in the structure of off brand shoes that affected my knees. My question is does the structure of off-brand shoes have any negative impact on the musculoskeletal system in the knee or foot? To research this question I looked at previous experiments examining the effects of various insoles and shoe structures on stride and gait patterns as well as on adductor movement, all factors that contributed knee osteoarthritis. I looked at data that encompassed a variety of age groups as well as experiments that focused on different brands of shoes and the various effects they could have on the joints and muscles in the foot and knee. The data I have collected so far supports my hypothesis that the structure of shoes does affect the musculoskeletal system in lower extremities but that there is no significant difference in the structure of shoes between off brand shoes and name brand shoes. This research can be used to find noninvasive methods of alleviating tendonitis and knee valgus. Future research can be conducted on how the structures of shoes can be used to prevent the development of joint pain and tendonitis.
208. **The Saudi Arabian Oil Economy’s Influence on the Government’s Investments**

*Tala Khalefa, Dept. of Chemistry, with Prof. Mary Boyes, VCU Honors College*

Saudi Arabia is one of the richest countries in the Middle East, as according to the World Bank it had a GDP of 646 billion USD in 2015 (qtd. in Trade Economics). However, 50% of its GDP comes from the oil and gas sector as of 2016, making it extremely dependent on the revenue it receives from oil (OPEC 8). While this abundance of revenue in Saudi Arabia may seem like a blessing, the paradox of the resource curse theory concludes that countries with an abundance of a nonrenewable resource show a trend of less economic growth and development than other countries. This holds true for Saudi Arabia, as its dependence on the oil industry took much of the government’s focus, leaving behind certain innovations in the country like education and infrastructure development. Saudi Arabia currently imports a large population of foreign laborers, depends on imports of most of its raw material, and has inequality between wealth distributions of the regions which are contributing to the issues of the nation. This paper analyzes the investment of the Saudi Arabian government in its efforts to decrease the foreign labor force, increase the diversification of its resources in its GDP, and increase the wealth in the areas outside the East and West Regions through the non-oil sectors. The current research shows that despite efforts from the Saudi Arabian government to combat its resource issues by introducing technology and increasing funding for education, Saudi Arabia continues to have a majority of its workforce composed of foreign laborers. The oil and gas sector comprises 85% of total export earnings, making its GDP a one-resource economy (OPEC 8). This is important when looking at the future outlooks for Saudi Arabia, especially as efforts to switch from non-renewable to renewable resources increase as a source of energy.

209. **How Hookups affect Women: A 21st Century Change**

*Karina Kopf, Dept. of International Business, with Prof. Faye Prichard, VCU Honors College*

As a woman pursuing a college education while living on campus, I have been exposed to certain situations and lifestyle habits that I was not previously exposed to. The most prominent of these is the overwhelming presence of what researchers like to call “hookup culture” among college students living on campus. This social phenomenon has become increasingly popular across the nation, but little research has been regarding the subject. A typical stereotype that surrounds this culture is that women tend to have negative implications from hooking up, while men are assumed to have primarily positive outcomes from the same experience. My research question is how do changes in the way women are viewed in today’s society change the way they react mentally to college hookups? In order to find an answer to my question I have looked at many scholarly sources where many experiments were conducted in order to better understand how women feel about their hookup experiences. Most of these experiments involve surveys taken by women on various college campuses. The results of these surveys are then analyzed by the conductor of the experiments. From these sources I have found that women who are more assertive during their hookups, and more willing to stand up for what they want out of that experience tend to have positive reactions to hookups, while women who are pushed into it or are not making decisions for themselves are less happy with their experience. I have also found research that shows that women in the 21st century as a whole are much more willing to stand up for their rights and speak out for what they want or what they believe in. I believe that there is a correlation between the two, and that the stereotype that women as a whole are brought down by hookups, or tend to feel more depressed afterwards is no longer true. I think that the next step would be to continue to find research that could tie assertiveness in other aspects of life to assertiveness during hookups. I believe that this research could help women in college better understand how to handle hookup culture, and allow them to avoid the negative outcomes that may otherwise occur.
210. Medical abuses of marginalized communities and lack of culturally competent health professionals harms disadvantaged patients’ perceptions of health care.

Sohal Tamanna, Dept. of Biomedical Engineering, with Prof. Faye Prichard, VCU Honors College

Health care does not reach everyone equally, and the quality of care that people receive is often dependent on their social identities (race, gender, sexuality, socioeconomic class, language, etc). I aim to learn how the history of medical abuse of marginalized patients has broadened the gap between the perceptions of health care, both as a system and as a method for self care, among marginalized communities and privileged communities. Also, I aim to connect that history to the quality of care currently available to marginalized patients. First, I investigated the current state of the health care environment and gathered experiences of LGBTQ+ people, people living with HIV, and LGBTQ+ people of color. Then, I examined the techniques that clinics and groups that recognize problems in lack of cultural competency and availability of quality health care used to expand access. Finally, I analyzed the history of medical abuse of marginalized patients, specifically poor black and Native American women. My current research shows that the government-sanctioned medical abuse of marginalized communities over history combined with individual doctors’ lack of cultural competency has fostered fear and suspicion within many disadvantaged people, including LGBTQ+ people, people living with HIV, and poor women of color. I am still exploring how women of color perceive health care as a method for self care while knowing that, historically, the United States’ health system has not prioritized and valued their lives and choices. Implications include periodically providing cultural competency training at clinics and practices, with special attention on why marginalized patients may be uncomfortable within the health care system, and collaboration between health care professionals, community members, and allies to create more accessible programs.

211. Acupuncture as a Potential Alternative to Epidural Analgesia for Pain Management During Labor

Joy Ma, Dept. of Statistics, with Prof. Faye Prichard, VCU Honors College

While current methods of labor pain management, specifically epidural analgesia, are effective in managing pain, these treatments are often accompanied by dangerous side effects which can lead to long term ramifications. Thus, it is necessary to find suitable alternatives to this invasive method of analgesic. I am studying needle acupuncture and epidural analgesia, both used to reduce a woman’s pain in labor and vaginal birth, because I want to figure how the release of beta-endorphins or the use of opioids can change neurotransmitters in the brain in order to help my reader understand the possible alternatives for pain management during labor. I investigated the potential consequences and benefits of implementing either treatment. I explored the feasibility of using different forms of acupuncture for pain management. I examined the different mechanisms through which epidurals and acupuncture affect the brain in order to discover whether exogenous opioids (which come in epidurals) or endogenous opioids also known as beta-endorphins (which are stimulated by acupuncture) are more powerful in reducing pain. My research currently shows that epidural analgesia should be used more sparingly because it can have a negative effect on the mother’s physical and mental health. I believe I will find that either acupuncture, although not a panacea, can be a suitable alternative to epidurals for women seeking pain relief during labor or that the two should be used in conjunction to provide maximum pain relief with minimum negative side effects. It will be beneficial to conduct a study to test the effectiveness of the results of this paper in order to determine experimentally if these methods can be applied to pain management in hospitals.
212. **How learning disorders, specifically ADHD and ADD, affect the impacts of addicting substances and how they relate to substance use disorders.**

*Mana Nasseri, Depts. of Biology and Chemistry, with Prof. Faye Prichard, VCU Honors College*

My proposed question is: how do learning disorders, specifically ADHD and ADD, affect the impacts of addicting substances and how do they relate to substance use disorder (SUD)? I’m researching this area because as a person who has ADD, I understand what exactly it means to not be able to focus clearly. I wanted to understand more about this disorder and I also thought it would be interesting to compare the juxtaposition of disorders that disable a person from staying focused versus substances that causes people to only fixate on that/become addicted. To test this question, I examined multiple scholarly articles and meta-analyses. The results indicated that there is a high linkage between ADHD and SUD. Multiple studies and research have found that individuals who have ADHD possess a greater risk for obtaining SUD not only because of the disease itself but through neurological, social, environmental, and biological factors that are associated with ADHD. The direction that future research is heading towards is focused on helping to prevent individuals with ADHD from getting SUD. A main area of research is dedicated to discovering what the biomarkers for SUD in the individuals who have ADHD are to help prevent them from being susceptible to SUD.

213. **Religion in Modern American Elections**

*Andrew Heinsius, with Prof. Maggie Tinsley, VCU Honors College*

Due to many differing and significantly zealous opinions coming from all sides of contemporary media, I decided to plunge into research that began with curiosity about how much religion really does affect American politics, and whether it is more or less involved today than it has been historically. These feelings grew into research on how religion was represented in government today in comparison, then finally into an analysis of religion’s influence on the election chances of recent (1940-2016) candidates for federal office as put into its historical context. Through avid research from both religious and nonreligious sources, and many reviews of statistics via surveys and polls, as well as analysis of many media sources, I have expected to reach the result that religion, even today, is a strong force in the American electoral process and our representative system, even though certain other political trends have slowed to a halt (in-viability of black, female, Catholic, Jewish, etc. candidates). This conclusion could have far-reaching consequences - and in fact does already - upon how both candidates and American voters behave within the federal system of American government - regardless of whether they are religious or not - such as: many candidates having much stronger religious roots than their constituents, religious debate factoring into political debates, or many candidates losing viability for election due to their religious preferences and/or the preferences of their constituents.


*Lydia Gyurina, Dept. of Kinetic Imaging, with Prof. Mary Boyes, VCU Honors College*

The Internet introduced new ways of presenting information and dramatically altered nearly every aspect of modern society, including print publications. However, little research has been conducted on the changes that occurred in print media during the Internet’s formative years. Because of its popularity and serial nature, *Guinness World Records* provides an excellent lens through which to investigate these changes. Between the years 1995 and 2005, while the Internet emerged and gained popularity, *Guinness World Records* underwent substantial changes in design and branding. This paper investigates the changes in design and language which occurred in *Guinness World Records* in American editions of the book between 1995 to 2005,
in order to determine if and how the rise of the Internet changed the primary purpose of the book from education from entertainment, and how this shift has influenced its design.

I examined every issue of Guinness World Records which was published between 1995 and 2005, paying special attention to the cover design, title spreads, layout of pages, and language used in introductions and in record entries. I also investigated the development of the company itself, and explored current scholarship on the Internet’s effect on culture and audience processes. My research revealed that between 1995 and 2005, Guinness World Records became more skim-friendly, as evidenced by a decrease in article-based and narrative elements throughout the book in favor of brief, impersonal descriptions of records and of the book itself. These changes likely occurred due to a growing digital media market and a growing expectation of instant gratification due to the Internet, in addition to the shift in mission and expansion of the company itself.

My research addresses the changes which occur a within single publication during a relatively short time frame. Additional research is left to be done regarding the changes in graphic design and language in other forms of media which occurred during the developmental years of the Internet and its related technology.