Virtual Symposium - 2020

PROGRAM WITH ABSTRACTS

APRIL 23-24, 2020

University of Mary Washington

Fredericksburg, Virginia

Presentations listed by Categories

Creative Writing

Krista Beucler, “The Necromancer: A Novella”

Exhibition

Alexis Anderson, Gillian Brown, Sarai David, Meredith Glasco, Tanner Herndon, Emily Hilbert, Tessa Honeycutt, Jonni Hower, Brittany Johnson, Jordan Petty, and Alana White, “Margaret’s Menagerie”

Breanna Bravo, Courtney Chetister, Benji Collins, Abigail Dyer, Natalie Eaton, Erin Fei (Humphrey), Cora Freeman, Tess Hatton, Marcus Hill, Ryan Lopez, Tara Meeks, Emily Pawlica, Megan Prince, Mason Radcliffe, Katherine Raffa, Kelli Schooler, and Samantha Van Heest, “UMW Studio Art Senior Exhibition 2020”

Mapping

Lindsey Minges, Nigel Brown, Samantha Melvin, Matthew Bova, and Nicholas Buccella, “Mapping Ivy Hill Cemetery”

Oral Presentation

Ariane Akhand, “The Roman Dogma of Animal Breeding: "Bark"aeological Findings Reveal the Effects of Selective Pressures on Roman Dogs”

Rick Altenburg, “Finding Quiyough: A Preliminary Site Report for 44ST1164”

Kathryn Arntsen, Kayln Clinkenbeard, Madeleine McGann, and Rebekah Stone, “The Effects of Gender, Discipline, and Scientist Advocacy on Perceptions of Credibility and Motivations”

Téa Barndt, “Japanese Whaling and the International Whaling Commission”

Nichole Boigegrain, “Caregivers’ Failure Mindset, Helicopter Parenting, and Emerging Adults’ Intelligence Mindset”

H. Sumner Bridenbaugh, “Owning the Birthing Room: Self-advocacy and Proof of Authority in Seventeenth Century Midwifery Manuals”

William Carpenter, “Vegetius and Julius Caesar: A Proper Roman General”

Devin Carson, “How to Create an AR Poster”

K. Corbett, “The Geometry of Surfaces and its Applications Using Mathematica”

Grace Corkran, “Between Life and Death: Pregnant Women in the Nazi Concentration Camps”

Sarai David, “Leonardo's Versions of the Rocks”

Beau De Koninck and Tom Meldrum, “An Economic Base Analysis of Virginia in 2012 and 2017”

Lydia Eisenberg, “Hair and Power in Ovidian Elegy: A Discussion of Feminine Dominance and the Hair Apparent”

Abigail Farley, “Interpersonal Violence in the Context of Individuals with Intellectual Disabilities”

Anushah Hassan, “Arabic to Urdu: The Journey of Semantics”

HISP 469: Laboratory in Preservation Planning, “Connect Fred: Enhancing Trail Connectivity through Historic Fredericksburg”

Rebecca Jacobi, “Challenging Bosnian Women’s Identity as Rape Victims: The Fetishization of Sexual Violence in Post-Conflict Discourse”

Javon Jones, “Live Sound Reinforcement Comprehensive Study”

Nicholas Maksimowicz and Patrick George, “Effect of Higher Education on Opioid Overdose Deaths: A Case Study of the US”

Megan Marzzacco, “COMM 491: Digital Writing & Design”

Rachel McVicker, “Allied Contributions to Post 9/11 Wars”

Zachary Milnes, “The Effect of Internet Download Speeds on Income in a County”

Matthew Nelson, “The Death of a Poet: Ovid's references to Horace in Amores 1.15 and Tristia 3.3”

Daniel Pan, “Barriers to Implementing Educational Technology in Higher Education”

Claire Parkey, “Depots and Dollars: A Comparative Analysis of the Effects of Federal Spending on Preservation in Urban and Rural Communities”

Delaney Resweber, “Making Sense of Time: Using a 2-Cent Coin to Follow the Johnson Family from Sherwood Forest Plantation to Fredericksburg”

Claire Ross, “Victorian Identity and Material Culture”

Bryce Runey, “Manipulation of the Greeks Within Black-Scholes”

Siddhartha Rao, “Minimum Wage and Fast Food Employment”

Tara Scroggins, “Idealized Representations of Alcatraz Federal Prison”

Maddie Shiflett, “‘American and Nothing Else’: Japanese American Dual Citizenship in Hawaii”

Grace Smith, “An Interview with Petrarch: The Humanist World Cup”

Rachel Summers, “Embryonic development of the stress hormone axis in two model teleost species”

Erin Whitesell, Miranda Batte-Futrell, Christine Cao, and Nichole Boigegrain, “The Effect of Helicopter Parenting on the Prosocial Behaviors of Emerging Adults”

Brandon Williams, “What has happened to U.S. Inflation? The Effect of Globalization on the Phillips Curve”

Performance

UMW Theatre Students**,** “UMW Theatre Remote Performance of William Shakespeare's Much Ado About Nothing”

Posters

Karolina Albert, Emily Bowerman, Austin Chapple, Alexander Elvir-Herrera, Patrick Healy, Viviana Hernandez, Kate Jolly, Alilexondra Lloyd, anna Longacher, Maryclaire

Muskett, Khaila Nelson, Maeve Reilly, Savannah Roberts, Lauren Talbert, Stephanie Turcios, and Eva Waszak; PSCI 370: Women in Politics, “Academic Podcasts & Posters for Political Science 370 Spring 2020: Women in Politics”

Thomas Bustamante, “Assessing the presence and concentrations of microplastics in the gizzards of Virginia waterfowl”

Rebecca Callaway, Mary Dye, and Adam Schoene, “Laser Harp”

Lauren Closs, “Investigating reproductive success and endocrine regulation of mating strategies in male medaka”

Damon R. Cox, “Food Waste”

Amy Creel, “Deterministic and Stochastic Models for HIV-1 Dynamics”

Catherine Crowell, “The impacts of pH on trace contaminant leaching and toxicity of coal ash in Planorbella duryi”

Elisabeth DellaRova, “Generosity of Spirit: Faith, Democracy, and Grace in Marilynne Robinsons Gilead”

Than-Binh Duong, “The Influence of Polyethylene Nano plastics on The Toxicity of Methoxychlor on D. magna”

Than-Binh Duong, “The Presence, Distribution, and Concentration of Microplastics In the Lower Basin of the Chesapeake Bay, USA Near Wastewater Treatment Plants”

Katheryn Gonzalez, “The Pronoun Vos In Spanish Textbooks”

Christopher Good, “Fantasmas o Fantasia: Un AnÃ¡lisis de Casa tomada”

Mary Hoffman, “Sublethal Effects of Sulfoxaflor Pesticide on Physiology and Behavior of Daphnia magna”

Emily Matuczinski and Ashley Parkhurst, “The effect of a possible glioblastoma treatment on somatic cells”

Kaitlyn McClung and Emily Brooks, “Evaluation of Metal Contamination and Soil Properties at Former Mine Sites in Poland”

Meryl Menezes, Anna Higginbotham, Jessica Raiford, and Aidan McClanahan, “Predicting Sexual Satisfaction in Age-Diverse Women”

Daniel Milliken, “Carbon Sequestration and Storage Estimates of Landscaped Trees on the University of Mary Washington Campus”

Leslie Miyazono, “What Is CBD And Why Should Employers Be Aware?”

Cristina Montemorano, “A Guide for Creating Great VR Storyboards: Planning to Make Your Virtual Vision a Reality”

Laura O'Dea, Meredith LeBel, and Nicole Haynes, “Effects of Probiotics on Inflammatory Responses in Neuronal Tissue”

Cheyenne Palmo, “Oxygen isotope variability in Crassostrea Virginica shell from the Chesapeake Bay: applications to regional paleoclimate”

Lillian Salamone, Laurence King and Kathleen Keith, “An Archaeological Analysis of a Possible Slave Quarter on the Little Falls Plantation in Southern Stafford County”

Spencer Saunders, “Exposure effects of thiamethoxam on the viability, growth, and behavior of Physa acuta”

Visual Performance

Alexis Anderson, Gillian Brown, Sarai David, Meredith Glasco, Tanner Herndon, Emily Hilbert, Tessa Honeycutt, Jonni Hower, Brittany Johnson, Jordan Petty, and Alana White, “Margaret's Menagerie”

Alyssa Brown, “The Imitation Game | VR Concept”

Liliana Ramirez, Cadiann Treviño Pinto, “Inspired by Literature and Film: Creative Interpretations form Spanish 312”

Jade Turner, Peyton Dunow, Samara Wong, and Julie Boynton, “Error Related Negativity and Moderate Exercise”

Abstracts

Listed by College and Department

College of Arts and Sciences

Art and Art History Department

Students: Alexis Anderson, Gillian Brown, Sarai David, Meredith Glasco, Tanner Herndon, Emily Hilbert, Tessa Honeycutt, Jonni Hower, Brittany Johnson, Jordan Petty, and Alana White
Project Title: ***"Margaret's Menagerie"***
Faculty Mentor: Professor Marjorie Och
"Margaret's Menagerie" is an exhibition produced by students in ARTH 317: Laboratory in Museum Studies. The exhibition focuses on the work of Margaret Sutton (1905-90), a 1926 graduate of the State Teacher's College in Fredericksburg, Virginia, now the University of Mary Washington. The works chosen for the exhibition explore the artist's vivid imagination and the deep resource of inspiration that she found in animals and nature.

Students: Breanna Bravo, Courtney Chetister, Benji Collins, Abigail Dyer, Natalie Eaton, Erin Fei (Humphrey), Cora Freeman, Tess Hatton, Marcus Hill, Ryan Lopez, Tara Meeks, Emily Pawlica, Megan Prince, Mason Radcliffe, Katherine Raffa, Kelli Schooler, and Samantha Van Heest
Project Title: ***"UMW Studio Art Senior Exhibition 2020"***
Faculty Mentors: Professor Carole Garmon, Professor Rosemary Jesionowski, Professor Jon McMillan, Professor Chris Musina, and Professor Jason Robinson
Each year, the Department of Art and Art History is pleased to present the thesis work of our graduating seniors in an exhibition. This Senior Exhibition represents the culmination of each student's time at the University Mary Washington. Through ARTS 474: Professional Practices, ARTS475: Senior Thesis Seminar. Each student has also received mentoring from the specific Studio Art faculty member whose area of expertise is most appropriate. Traditionally, the exhibition is held in the foyer and halls of the University Center with a celebratory reception on Research and Creativity Day. Congratulations to our graduating seniors; they've truly done an outstanding job.

Student: Sarai David
Project Title: ***"Leonardo's Versions of the Rocks"***
Faculty Mentor: Professor Marjorie Och
Leonardo da Vinci's two paintings entitled the Virgin of the Rocks, currently located in the National Gallery in London and the Louvre in Paris, depict nearly identical subject matter in two different styles. Recent conservation confirms the authorship of the London version, allowing researchers to compare the styles of the two paintings. This presentation examines stylistic elements such as sfumato, chiaroscuro and compositional changes of the two paintings. It also considers the contractual requirements for the altarpiece and how those requirements may have influenced Leonardo's stylistic choices. Finally, this presentation concludes that, in an attempt to create a cohesive design, Leonardo modified the style for which he is best known.

Biological Sciences Department

Student: Thomas Bustamante
Project Title: ***"Assessing the presence and concentrations of microplastics in the gizzards of Virginia waterfowl"***
Faculty Mentor: Professor Andrew Dolby
Microplastics are defined as plastic fragments that are smaller than 5mm. These particles have become a ubiquitous water pollutant in recent years. While a substantial amount of research on their impacts on marine ecosystems has been conducted, the effect of microplastics on freshwater food webs remains poorly understood. In this study, we assessed the presence and concentrations of microplastic particles in the gizzards of the Canada Goose (Branta canadensis), Ring-necked Duck (Aythya collaris), Long-tailed Duck (Clangula hyemalis), Bufflehead Duck (Bucephala albeola), and Mallard (Anas platyrhynchos) hunted in the Piedmont and Coastal Plain of Virginia. Gizzards were bisected and had their contents removed for analysis. Collected gizzard contents underwent density separation in order to separate plastics from the sediment within gizzards. Isolated particles were then visually inspected under a dissecting microscope. Preliminary results show that with contamination taken into account, 90% of birds sampled contain microplastic fibers in their gizzards. These range in concentration from about 0.08-11.49 fibers/gram of gizzard material. All plastics were secondary fibers, meaning they originated from larger plastics that broke down over time. This provides further evidence that waterfowl not only ingest microplastics but retain them in their digestive systems. Infrared spectroscopy was done on one fiber; it was determined to be polyethylene. As we move forward, we plan to incorporate chemical digestion and a more efficient chemical analysis in our methods. Further studies will also examine microplastic spatial distributions, as well as microplastics in

the intestinal lining and lumen of these birds. This work will be able to help us understand the threat microplastics pose to organisms and ecosystems, as well as help us understand their geographic distributions.

Student: Lauren Closs
Project title: ***"Investigating reproductive success and endocrine regulation of mating strategies in male medaka"***
Faculty Mentor: Professor Dianne Baker
Mate guarding, when two males compete for one female, is a reproductive strategy seen across a variety of vertebrate species. This often leads to hierarchical relationships, in which one male exerts dominance over other, subordinate males. However, the physiological mechanisms that promote dominance or subordinance in males remain largely unexplored. This study investigates the reproductive success and endocrine signals of these reproductive strategies in Japanese medaka (Oryzias latipes). To identify dominant and subordinate males, triads consisting of two males of different genotypes and one female were observed repeatedly for 5 days. Male reproductive success was determined by genotyping embryos from each female. We found that the number of eggs fertilized by dominants and subordinates did not differ ($p=0.29$), indicating that dominant behavior does not guarantee reproductive success and that subordinate males may successfully fertilize eggs using sneaker male tactics. We hypothesized that these behaviors are linked to activity in the reproductive endocrine axis. To test this hypothesis, we quantified pituitary luteinizing hormone (LH) and follicle stimulating hormone (FSH) in dominant and subordinate males using ELISAs. While FSH did not differ between the groups, LH was unexpectedly higher in subordinate males ($p=0.047$). This indicates that either LH production is stimulated, or its pituitary release is inhibited in subordinates. To investigate these opposing explanations, we measured mRNA levels of LH, FSH, and GnRH receptors in the pituitary, and GnRH and AVT in the brain of dominant and subordinate males using qPCR. Mean differences between dominants and subordinates were not significant for any gene. Dominant fish expressed higher lhb in 8/12 tanks, indicating that LH production is not stimulated in subordinates, but as the transcripts for GnRH and its receptors also did not differ, further studies are needed to determine the mechanism by which LH release may be inhibited.

Student: Daniel Milliken
Project Title: ***"Carbon Sequestration and Storage Estimates of Landscaped Trees on the University of Mary Washington Campus"***
Faculty Mentor: Professor Alan Griffith
Trees play an important ecological role within the urban environment. They improve public health, provide environmental support and provide aesthetic benefits to cities. To help provide a better understanding on the services that our trees provide, researchers have come up with a way to place economic (monetary) value on these services they provide. Our study will explore the ideas of ecosystem values and answer the following

questions: What are the services that the trees located on the University of Mary Washington (UMW) campus provide for the faculty and student population? Specifically, what amount of carbon is removed from the atmosphere by each species of tree through sequestration and storage? This independent research project used the United States Department of Agriculture Forest Service's software suit, i-Tree Eco, to quantify the ecosystem benefits that the University of Mary Washington's urban forest conveys to its community.

Students: Laura O'Dea, Meredith LeBel, Nicole Haynes
Project Title: ***"Effects of Probiotics on Inflammatory Responses in Neuronal Tissue"***
Faculty Mentor: Professor Deborah O'Dell
Alzheimer's disease (AD) is a neurodegenerative disease that affects more than 40 million people. While the pathophysiology has yet to be fully elucidated, some studies suggest AD associated chronic inflammation is caused by hyperactive microglia that produce pro-inflammatory factors. Probiotics have been shown to have anti-inflammatory properties and may influence neurochemistry via the gut-brain-axis, which controls communication between the intestines and brain, crossing over the blood brain barrier (BBB). A model of the BBB was constructed with a double transwell system to clarify the effects of probiotics on cerebral inflammation. Microglia cells grown in the basolateral chamber were co-cultured with endothelial cells in the upper compartment while an astrocyte monolayer separated the two compartments. Once the system was exposed to human peripheral blood T-cells and combined with histamine (probiotic anti-inflammatory product), formic acid (probiotic inflammatory product), both, or neither, the microglial medium was collected and analyzed for tumor necrosis factor α (TNFα) and interleukin-10 using ELISA. ANOVA and T-Tests were run and showed no significant results, except for the histamine and formic acid combination. In the combination treatment, levels of TNFα were slightly different than the control ($p = 0.00006$), contrary to what was expected. Under these conditions, probiotics do not reduce inflammation in the brain and thus cannot effectively treat AD patients. However, in the future, more experiments should be conducted with multiple inflammatory and anti-inflammatory molecules as there could be overlapping interactions between several probiotic products that produce advantageous metabolic effects and mitigate elevations in inflammatory responses.

Student: Rachel Summers
Project Title: ***"Embryonic development of the stress hormone axis in two model teleost species"***
Faculty Mentor: Professor Dianne Baker
Glucocorticoid hormones mediate stress responses in all vertebrates, from teleost fishes to mammals. In adult teleosts, the primary glucocorticoid, cortisol, is synthesized within interrenal tissue via enzyme-mediated reactions regulated by the hypothalamic-pituitary-interrenal (HPI) axis in response to stressors. The hypothalamic peptide

corticotropin-releasing hormone (CRH) stimulates release of the pituitary protein adrenocorticotropin hormone (ACTH), which stimulates cortisol production in interrenal cells. Cortisol affects target cells via two types of receptors, the glucocorticoid receptor (GR) and mineralocorticoid receptor (MR). The timing and sequence of events leading to a fully functioning HPI axis in developing nonmammalian vertebrates is not fully known. Addressing this gap, we measured expression of genes involved in cortisol synthesis and signaling throughout embryogenesis in two teleosts, the zebrafish (Danio rerio) and Japanese medaka (Oryzias latipes). We isolated RNA from pools of embryos collected at multiple developmental stages and synthesized complementary DNA (cDNA) by reverse transcription. Using cDNA as a template, we measured relative expression of key HPI genes, including CRH, melanocortin type 2 receptor (MC2R), steroidogenic acute regulatory protein (StAR), 11 β hydroxysteroid dehydrogenase (HSD2), and MR by quantitative polymerase chain reaction (qPCR). We measured cortisol throughout embryogenesis using an enzyme-linked immunosorbent assay (ELISA). We found noteworthy differences in expression profiles for all measured genes between species. Notably, we saw large differences in magnitude for changes in CRH, MC2R, and StAR expression. HSD2 showed different patterns of expression in zebrafish and medaka. Temporal cortisol patterns differed between species. Medaka cortisol increased significantly for hatch, whereas zebrafish saw a significant decrease.

Chemistry Department

Students: Emily Matuczinski and Ashley Parkhurst
Project Title: ***"The effect of a possible glioblastoma treatment on somatic cells"***
Faculty Mentor: Professor Leanna Giancarlo
Glioblastoma multiforme (GBM) is a serious intracranial cancer which maintains a low survival rate due to its aggressive nature and invasive morphology that is resistant to current treatment methods. Recently, superparamagnetic iron-oxide nanoparticles (SPIONs) bound to a TWEAK ligand have been proposed to specifically target glioblastoma cells at their Fn-14 receptor by inducing cellular death of the cancerous cells through the disruption of the membrane when exposed to a magnetic field. While apoptosis in GBM cells was successfully induced in vitro, the effect of the SPION-TWEAK complex on normal somatic cells and the effect of external environments on the SPION biopolymer is currently being evaluated. Specifically, in vitro endothelial cells, a common somatic cell type used in the lining of blood and lymph vessels, were subjected to the SPION-TWEAK complex in the presence and absence of a magnetic field. These cells were visualized via fluorescent microscope to observe if the endothelial cells underwent programmed cell death from the proposed treatment. Results from fluorescence microscopy demonstrate that the SPION-TWEAK complex has no effect on

the endothelial cells, maintaining the theory that the conjugated nanoparticles only affect GBM cells. Also, previous studies have shown that the physicochemical properties and integrity of nanoparticles undergo drastic changes in vitro and in vivo, and these changes are attributed to cellular lysosomal degradation. Transmission electron microscopy studies should be conducted to determine whether the biopolymer from the SPION-TWEAK complex is affected by the magnetic field presence, or if the biopolymer is shed by lysosomal degradation. It is crucial to establish the interactions of the nanoparticle complex with benign cells and their magnetic field environment in order to utilize the proposed treatment in vivo so that it does not affect the essential, noncancerous cells in the body.

Classics, Philosophy, & Religion Department

Student: Ariane Akhand
Project Title: ***"The Roman Dogma of Animal Breeding: "Bark"aeological Findings Reveal the Effects of Selective Pressures on Roman Dogs"***
Faculty Mentor: Professor Liane Houghtalin

Animals as a whole are often overlooked when studying ancient Rome, but there is one animal that even Roman authors of farming guides often dismissed as being insignificant: this animal being the dog. The Romans kept dogs for many purposes, such as for hunting game, protecting a flock of sheep, guarding the house, and providing companionship. The authors of Roman farming guides often provided guidelines as to which characteristics were ideal for each type of working dog, but are these ideal characteristics reflected in the reality of Roman dogs? I set out to conclude to what extent the Romans influenced observable dog traits by the process of selective breeding. The ideal dogs described in the guides written by Columella, Varro, and the Greek author Xenophon have been analyzed and compared to archaeological findings depicting real Roman dogs in the forms of vases, mosaics, and actual dog bones. It was found that the Romans placed selective pressures most strongly on their hunting and herding dogs, followed closely by their guard dogs, and then minimally on their lap dogs. The nearly uniform traits shared by herding and hunting dogs is most likely due to the high stakes positions that these dogs held, as their owner depended on them for money and food. The guard dog also held a high stakes position in protecting the household, so it is not surprising that it experienced selection in a similar way. The lap dog did not contribute to its household as working dogs did, and selection for a lap dog's traits was likely done on an individual basis, based on the owner's personal preferences. This leads to the highest degree of diversity being observed in Roman lap dogs.

Student: William Carpenter
Project Title: ***"Vegetius and Julius Caesar: A Proper Roman General"***
Faculty Mentor: Professor Liane Houghtalin
Little is known about Vegetius, who wrote a military handbook, Epitoma Rei Militaris (RM), most likely for Emperor Theodosius I (although even that is not certain) during the late 3rd or early 4th century CE. His manuscript is extensive, examining a wide array of military practices and norms that a proper Roman army should follow. The RM covers specific tasks and responsibilities of a general, which Vegetius appears to have drawn from earlier Roman writers, mainly those from the late Republic and early Principate. Comparing Vegetius's writings to those of Julius Caesar, specifically to Caesar's own narrative of his actions in Book I of De Bello Gallico (BG), provides insight into how Roman ideals of good military leadership progressed through centuries of history.

Student: Lydia Eisenberg
Project title: ***"Hair and Power in Ovidian Elegy: A Discussion of Feminine Dominance and the Hair Apparent"***
Faculty Mentor: Professor Liane Houghtalin
When considering the love elegy of Ovid, there are multiple cases in which love, beauty, or infatuation with a woman is expressed through visual descriptions of her hair. In the Amores and Ars Amatoria, these descriptions of hair support a seemingly subjective view of beauty when compared to current hairstyle trends at the time. As a result, this view of feminine beauty suggests that the woman holds the power within the amorous relationship described. However, the nature of the hair description reduces Ovid's view of feminine beauty to an objective one, revealing a disingenuous view of feminine power and therefore supporting Ovid's claim to masculine dominance in the relationship.

Student: Matthew Nelson
Project Title: ***"The Death of a Poet: Ovid's references to Horace in Amores 1.15 and Tristia 3.3"***
Faculty Mentor: Professor Angela Pitts
References to poets immortalizing themselves by writing poetry is a frequent trope of classical literature. It appeared in Greek literature thanks to the lyric poets Sappho and Theocritus and the philosopher Plato. The Greeks passed down the tradition to the Romans, where it featured in the collections written by Horace, Gallus, Tibullus, Propertius, and, eventually, Ovid. Ovid's claim to immortality in Tristia 3.3 is an interesting poem to study, given he references his earlier claim to immortality in Amores 1.15 and Horace's claims in Carmina 2.20 and 3.30. My paper examines his attitude in both of his poems, analyzing the connections he makes to his prior work and to Horace's. Drawing upon this research, I argue the sequence of claims by Ovid

demonstrates his lack of repentance for his exile. Rather than truly admit guilt, I believe Tristia 3.3 reveals he continues to take pride in erotic poetry – a revelation visible when the poem is placed in contrast against Amores 1.15.

Earth & Environmental Sciences Department

Student: Catherine Crowell
Project Title: ***"The impacts of pH on trace contaminant leaching and toxicity of coal ash in Planorbella duryi"***
Faculty Mentor: Professor Tyler Frankel
Coal fly ash is a major industrial waste that is primarily produced by coal-burning power plants. Ash contains multiple trace contaminants that have the potential to leach into waterways after rain events, causing undesirable effects on aquatic species in these ecosystems. Few laboratory studies have examined the relationship between acidified rainfall and the release of trace metals from coal ash and the impacts of such rainfall on the toxicity of coal ash leachates on aquatic invertebrates. Thus, the goals of this study were to 1) evaluate the effect of varying pH's on the leaching of trace contaminants from coal ash and 2) examine the impacts of these leachates on the viability, development, and hatch rate of embryonic Planorbella duryi, a freshwater snail species found in intermittent streams throughout North America. Briefly, 100g of coal fly ash obtained from a local coal ash repository was added to individual glass vessels containing 1L of synthetic water adjusted to pH's of 4.5 to 7.5. After 48 hours, all leachates were vacuum filtered, and an aliquot analyzed for aluminum, arsenic, calcium, cadmium, chromium, cobalt, iron, mercury, magnesium, manganese, lead, selenium, and zinc using ICP-OES. Embryonic P. duryi clusters (<2hrs old) were then exposed to each leachate for 10 days using a 48hr static-replacement assay, and the number of viable individuals and hatchlings in each cluster assessed daily. To examine the impacts on growth, photographs of each embryo were obtained every 24 hours. While this project is currently ongoing, we expect to find increases in aqueous trace contaminant concentrations as a result of decreased pH in leachates as well as decreased viability, growth, and hatching success. This study will provide important information regarding the potential impacts of acidified rainfall on the mobilization of trace contaminants and toxicity of coal ash leachates on aquatic invertebrates.

Student: Than-Binh Duong
Project Title: ***"The Influence of Polyethylene Nanoplastics on The Toxicity of Methoxychlor on D. magna"***
Faculty Mentor: Professor Tyler Frankel

Nanoplastics (NPs), defined as plastic particles < 0.1 mm, have become an emerging concern in aquatic environments due to their multiple pathways of entry into rivers and streams. NPs may originate from the manufactured beads for personal care products as well as the from the fragmentation of larger plastic items. Due to their small size they are easily ingested by aquatic organisms, resulting in detrimental health effects such as digestive tract obstructions, feeding debilitation, and energy depletion. Due to their physiochemical attributes, NPs have also been shown to sorb and mobilize organic pollutants such as pesticides, suggesting that interactions between these two types of pollutants may result in an altered biological response compared to the effects of each individual contaminant. This study assessed the potential synergistic or antagonistic effects of polyethylene nanoparticles and the organochlorine pesticide methoxychlor on the viability and mobility of Daphnia magna. Adult D. magna were exposed to either 1) virgin 10-20µm polyethylene pellets, 2) methoxychlor, or 3) various combinations of the same pellet and methoxychlor concentrations for 48 hours or 7 days using a static exposure method. Mortality and paralysis were assessed per 24 hours of exposure. Mobility was assessed after 24 hours of exposure. To assess mobility, individuals were recorded in a light-controlled behavioral chamber for 3 minutes. Footage was analyzed using ToxTrac to quantify mobile speed, acceleration, and distance traveled. While this project is currently ongoing, we expect to find a significant difference in mobility parameters and mortality rates when exposed to the combination of polyethylene pellets and methoxychlor compared to the effects from each contaminant alone. Thus far, few studies have examined the ability of NPs to influence the toxicity of organochlorine pesticides in aquatic invertebrates. This study will help explicate the impacts of plastic pollution on aquatic biota in freshwater systems.

Student: Than-Binh Duong
Project Title: ***"The Presence, Distribution, and Concentration of Microplastics In the Lower Basin of the Chesapeake Bay, USA Near Wastewater Treatment Plants"***
Faculty Mentor: Professor Ben Kisila
The Chesapeake Bay is a large estuary located along the east coast of the United States, with numerous wastewater treatment plants (WWTP) located throughout its basin. This area supports a vast diversity of aquatic biota and provides for numerous communities throughout the eastern United States. While effluent from WWTPs has been identified as a major contributor to microplastic pollution, little research has been conducted to examine microplastic contamination in the Chesapeake Bay watershed areas surrounding these effluent streams. Microplastics are unique in that their size (<5mm) enables ease of ingestion by aquatic organisms, causing adverse health effects such as energy depletion and digestive tract obstructions. MPs may also biomagnify throughout trophic levels, ultimately posing a threat to human health due to unintended

consumption. In this study, the presence of microplastics in major rivers in the lower basin of the Chesapeake Bay, USA was examined. Water samples and sediment samples were collected in the Potomac and Rappahannock river upstream, midstream, and downstream of WWTP outfall sites via dip sampling and grab sampling, respectively. Sediment samples were treated with a wet peroxide oxidation using Fenton's reagent to digest natural organic matter and sodium chloride to separate MPs from the sample. Surface water samples were filtered by vacuum filtration to separate suspended particles from water. Presence, type, and quantity of MPs were assessed using light microscopy. While this project is currently ongoing, we expect to find that MPs are more abundant in samples collected at WWTP outfall locations rather than locations upstream or downstream from those sites. The results of this study will provide novel information regarding the presence, distribution, and concentrations of MPs in water and sediment samples from several areas of the Chesapeake Bay watershed due to inputs from WWTP effluent.

Student: Mary Hoffman
Project Title*: "Sublethal Effects of Sulfoxaflor Pesticide on Physiology and Behavior of Daphnia magna"*
Faculty Mentor: Professor Tyler Frankel
Insect pests are a major concern for large-scale agriculture as a result of increasing insect resistance to pesticides, driving a need for the development of new pesticides. Sulfoxaflor, a sulfoximine pesticide recently approved for use by the USEPA, was developed in order to replace neonicotinoid use and has shown to have high efficacy in the field. It is used in rotation with other pesticides, with environmental introduction caused primarily by wet spray application or agricultural runoff. In insects, sulfoxaflor binds to nicotinic acetylcholine receptors, triggering over-activation that leads to paralysis and death. Preliminary exposure studies have shown neonatal effects and development of liver tumors in rats and mice, and moderate oral toxicity in bobwhite quails and fathead minnows. Little research into the effects of the chemical on aquatic non-target invertebrates has been conducted; as such, this research aims to identify potential physiological and behavioral impacts of sulfoxaflor on adult Daphnia magna at concentrations of 0, 0.1, 1, 10, 100, and 1000 μg/L. Impacts on mobility were determined using top-down recordings and behavioral analysis software ToxTrac (v2.84). Heart rate was analyzed through analysis of minute-long heart recordings to quantify beats per minute. While this research is currently ongoing, it is expected that these treatment levels are sub-lethal at 24 hours, and that exposure to sulfoxaflor at higher concentrations will inhibit heart rate and mobility in adult Daphnia magna. The research aims to help elucidate the potential sub-lethal impacts of sulfoxaflor on non-target aquatic invertebrates.

Students: Kaitlyn McClung and Emily Brooks
Project Title*: "Evaluation of Metal Contamination and Soil Properties at Former Mine Sites in Poland"*
Faculty Mentor: Professor Melanie Szulczewski
Surface mining dramatically affects the environment, both where the resource extraction takes place and in the areas where mining wastes and overburden are deposited. Poland is Europe's top coal producing country and is also home to many mines for pyrite, sand, and other mineral resources. We studied soil samples from three former mining areas in Poland: the Bełchatów and Smolnica coal mines, and the Piaseczno sulfur mine. Various substrates, amendments, and trees had been used for remediation, with activities taking place up to 36 years previously. The success of reforestation and soil development varied greatly, especially in pH, organic matter, and metal concentrations.

Student: Cheyenne Palmo
Project Title: ***"Oxygen isotope variability in Crassostrea Virginica shell from the Chesapeake Bay: applications to regional paleoclimate"***
Faculty Mentor: Professor Pam Grothe
Future climate predictions in the Chesapeake Bay region suggest unprecedented warming (Cronin et al., 2003) and more intense periods of rainfall (Najjar et al., 2010). In order to quantify present and future changes in climate variability, we need a long baseline of natural climate variability that extends far beyond the instrumental record. Paleoclimate records can be used to help quantify anthropogenic climate change from natural climate variability. However, reconstructing regional climate in an estuary system is challenging, resulting in a lack of pre-instrumental era climate records for the Chesapeake Bay. The Common Eastern Oyster, Crassostrea Virginica, is a promising natural archive to reconstruct natural, or pre-industrial, climate in the Chesapeake Bay region. Stable oxygen isotopes ($\delta^{18}O_{shell}$) recorded in their calcium carbonate shell are indicators of both changes in temperature and the $\delta^{18}O$ of the water ($\delta^{18}O_{sw}$), which is typically a function of salinity. In this study, the $\delta^{18}O_{sw}$ and $\delta^{18}O_{shell}$ values were analyzed to understand how the variability in the $\delta^{18}O$ of Crassostrea Virginica calcium carbonate shell reflects changes in sea surface temperature and salinity in the Chesapeake Bay in order to validate it as a paleoclimate archive. The oysters were sampled along their banded growth structure, providing yearly resolution for isotopic analysis. We predict that the $\delta^{18}O$ of the oyster shell will reflect the same $\delta^{18}O$ trends as the water, meaning the shells will precipitate at isotopic equilibrium. Additionally, we predict that salinity, dependent on temperature and precipitation, is the primary driver for changes in $\delta^{18}O$ of the shell, whereas increased $\delta^{18}O_{shell}$ values reflect higher salinity values. This work will provide the foundation for understanding the controls between estuarine water and shell geochemistry, with the potential to apply this

relationship to regional paleohydrology and paleoclimate reconstruction using fossil Crassostrea Virginica shells.

Student: Spencer Saunders
Project Title: ***"Exposure effects of thiamethoxam on the viability, growth, and behavior of Physa acuta"***
Faculty Mentor: Professor Tyler Frankel
Thiamethoxam is a neonicotinoid insecticide that targets the nicotinic acetylcholine receptors of target organisms. It is used on a wide variety of crops and can be applied in multiple methods including seed coatings, broadcast sprays, or foliar sprays. As thiamethoxam is highly soluble, it easily enters aquatic environments and surface water through run-off events from agricultural fields. Detected environmental concentrations have ranged from the low ng/L range up to 225 ug/L. While the effects of thiamethoxam exposure has been well studied in aquatic vertebrates, few studies have examined their impacts on freshwater invertebrates. As such, this study assessed the impacts of thiamethoxam exposure on the viability, behavior, and shell growth of juvenile freshwater bladder snails (Physa acuta). Adult P. acuta specimens were collected from local waterways in Fredericksburg, VA and bred under laboratory conditions for several generations. Laboratory hatched one-week old juveniles were then exposed to various concentrations of thiamethoxam (0 (EtOH control), 1.56, 3.13, 6.25, 12.5, or 25 ug/L) for two weeks using a static replacement exposure method (100% change every four days). Mortality was assessed every 24 hours, while shell growth and behavior were assessed on day 7 and day 14. Photos of each snail were obtained after one and two weeks and growth was measured using ImageJ (v1.8.0). Behavior was assessed using ToxTrac (v2.83) including average speed, average velocity, total distance traveled, and time spent stationary. While this experiment is still ongoing, we expect to see higher mortality rates and decreased growth concurrent with higher concentrations of thiamethoxam. We also expect to see increases in average speed, average velocity, and total distance traveled with increased exposure concentrations. Our findings will help expand our knowledge on how thiamethoxam impacts multiple physiological endpoints of a novel freshwater invertebrate species.

Economics Department

Student: Téa Barndt
Project Title: ***"Japanese Whaling and the International Whaling Commission"***
Faculty Mentor: Professor Margaret Ray

This project examines the effect the International Whaling Commission has had on the Japanese Whaling Industry. Economic research into this field has been limited, and new analyses are needed considering Japan's recent departure from the International Whaling Commission and resumption of commercial whaling. In particular, we seek to determine whether the 1986 moratorium banning commercial whaling has had a significant impact on the quantity of whales harvested by Japanese whaling vessels. Although this project did not find that the moratorium significantly impacted whale harvesting, there is a number of limitations to this research that suggest further study is required.

Students: Beau De Koninck and Tom Meldrum
Project Title: ***"An Economic Base Analysis of Virginia in 2012 and 2017"***
Faculty Mentor: Professor Amrita Dhar
Our project uses a location quotient technique and OLS regression to identify the job sectors which provide an economic base for the state of Virginia. A comparison of the bases in 2012 and 2017 reveal that Virginia's economy has grown more reliant on Professional and Scientific, Public Administration, and Social Security recipients. Through our regression, we can also estimate the relative importance of each of the basic jobs identified through the location quotient technique.

Students: Nicholas Maksimowicz and Patrick George
Project title: ***"Effect of Higher Education on Opioid Overdose Deaths: A Case Study of the US"***
Faculty Mentor: Professor Amrita Dhar
Opioid abuse is rising and is a serious epidemic that currently has a major impact on many Americans. It places a burden on all American citizens and American institutions through healthcare and pharmaceutical companies, while making it difficult to create a healthy culture for future generations. People tend to think of opioid abuse to occur in lower-income populations and to be more correlated with uneducated individuals. We estimate the effect of having received some college education or more on overdose deaths across the U.S. We use having some college education or more and standard high school education. We find that people who have obtained some form of higher education were likely to be significantly impacted by the opioid crisis.

Student: Zachary Milnes
Project Title*: "The Effect of Internet Download Speeds on Income in a County"*
Faculty Mentor: Professor Amrita Dhar
In this presentation I perform a Two-Stage Least Squares regression on data over the 5 years between 2014 and the end of 2018 in 135 counties in the continental US in order to

determine whether faster download speeds are correlated with higher per capita income. I find that there is in fact a statistically significant effect, where just a 10 mbps increase in average download speeds is correlated with a 7% higher income.

Student: Siddhartha Rao
Project Title: ***"Minimum Wage and Fast Food Employment"***
Faculty Mentor: Professor Steve Greenlaw
The topic of living wage is highly contested in today's political environment with many liberals looking to implement some kind of minimum wage increase, while conservatives argue to keep it where it is. The most common economic theory for the minimum wage debate comes from micro analysis of single firms and shows a decrease in employment from an increase in minimum wage although studies have found no conclusive answer. A newer macro perspective shows the possibility of no change in employment due to a minimum wage increase. With this macro theory in mind, the aim of this study is to look deeper into this question through regression analysis looking specifically at fast food jobs, considered some of the lowest paying jobs in the country. The results of this study support that an increase in population leads to an increase in fast food jobs and an increase in GDP leads to a decrease in fast food jobs. The minimum wage variable had a very low t-value meaning that it was not different from zero. This supports the macro perspective in showing no change in employment from an increase in minimum wage.

Student: Brandon Williams
Project Title: ***"What has happened to U.S. Inflation? The Effect of Globalization on the Phillips Curve"***
Faculty Mentor: Professor Steve Greenlaw
Since the end of the Great Recession, U.S. inflation dynamics have transformed. Inflation rates have remained low and stable, while unemployment has decreased, and the GDP growth rate has increased. Furthermore, there has been a lack of wage growth of wages in many sectors. These recent behaviors suggest a potential breakdown in the Phillips Curve; therefore, this paper aims to explain the behavior of the inflation dynamics by augmenting the Phillips Curve to incorporate globalization, such as openness to trade and FDI flows. Since the 1970s, world trade has increased from 26.7% in 1970 to 58.4% in 2018. During this time, the number of multinational corporations increased as well. These corporations can conduct vertical specialization to fragment the production process into small tasks, thus decreasing the price of inputs. By using OLS estimation, this paper finds little support for the hypothesis. Further research should focus on data in the sector or industry level. Additionally, further research should explore other possibilities that can influence inflation dynamics, such as workers' bargaining power or the 'sharing' economy.

English, Linguistics, & Communication Department

Student: Krista Beucler
Project Title: ***"The Necromancer: A Novella"***
Faculty Mentor: Professor Warren Rochelle
This individual study was designed to help me come to a better understanding of the publishing industry and how a writer bridges the gap between writing and publication, between a hobby and a profession. Creatively, my goal was to revise, develop, and polish a novella rooted in ENGL 470B, fiction seminar. Professionally, I learned and implemented the process of producing, preparing, and sending out original creative work to literary magazines for publication. The outcomes of the project included a significantly revised fantasy novella, a series of cover letters, a strong and flexible understanding of the literary marketplace, and completed submissions for several literary magazines. During the project I submitted to the Magazine of Fantasy & Science Fiction, the Clay Reynolds Novella Prize, and Driftwood Press. This project built on what I have learned throughout my time at UMW, particularly my creative writing classes; but more than that, this project has been the beginning of the rest of my career as a writer.

Student: Alyssa Brown
Project Title: ***"The Imitation Game | VR Concept"***
Faculty Mentor: Professor Brenta Blevins
Virtual reality is recognized as an immersive technology that separates its user from their current, fixed reality. VR is still very young. The shoes that it is expected to fill are waiting patiently in the future, knowing its potential has yet to be reached. The VR concept that I introduce with my project, fills these metaphorical shoes. The user is not aware of a heavy headset weighing down on their face. Instead, they are projected into darkness, and expected to quickly adapt. I present, through photographs that I have taken and edited, a void, much like the black dreamscape in Stranger Things. Through this digital project, I want to introduce a concept that would remove bias of artificial intelligence in an unanticipated manner. The user believes that they will be playing an advanced version of the Turing test in a virtual environment, but come to face a deeper truth inside of themselves. In other words, the game starts simply, and ends with a lesson. As Turing suggests, aren't we also machines of a similar nature? Flesh and bone rather than wires and circuitry? Instead of holding a pessimistic viewpoint that is spiteful towards the presence of AI in our future, we should attempt to open our eyes to the coexistence of man and machine as well as the bond that we could share. It is okay to

acknowledge with some fear, and an even greater hope, that we are different from one another, yet so entirely the same.

Student: Devin Carson
Project Title: "How to Create an AR Poster"
Faculty Mentor: Professor Brenta Blevins
I made a video on how to create an augmented reality poster using the website Artivive. The final poster I created is in honor of Dr. James Famer Jr.

Student: Elisabeth DellaRova
Project Title: ***"Generosity of Spirit: Faith, Democracy, and Grace in Marilynne Robinsons Gilead"***
Faculty Mentor: Professor Jonathan Levin
As my honors capstone and a culminating course for the English major, I have completed an individual study on the theme of grace and how it relates to the American experience in Marilynne Robinson's work, specifically her three books Gilead (2004), Home (2008), and Lila (2014). The books are about the families of John Ames and Robert Boughton, who are preachers and lifelong friends living in the fictional small town of Gilead, Iowa in the 1950s. Through the books, Robinson presents her view on modern American Christianity, placing it in the context of American religious movements such as Transcendentalism, Puritanism, and especially Calvinism. I spent the semester reading many of Robinson's essays, many of which focus on religion, grace, American history and politics, and Calvinism, as well as outside sources on American religious history, scholarly criticism of Robinson's fiction, and interviews with Robinson. From my interactions with these readings, I have concluded that Robinson argues that the grace that comes out of American Christianity is synonymous with generous discourse and a generosity of spirit. She feels that this form of grace is becoming increasingly lost, or perhaps silenced, in American culture, especially since the mid-20th century when her books are set. Through her characters–John Ames, Jack Boughton, and especially, I will argue, Lila Ames–Robinson presents a display of the way this generosity of spirit should intersect with faith and democracy in our nation.

Student: Megan Marzzacco
Project Title: ***"COMM 491: Digital Writing & Design"***
Faculty Mentor: Professor Brenta Blevins
This semester I did an individual study focusing on creative writing and design in our digital age. I researched and worked with Dr. Blevins on the writing process, invention techniques, and publication, among other topics. I worked on taking my original pieces of writing and poetry and transforming them to a digital design using Adobe Illustrator. I posted these graphics on a public Instagram account to share my writing. In this

presentation, I outline some of the most valuable lessons from my research and showcase a few of my digital designs.

Student: Cristina Montemorano
Project Title: ***"A Guide for Creating Great VR Storyboards: Planning to Make Your Virtual Vision a Reality"***
Faculty Mentor: Professor Brenta Blevins
Virtual reality technology has grown in popularity due to increased industry production and innovation. However, the creation of quality content to run on these systems has lagged behind in comparison to the design of the physical equipment required to access virtual environments. How does one go about designing quality VR content? Originally created as instructional material for students in Brenta Blevins' DGST 301E class, this infographic walks readers through the brainstorming and storyboarding process of creating virtual reality projects. This guide is useful for a wide audience of content creators as they take inspiration from other content mediums, think spatially, and consider the accessibility of their final products.

Student: Daniel Pan
Project Title: ***"Barriers to Implementing Educational Technology in Higher Education"***
Faculty Mentor: Professor Brenta Blevins
More often than not, violations of digital ethics stem from a lack of education/ awareness and not malicious intent. If secondary education institutions were to implement emerging technologies in their programs, students would learn the ethical boundaries of these consumables before they purchased them on their own. This project serves to determine the biggest struggles that higher education institutions face when trying to implement new technologies.

Geography Department

Students: Lindsey Minges, Nigel Brown, Samantha Melvin, Matthew Bova, and Nicholas Buccella
Project Title: ***"Mapping Ivy Hill Cemetery"***
Faculty Mentor: Professor Jackie Gallagher
The Ivy Hill Cemetery Mapping project began during the Fall semester of 2019 and is still currently ongoing. The goal of this project is to create a searchable web app of the Ivy Hill Cemetery in Smithfield, VA of all the different graves located there, in addition to a cohesive story map that outlines the historic significance of the cemetery and town of Smithfield. Though the project is not yet complete, the work we have done thus far is

a good indication of the trajectory of our project and what our finished product will look like. Whether for the purposes of genealogy research, data collection, or used as a tool to enhance the historic context of Smithfield, the final version of this project will be a comprehensive and readily available resource to the public.

Historic Preservation Department

Student: Rick Altenburg
Project Title: ***"Finding Quiyough: A Preliminary Site Report for 44ST1164"***
Faculty Mentor: Professor Lauren McMillan
In March 2019, Dr. McMillan and the Historic Preservation Department participated in an archaeological excavation in conjunction with the Patawomeck Tribe of Virginia. The goal of this excavation was to find evidence of the village of Quiyough, which appears on John Smith's 1612 Map of the Chesapeake. Our work was an extension of other investigations led by Mike Clem and the Virginia Department of Historic Resources. This presentation is an analysis of our findings as well as a comparison with those made by the DHR.

Students/Class: HISP 469: Laboratory in Preservation Planning
Project Title: ***"Connect Fred: Enhancing Trail Connectivity through Historic Fredericksburg"***
Faculty Mentor: Professor Andrea Smith
The students of HISP 469: Laboratory in Preservation Planning worked under Dr. Smith to develop new bike and pedestrian paths for historic downtown Fredericksburg in order to improve the wayfinding and connectivity of existing trails. Students researched successful trails in urban settings comparable to Fredericksburg to gain an understanding of the positive and negative qualities of those trails, and how they could be applied or avoided in the new trails created by this project. Research into local and state ordinances regarding signage, bike paths, and similar details was also completed. Using GIS, Survey123, and Google Maps, students conducted extensive surveying of the existing trails and downtown area. The class selected the most ideal pedestrian and bike trails based on the data collected. After these trail paths were tentatively established, the class carried out two interviews with Fredericksburg locals to gain a better understanding of how users interact with the existing infrastructure and how to effectively integrate our plan in a way that benefits the city. For the plan proposed by the students to effectively connect to the existing network of trails, designs for signage that will aid in wayfinding while creating a unified aesthetic for each path were included. With these trails, the class hopes to further improve the walkability of downtown Fredericksburg and increase accessibility to local resources both historic and natural.

Student: Claire Parkey
Project Title: ***"Depots and Dollars: A Comparative Analysis of the Effects of Federal Spending on Preservation in Urban and Rural Communities"***
Faculty Mentor: Professor Andrea Smith
Historic preservation is a game of time and money; two things which are often in short supply. The success of preservation projects relies on federal funding more often than not, and political capital speaks louder than necessity in many cases. Studying trends in the administration of federal funds for preservation purposes raises a number of questions about accountability and inequality in allocation. This thesis analyzes the statistical trends present in preservation spending of the Transportation Alternatives Set-Aside fund in order to highlight a necessity for further research. By comparing the use and amount of administered federal money in rural and urban areas, one may isolate universally successful techniques of preservation as well as significant disparities and questions for future study.

Student: Delaney Resweber
Project Title*: "Making Sense of Time: Using a 2-Cent Coin to Follow the Johnson Family from Sherwood Forest Plantation to Fredericksburg"*
Faculty Mentor: Professor Lauren McMillan
After the Civil War, many recently freed African Americans found themselves in a position of new economic freedoms. Using an 1865 2-Cent coin found at Sherwood Forest Plantation (44ST615) by the University of Mary Washington archaeological field school students, I will explore the lives of the Johnson family- an African American family who occupied the former slave quarter during the Postbellum period from which the coin was recovered. The Johnsons' story provides a narrative of African American farm laborers during this period and their struggles for economic and educational freedom. Many freedmen still faced economic and social discrimination after the Civil War, and in response the Freedman's Bureau and African American led organizations were formed to promote financial independence and education. This paper will focus on the new lives as freedmen the Johnsons had, and the different ways they used their salaries to better their lives and the lives of their children.

Student: Claire Ross
Project Title: ***"Victorian Identity and Material Culture"***
Faculty Mentor: Professor Lauren McMillan
The plantation house at Sherwood Forrest Plantation (44ST615) was home to two upper-class white families in the latter portion of the 19th-century. During the 2015, 2016, and 2017 seasons of the University of Mary Washington field school, an American Civil War-era midden was excavated in the yard behind the plantation house. Through

this excavation, various artifacts associated with both families were uncovered, including a German-made, hard-paste porcelain clown head. The presence of this artifact, in addition to other items of "bric-a-brac," indicate that at least one of these two families were participating in the home decorating trend of conspicuously displaying decorative objects. The possession of and choice in these objects could signal the social class, cultural literacy, and cultural capital of a victorian individual or family. In this paper, I will further explore this victorian relationship between constructed identity and material possessions.

Students: Lillian Salamone, Laurence King, and Kathleen Keith
Project Title: ***"An Archaeological Analysis of a Possible Slave Quarter on the Little Falls Plantation in Southern Stafford County"***
Faculty Mentor: Professor Lauren McMillan
Students in the introductory archaeology class at the University of Mary Washington conducted a preliminary shovel test pit survey of the site currently referred to as Little Falls-Norton Property in March and April 2018 and March 2019. These investigations were undertaken at the request of the landowners, who discovered archaeological material while doing yard work. The site is currently a residential lot, near Little Falls Plantation, which is in southern Stafford County, Virginia. The analysis and interpretation of the site was undertaken by the authors for a class project. Analysis of the artifacts, combined with archival research, indicates the site was likely an Antebellum slave quarter/Postbellum tenant site. This mid-19th-century site was likely an outlying field quarter associated with the larger Little Falls Plantation. This poster will detail the historical and archaeological evidence uncovered during the course of this project and outline suggestions for future research.

History & American Studies Department

Student: H. Sumner Bridenbaugh
Project Title: ***"Owning the Birthing Room: Self-advocacy and Proof of Authority in Seventeenth Century Midwifery Manuals"***
Faculty Mentor: Professor Allyson Poska
Midwives had long been considered experts in pregnancy and childbirth prior to the Scientific Revolution and the professionalization of the medical field. However, in the late seventeenth century, we see an interest in the realm of childbirth from male surgeons and physicians seeking scientific understandings of pregnancy and women's bodies, who began to publish pamphlets and treatises on their findings. However, by analyzing midwifery manuals written by seventeenth-century women, such as Justine Siegemund and Jane Sharp, we can see midwives were on an equal level of medical and

anatomical understanding as male practitioners from their experiential education and were uniquely qualified for their position.

Student: Grace Corkran
Project Title*: "Between Life and Death: Pregnant Women in the Nazi Concentration Camps"*
Faculty Mentor: Professor Steven Harris
During WWII, 1.3 million people were transported to Auschwitz-Birkenau; 1.1 million died there. This notorious death camp was just one part of the intricate system the Nazis created to exterminate the enemies of the Third Reich. After the liberation of the camps by the Allies at the end of the war, historians have deconstructed what life was like in the camps based on the personal testimonies of adult survivors and the accounts of the children imprisoned. Though many aspects of life in the camps and the conditions of the prisoners have been examined, few historians have focused on the experiences of pregnant women in the concentration camps for the tragic reason that very few of these women survived their ordeal. While this was the reality for the majority of the women, not all pregnant women were selected to die. The Nazis were not in the position to immediately exterminate all their enemies and had to instead create a system that organized their killing into stages where life and death were selected based on certain criteria. Throughout my research paper, I hope to explore and answer the following question: what were the determining factors that sentenced pregnant women to either life or death during the selection processes in the Nazi concentration camps?

Student: Tara Scroggins
Project Title: ***"Idealized Representations of Alcatraz Federal Prison"***
Faculty Mentor: Professor Steven Harris
As media coverage of Alcatraz increased, popular culture glorified prison systems. Throughout the years, the amount of federal prisons multiplied as the media grew fascinated with incarceration. This expansion posed a new question: did the media's representation of Alcatraz play a role in the idealization of building prisons? In my media-focused argument, I hypothesize that the media's support of Alcatraz prison led to the construction of the multitude of prisons today.

Student: Maddie Shiflett
Project Title: ***"'American and Nothing Else': Japanese American Dual Citizenship in Hawaii"***
Faculty Mentor: Professor Krystyn Moon
By the early 20th century, persons of Japanese ancestry constituted the largest ethnic group in Hawaii. In response to the large population of Japanese residents and Japanese Americans in the Territory, white elites voiced strong concerns about the

potential influence that these individuals would have. Fearing that Japan would take over Hawaii through the "fifth column" living on the Islands, white Americans targeted Japanese Americans who had dual citizenship status. According to Japan's nationality laws, children born to Japanese citizens were automatically granted citizenship regardless of where they were born. Those with dual citizenship faced pressures to "Americanize" by adopting Western practices and expatriating from Japan. Japanese individuals in Hawaii faced additional pressures and limits to their rights because of its territorial status. Nonetheless, many Japanese Americans with dual citizenship status in Hawaii embraced Americanization efforts and used expatriation as a way to secure better treatment and rights.

Mathematics Department

Student: K. Corbett
Project Title: ***"The Geometry of Surfaces and its Applications Using Mathematica"***
Faculty Mentor: Professor Yuan-Jen Chiang
We first introduce the concepts of surface theory including the coordinate patch, coordinate transformation, normal vector, tangent plane, etc. We next compute the first fundamental form of a surface: the matrix (gij) of metric coefficients, gij = xi x xj, the inner product with respect to the basis {x1, x2} of the tangent space of the surface. We then discuss the second fundamental form, Weingarten map (i.e., shape operator), Christoffel symbols, the geodesic, geodesic curvature, principal curvature, Gauss curvature, mean curvature, normal curvature, parallelism, etc. We will apply the proceeding terms to a few concrete examples by different calculations. We will utilize the software Mathematica to sketch various surfaces and their geometric properties.

Student: Amy Creel
Project Title: ***"Deterministic and Stochastic Models for HIV-1 Dynamics"***
Faculty Mentor: Professor Leo Lee
In this research project, I investigated deterministic and stochastic versions of a model for Human Immunodeficiency Virus Type 1 (HIV-1) dynamics. First, the deterministic model is introduced, and numerical techniques are used to obtain an approximate solution to the system. Then, a stochastic model is developed from the deterministic system. Patient data is introduced, and the Monte Carlo Method is used to find an approximate solution to the stochastic system. The results of this project demonstrate the behavior of HIV-1 in an infected patient under the effects of reverse transcriptase and protease inhibitors, and the introduction of randomness to the system of equations

allows us to account for the randomness that occurs biologically within the model, thereby making our results more biologically sound.

Student: Bryce Runey
Project Title: ***"Manipulation of the Greeks Within Black-Scholes"***
Faculty Mentor: Professor Julius Esunge
In this research, we will look at derivatives as a function of accurately predicting risks and pricing. Both of which have the intention of either creating wealth monetarily, managing risks within respective industries, or in some fashions, a combination of both. Specifically, we will analyze the Greeks in the Black-Scholes equation and how they change the outcome of a call within the American markets. The project will involve analytical methods to derive and explain the usefulness of each of the Greeks. Also, statistical analysis will be performed on recent options data to show the practical aspects of each Greek. Mathematics, probability, and statistics are pivotal to accurately predicting both risks and pricing in these ubiquitous applications.

Modern Languages & Literatures Department

Student: Kathryn Gonzalez
Project Title: ***"The Pronoun Vos in Spanish Textbooks"***
Faculty Mentor: Professor Gonzalo Campos Dintrans
This semester-long project is part of my URES with Professor Campos-Dintrans during Spring 2020. In it, we read and learned about the Spanish pronoun vos (you singular). As is well known, Spanish has two second person singular pronouns: tú (informal) and usted (formal). However, the pronoun vos is also widely used, especially in Central America, where my family is originally from. Indeed, I used vos and I did not even know it until this project. Professor Campos-Dintrans and I were studying the presence of this pronoun in Spanish language textbooks, because it does not seem to be really acknowledged in textbooks, so we wanted to measure how often vos was actually mentioned, if at all.

Student: Christopher Good
Project Title: ***"Fantasmas o Fantasia: Un AnÃ¡lisis de Casa tomada"***
Faculty Mentor: Professor Fajardo-Cardenas
Literary analysis of Casa tomada (House overtaken), a short story written by Julio Cortazar in his book: "Bestiario" (bestiary). The story has features of magical realism, mystery, and horror in its account of two siblings whose home is overtaken after hearing

strange sounds. This essay was written by a student in Professor Fajardo-Cardenas' writing-intensive, Advanced Writing class (Spanish 413).

Student: Anushah Hassan
Project Title: ***"Arabic to Urdu: The Journey of Semantics"***
Faculty Mentor: Professor Maysoon Al-Sayed
Urdu is a language mainly spoken in South Asian countries like Pakistan and India. The language has been influenced by several different languages spoken in India, Europe, and the Middle East; one such language is Arabic. There are several Arabic borrowings in Urdu, but interestingly, the borrowed words don't always have the same meaning as they did in Arabic. Throughout the semester, I analyzed borrowed words that have either (1) retained their meaning, (2) evolved in meaning, or (3) completely changed their meaning when they transferred to Urdu. I analyzed a total of 44 words—17 that retained their meaning, 17 that evolved their meaning, and 10 that completely changed their meaning. I analyzed the form, meaning, and use of each word. Through my research, I attempt to fill in gaps within existing research and try and come up with plausible hypotheses as to why the semantic changes have or have not occurred. A couple of the hypotheses I have come up with are (1) borrowed words that referred to more general concepts in Arabic were used to refer to more specific ideas in Urdu and (2) since a majority of the transferred words seem to conform to Urdu's rules (syntax, grammar, etc.), borrowed words had conformed to Urdu's needs at the time. Through my research, I have learned that there are many layers to the borrowing of words from Arabic to Urdu. There is no one reason that can attribute to the retention, evolution, or change in meaning. However, I aim to help the existing research and find more plausible reasons for the evolution of semantics through borrowing words.

Students: Liliana Ramirez and Treviño Pinto
Project Title*: "Inspired by Literature and Film: Creative Interpretations form Spanish 312"*
Faculty Mentor: Professor Elizabeth Lewis
For their final project, students of Spanish 312: Introduction to Literature in Spanish, created their own artistic pieces inspired in the short stories, poetry, drama and film they had studied throughout the semester.

Student: Grace Smith
Project Title: ***"An Interview with Petrarch: The Humanist World Cup"***
Faculty Mentor: Professor Federico Schneider
My project is a paper written as interview with the Renaissance scholar Petrarch about humanism in the Renaissance. It is written as if it was a post-game interview with an

athlete, but instead of an athlete, I am interviewing a scholar about his own and other scholar's works in the period.

Music Department

Student: Javon Jones
Project Title: ***"Live Sound Reinforcement Comprehensive Study"***
Faculty Mentor: Professor Brooks Kuykendall
Live Sound Reinforcement is something people are frequently exposed to. Whether they be informative lectures, stellar musicals, robust orchestras, or even a single street performer, this system helps all in the audience to experience the show as clearly as anyone else; at least, that is the desire. Live Sound Reinforcement has a lot of specifics that go into making the system work: knowledge of basic sound science; understanding the individual parts of a Live Sound System; understanding how the parts become the whole; and how to build a system from scratch with knowledge and experience. This presentation demonstrates fundamental parts of what the research and application paper contains.

Physics Department

Students: Rebecca Callaway, Mary Dye, and Adam Schoene
Project Title: ***"Laser Harp"***
Faculty Mentor: Professor Lauren Dickinson
Musical instruments are often discarded when the cost of fixing an issue becomes an inconvenience. Millions of dollars worth of instruments are thrown away each year while communities around the country struggle with funding art and music programs. This causes music to become a privilege and for certain instruments to be only associated with certain socioeconomic classes. A new system needs to be designed where students and teachers can be exposed to musical instruments without having to worry about financial constraint. Instead of disposing of an expensive instrument and adding to landfills, mass produced electronic components can be used to extend its functionality as an educational tool. Affordable light sensors are used in place of the core sound producing material on the instrument. Software is combined with the light sensors in a manner to reproduce the sound it would make with original materials along with the ability to manually change the tone. Due to an electronic interface, performance can be easily recorded in notation software to keep track of progress and enhance the musicians understanding of music.

Political Science & International Affairs Department

Students/Class: Karolina Albert, Emily Bowerman, Austin Chapple, Alexander Elvir-Herrera, Patrick Healy, Viviana Hernandez, Kate Jolly, Alilexondra Lloyd, anna Longacher, Maryclaire Muskett, Khaila Nelson, Maeve Reilly, Savannah Roberts, Lauren Talbert, Stephanie Turcios, and Eva Waszak; **PSCI 370: Women in Politics**
Project Title: ***"Academic Podcasts & Posters for Political Science 370 Spring 2020: Women in Politics"***
Faculty Mentor: Professor Rosalyn Cooperman
The academic podcasts and posters from Professor Cooperman's Political Science 370 course, Women in Politics, asked students to create an original research project that examined a specific relevant issue related to gender in contemporary U.S. politics. These projects examine topics such as women's political candidacy, voter outreach in the 2020 election, the politics of reproduction and abortion, sexual harassment and discrimination policies, and health status of women of color.

Student: Rebecca Jacobi
Project Title: ***"Challenging Bosnian Women's Identity as Rape Victims: The Fetishization of Sexual Violence in Post-Conflict Discourse"***
Faculty Mentor: Professor Surupa Gupta
How does one call attention to the gender dimensions of war violence or postwar inequalities without reproducing images of passive female victimhood and support for patriarchal notions of the protection of women? In the case of the Bosnian War, because of the large scale of sexual violence and the attention focused on this violence, Bosnian women have been stereotyped and relegated to the role of rape victim. Although women suffered from grave violations of human rights, this stereotypical portrayal is not adequate, and neglects the active role played in the perpetration of violence by some women. It also neglects women's roles as activists, peace builders, sole supporters of their family, or political elites in a war effort. This project seeks to identify how existing scholarly literature and American newspaper media articles about the Bosnian War has contributed to the victimization of women. Most of the literature on women and warfare, or women and gender, analyzes the role of women from a victim-centered perspective. Although research shows that the majority of perpetrators are men, women too have been involved in the perpetration of war crimes. Hence, this project utilizes scholarly material, court cases, interviews with Bosnian women, and representations from the media to make the case that the securitization of sexual violence has

unintentionally resulted in its fetishization and enhanced the invisibility of women in post-conflict discussions.

Student: Rachel McVicker
Project Title: ***"Allied Contributions to Post 9/11 Wars"***
Faculty Mentor: Professor Jason Davidson
The United States has waged a war on terror since the terrorist attacks on 9/11 and while the US was in crisis, we called on our allies to aid in the fight. Through this project we evaluated the contributions in troops and money that the US allies made to the War in Iraq and Afghanistan. This is a study of burden-sharing but also tries to evaluate why these nations came to the US's aid. Through the research we determined that the Top Contributors to the War in Afghanistan were the UK, France, Germany, Italy, and Canada and the Top Contributors to the Iraq War are the UK, Italy, Australia, South Korea, and Poland. The war in Afghanistan received much more substantial contributions as the efforts were less controversial whereas the contributions to Iraq were much more limited and the countries contributing were much smaller powers. The major conclusions are that the US must value the alliances of the UK and Italy as they were willing to come to US aid in both instances, and the allies fatalities are comparable to the US's suggesting that their troops were equally involved in the conflict.

Psychological Sciences Department

Students: Kathryn Arntsen, Kayln Clinkenbeard, Madeleine McGann, and Rebekah Stone
Project Title: ***"The Effects of Gender, Discipline, and Scientist Advocacy on Perceptions of Credibility and Motivations"***
Faculty Mentor: Professor Mindy Erchull
We sought to replicate and extend research on the impact of scientists' public advocacy on perceptions of credibility and motivation by adding scientists' gender and discipline. We found that the field of science, but not gender, had an effect on perceived motives, but perceptions of credibility were not impacted.

Student: Nichole Boigegrain
Project Title: ***"Caregivers' Failure Mindset, Helicopter Parenting, and Emerging Adults' Intelligence Mindset"***
Faculty Mentor: Professor Holly Schiffrin
People may view intelligence as an innately fixed trait that cannot be changed or as something that can grow over time with effort. Growth mindsets are related to more favorable outcomes than fixed mindsets because children with growth mindsets are

more likely to persevere during difficult times and see failure as an opportunity to learn (Dweck et al., 1995). When parents convey that "failure-is-debilitating" to their children, it increases the likelihood that they will develop a fixed mindset (Haimovitz & Dweck, 2016). One-way parents might make their failure mindset observable to their children is through helicopter parenting (i.e., parents with failure-is-debilitating mindsets might intervene to prevent their children from failing). Helicopter parenting refers to developmentally inappropriate levels of involvement and control in children's lives (Segrin et al., 2012), which have damaging effects on the well-being (Schiffrin et al., 2014) and academic outcomes (Schiffrin & Liss, 2017) of emerging adults. A mediation analysis was conducted using bias-corrected 95% confidence intervals based on 10,000 bootstrap samples (Hayes, 2013). For maternal caregivers, failure mindset was significantly associated with maternal helicopter parenting, and maternal helicopter parenting was associated with emerging adults having a fixed mindset. There was an indirect effect of maternal failure mindset on emerging adults' intelligence mindset through maternal helicopter parenting. For paternal caregivers, failure mindset was significantly associated with paternal helicopter parenting behaviors. However, the path from paternal helicopter parenting to emerging adults' intelligence mindset and the indirect path were both nonsignificant. The paths from maternal failure mindset through paternal helicopter parenting and vice versa were not significant. Thus, when mothers view failure-as-debilitating, they engage in more helicopter parenting, and their children are more likely to develop fixed mindsets. These findings have implications for emerging adults' career and academic success.

Student: Abigail Farley
Project Title: ***"Interpersonal Violence in the Context of Individuals with Intellectual Disabilities"***
Faculty Mentors: Professor Virginia Mackintosh and Professor Laura Wilson
This project aimed to better investigate why individuals with intellectual disabilities are at a higher risk for experiencing interpersonal violence, why traditional therapeutic approaches are typically ineffective, and to provide alternative psychotherapeutic options that may be more beneficial and tailored to this population's abilities/needs. EDMR, IBT and supported employment are hopeful interventions for dealing with post-traumatic symptoms for intellectually disabled trauma survivors, although further research and replication is essential as there is a clear void in this area of research. Lastly, this population must not be viewed as hopeless and we must understand that they are capable of participating in therapy if it is tailored to their level of functioning. The strides made by this research are coupled with the hope that interpersonal violence against individuals with disabilities will become less frequent as they continue to become further accepted by our society and that these alternative approaches to trauma therapy may lead to more hopeful post-traumatic trajectories.

Students: Meryl Menezes, Anna Higginbotham, Jessica Raiford, and Aidan McClanahan
Project Title: ***"Predicting Sexual Satisfaction in Age-Diverse Women"***
Faculty Mentor: Professor Jennifer Mailloux
A significant indirect effect of body surveillance (a component of self-objectification) on sexual satisfaction through body shame (the other component of self-objectification), sexual attractiveness, and cognitive distraction during sex was found in a sample of younger women. However, this indirect effect was not found in sample of older women indicating that age, or a correlate of age, may influence the relationships between the variables in our model.

Students: Jade Turner, Peyton Dunow, Samara Wong, and Julie Boynton
Project Title: ***"Error Related Negativity and Moderate Exercise"***
Faculty Mentor: Professor Emily Stanley
Previous research has found that moderate levels of exercise are related to improved cognitive functioning, along with increased P3 (stimulus evaluation) and decreased N2 (response monitoring), which are components of error processing. Previous studies have also shown an enhanced effect of exercise on executive functioning. The present study aims to determine whether athletes will have a smaller error-related negativity (ERN), another aspect of error processing, than non-athletes. This study will include giving the Flanker task while connected to an electroencephalogram (EEG), having participants bike for fifteen minutes, completing the Flanker task again, and measuring positive and negative affect, mental toughness, and intrinsic motivation as possible mediators. We hypothesize that participants who fit in the athletic category and all participants' second trial will make fewer mistakes overall on the Flanker task and have a smaller ERN. We will also explore other factors to look for mediation in the relationship.

Students: Erin Whitesell, Miranda Batte-Futrell, Christine Cao, and Nichole Boigegrain
Project Title: ***"The Effect of Helicopter Parenting on the Prosocial Behaviors of Emerging Adults"***
Faculty Mentor: Professor Holly Schiffrin
We examined the relationship between helicopter parenting, the psychological needs of self-determination theory (i.e. autonomy, competence, and relatedness), and prosocial behaviors among emerging adults. Psychological needs satisfaction mediated the relationship between helicopter parenting and prosocial behaviors. As emerging adults perceived more helicopter parenting by their mothers or fathers, they reported less satisfaction of their psychological needs and fewer prosocial behaviors.

Theatre & Dance Department

Students/Class: UMW Theatre Students
Project Title: ***"UMW Theatre Remote Performance of William Shakespeare's Much Ado About Nothing"***
Faculty Mentor: Professor Helen Housley
Live Zoom Production aired on April 16, 2020.
Beatrice and Benedick are meant for each other. Trouble is, they don't see it that way. In one of Shakespeare's wittiest and most romantic of comedies, mistaken identities, misdirected insults, devious fakery, and bumbling antics prove no match for the effervescent power of love. Will calculated swooning and conniving mischief succeed to find Beatrice and Benedick falling madly for each other, or will it all simply amount to *Much Ado About Nothing*?

College of Business

Student: Leslie Miyazono
Project Title: ***"What is CBD and Why Should Employers Be Aware?"***
Faculty Mentor: Professor Alexandra Dunn
Cannabidiol (CBD) is a chemical compound present in the cannabis plant, which can be sued medicinally as a remedy for a variety of ailments and pain management. The varying nature of CBD products on the market may present some obstacles for employers. Will CBD trigger a positive test result and inadvertently violate a valid workplace drug policy? This project will discuss the current classification, various legislation, and approved uses of cannabis derived products such as CBD. The need for various workplace drug policies will also be reviewed. The purpose of this project is to generate awareness to employers on the evolving CBD marketplace and the multiple layers of complexity of this topic in order to decide if current drug policies need to be amended or revised.

Student: Damon R. Cox
Project Title: ***"Food Waste"***
Faculty Mentor: Professor Kashef Majid
My project talks about the high amounts of food waste in America and around the word. It talks about problems that food waste causes, causes of food waste, and recommendations on how to slow down food waste.