Office of Student Research

APPALACHIAN STATE UNIVERSITY

26th Annual Celebration of Student Research and Creative Endeavors

Full Program

April 19, 2023

Welcome

Welcome to the 26th Annual Celebration of Student Research and Creative Endeavors sponsored by the Office of Student Research.The Office of Student Research (OSR) was established in 2005 in order to expand the opportunities for undergraduate and graduate students to engage in research and mentored scholarship at Appalachian State University. We firmly believe that students who understand how discoveries are made in their chosen fields are well-prepared to address the unsolved problems of the future.

We certainly look forward to this event each year. This year we are excited to see how much the research and creative activities that occur on campus continue to have increased and flourished. The numbers of Office of Student Research Travel and Research grants were close to pre-COVID submissions this year and Undergraduate Research Assistantship applications doubled. As a result, we have 144 student presentations at today's event, providing yet another indication of Appalachian's resiliency. Faculty have continued to engage students in the research and creative process and the Office of Student Research is pleased to be a small part of it all.

While our students continue to amaze us, the dedication of our faculty is outstanding. Without the support and mentorship of faculty across campus we would not be able to showcase the work of the students. And to the students, thank you for sharing your hard work with the entire campus. The work you have done on these projects have the ability to make a significant impact.

Please visit the Office of Student Research website (www.osr.appstate.edu) to find out more about student research and creative endeavors on campus. We strive to support and assist students and faculty in their efforts to engage in research and creative endeavors. We are so very thankful to have the ability to fund such amazing work and that is in large part to the support from the following areas: Office of Academic Affairs, Office of Research, Office of Student Affairs, Cratis D. Williams Graduate School, and University College. Finally, a special thank you to Dr. Mark Ginn - Vice Provost for Undergraduate Education, Dr. Ted Zerucha - Assistant Vice Provost for General and Experiential Education and Dr. Ece Karatan - Vice Provost for Research and thank you to the staff in the Office of Student Research which include Kathy Weaver Stevens our Graduate Assistant Nick Davison.

Rebecca A. Battista, Ph.D., Director, Office of Student Research, Professor - Department of Public Health and Exercise Science

Schedule of Events

All events occur on the 4th floor of Plemmons Student Union
Registration Opens 8:30am

Poster Competition
Undergraduate and Graduate Student Poster Competition - 9:00-10:30am - Parkway Ballroom

Oral/Platform Talks
Morning Session
Oral Session 1: 10:00am-11:00am, Room 415
Oral Session 2: 11:00am-12:00pm, Room 417
Afternoon Session
Oral Session 3: 1:00pm-2:20pm, Room 415
Oral Session 4: 2:40pm-4:00pm, Room 415
Oral Session 5: 2:40pm-3:40pm, Room 417

Poster Presentations
Morning Sessions
Poster Morning Session 1: 9:00am-10:30am, Parkway Ballroom
Poster Morning Session 2: 10:40am-12:00pm, Parkway Ballroom
Afternoon Sessions
Poster Afternoon Session 1: 1:00pm-2:30pm, Parkway Ballroom
Poster Afternoon Session 2: 2:40pm-4:00pm, Parkway Ballroom ‘

There is a break from 12:00 – 12:45pm. Poster Competition Awards will be announced promptly at 12:45pm.

Poster Competition – 9:00am-10:30am – Parkway Ballroom
Posters PC 1 – PC 20

PC1
Jonathan Farrior, Nutrition Graduate Student
Faculty Mentor: Danielle Nunnery, Nutrition and Health Care Management
Co-Author(s): Manan Roy PhD; Maggie Sugg PhD
Title: USING GIS SERVICE AREA ANALYSES TO IDENTIFY CHARACTERISTICS OF WIC INACCESSIBLE REGIONS
Introduction: The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) connects vulnerable populations to nutrition education and health services. WIC-eligible non-participants report transportation and time constraints as key barriers. Geospatial Information Systems (GIS) can be used to generate a reasonable area of access around an address. The goal of this study is to generate service areas for all NC WIC resources and explore the demographic characteristics of populations outside of a 30-minute drive time. Materials and methods: All WIC office and retailer addresses were collected for NC. 2019 NC Census Block Group boundaries were obtained from the Census. ArcGIS Pro 3.0.2 was used to map addresses and generate service areas. Service area results were joined with Census data. Results: 169 regions had <25% of geographic area accessible to a WIC office or retailer within a 30-minute drive. Notable characteristics include: 10,297 age eligible children, 38,151 females of childbearing age, 28.95% income eligibility, as well as proportions for race, ethnicity, and households with no vehicle or internet. Discussion: This study utilized GIS with NC Census data to identify population characteristics of those living in regions with long drive times to WIC resources. This method provides a unique approach to identifying vulnerable areas of NC that could benefit most from policy-directed funding."

PC 2
Hope E Gamwell Muscarello, Exercise Science Graduate Student
Faculty Mentor: Jared Skinner, Public Health and Exercise Science
Co-Author(s): Olivia Chapman, Jaden Tuitt
Title: ENHANCING LOCOMOTOR LEARNING WITH MOTOR IMAGERY AND TRANSCRANIAL DIRECT CURRENT STIMULATION
Neurorehabilitation through motor imagery (MI) and transcranial direct current stimulation (tDCS) may enhance motor function by inducing neuroplasticity. Aim: To demonstrate the feasibility and observe the effects of MI combined with prefrontal tDCS on locomotor learning in young, healthy populations. Methods: A double-blind, randomized, sham-controlled study was performed with 33 healthy individuals across three groups (n=11/group); Active, Sham, or Control. All participants walked a 16-m obstacle course. Next, Active (2.0mA) or Sham tDCS was delivered during a 20-minute MI intervention. The Control group did not participate in MI training. Immediately after

the intervention, participants completed the course again and at one-week post. Oxygenated hemoglobin (O2Hb) levels and time were collected during all trials. Repeated measures ANOVAs were used to determine group × time interactions for speed and O2Hb levels. Results: There were significant group x time interactions for time ($F(2,30)=5.14, p=0.01$) and O2Hb ($F(2,30)=4.33, p=0.02$). Within the active group, speed during the post and 1-week assessment was significantly faster compared to Pre. Additionally, O2Hb levels were significantly smaller during the post and 1-week assessment than Pre. The Sham and Control groups saw no significant changes in O2Hb or time. Conclusion: A single session of MI training and Active tDCS led to learning and retention, evidenced by cerebral adaptations and motor improvements.

PC 3

Leigha Henson, Biology Graduate Student
Faculty Mentor: Howard Neufeld, Biology
Co-Author(s): N/A

Title: PHOTOSYNTHETIC MEASUREMENTS OF SEVERAL COMMON MOSS SPECIES OF THE SOUTHERN APPALACHIAN MOUNTAINS

Mosses function as keystone species and bioindicators of forest integrity. They are sensitive to changes in atmospheric conditions and may influence ecosystem functioning out of proportion to their biomass. Yet despite their importance, there have been no studies of their ecophysiology in the Southern Appalachian Mountains (SAM). We therefore have begun a study of SAM moss ecophysiology and are investigating photosynthetic responses of four SAM moss species to varying levels of PAR, using two species from open habitats and two from forest understories. We used a custom-built cuvette attached to a Li-6800 gas exchange system to better control RH. We calculated the following parameters: maximum photosynthetic rate (Amax) at light saturation (LSP), dark respiration rate (Rd), light compensation point (LCP), and apparent quantum efficiency (AQE) for each species, as well as chlorophyll contents of each species. We hypothesized that mosses in understory habitats would have more chlorophyll and lower a:b ratios than open-habitat mosses. We also hypothesized that open habitat mosses would exhibit higher LCP, LSP, Amax and Rd, but lower AQE compared to understory mosses. Polytrichum juniperinum and Ceratodon purpureus, open habitat mosses, had higher LSPs (631 and 1097 μmol m−2 s−1, respectively), than the understory species (Hypnum imponens and Thuidium delicatulum at 484 and 339 μmol m−2 s−1, respectively). Understory mosses had the lowest Amax at 1.90 and 1.1 μmol m−2 s−1 for H. imponens and T. delicatulum, while open habitat mosses, C. purpureus and P. juniperinum, were higher at 4.6 and 17.0 μmol m−2 s−1, respectively. Polytrichum juniperinum had the highest total chlorophyll at 53.5 μg/mL while H. imponens and T. delicatulum were lower 11.9 and 10.7 ug/mL respectively. The results of this research should provide a basis for understanding how SAM mosses are adapted to their habitats and may respond to future climate change.

PC 4
Abigail Hockett, Biology Graduate Student
Faculty Mentor: Mary Kinkel, Biology
Co-Author(s): Cort Bouldin
Title: THE EFFECTS OF ANEUPLOIDY DURING EMBRYONIC DEVELOPMENT
This research focuses on understanding how aneuploidy affects development. Aneuploidy is the state of having more or fewer sets of chromosomes than what naturally occurs in the organism. In cases of aneuploidy, the altered number of chromosomes is associated with proportional changes in cell volume. How these changes cause defects in embryonic development is not known. To address this question, the zebrafish is an ideal model. Their external fertilization allows us to observe development from the one-cell stage. Protocols were developed for generating haploid and tetraploid embryos. This allowed a comparison of embryonic development between normal diploid embryos versus haploid and tetraploid embryos with half or double the normal number of chromosomes, respectively. The altered chromosome number was confirmed using karyotyping. Analysis of the gross morphology of the embryos at 24 hours post fertilization found haploid and tetraploid embryos to have shortened and malformed posterior bodies. Next, in situ hybridization was performed to determine whether gene expression was affected in the somites (blocks of developing muscle) or somite boundaries. Expression of myod1 was disrupted in haploid and tetraploid embryos, indicating defects in normal muscle development. Similarly, expression of xirp2a showed disruptions to the somite boundaries. These results support the hypothesis that aneuploidy affects posterior development by causing defects in somite development.

PC 5
Robert Onjiko, Biology Graduate Student
Faculty Mentor: Maryam Ahmed, Biology
Co-Author(s): N/A
Title: EFFECTS OF MODERATE MALNUTRITION DURING PREGNANCY ON NEONATAL IMMUNITY TO MALARIA
High mortality rates caused by malaria are seen in children under five years with parallel cases of malnutrition in malaria endemic regions, but there is limited knowledge on neonatal immunity to the Plasmodium infection in relation to malnutrition due to the lack of a reliable neonatal animal model to study the disease in children. By utilizing a newly developed young rodent model in our lab, we have observed that CD4 + T cells from malnourished (MND) day 13 old young mice (pups) are activated slower than those from well-nourished pups while their innate immune cells production (NK cells) is prolonged. To investigate neonatal CD4 +T cell response to malaria in different nourishments, we infected malnourished 13-day old pups and

well-nourished pups with Plasmodium chabaudi and determined the activation status (CXCR5+ -CD44 + CD62L +) and differentiation of effector (Teff) subsets, using the expression of CD62L or CD44. Malnourished Pup CD4 4 cells were downregulated when compared to well-nourished CD44 cells. Surprisingly, there were more proportions of TFH (CXCR5+) and B cells (CD19+ GL7+) subsets in the malnourished pups than their well-nourished counterparts, which had mostly TEFF (CD44 + CD62L-), suggesting that the transition of Teff subsets is slower in the malnourished mice pups. We next determined cytokine secretion and Tbet expression by the Teff. We observed that IFNγ, which is the protective cytokine against malaria parasites was high in the pups from well-nourished mothers. Tbet, a marker for T helper 1 cells was also slightly higher in the pups from the well-nourished mothers while there was no significant difference in the proportions of IL-2 expressed from both groups.. Taken together, this data suggest that pups from the malnourished mothers CD4 T cells may require more Tbet to activate functional effector cells during Plasmodium infection and IFNγ to fight the malaria parasites.

PC 6

Erik Rangel Silva, Biology Graduate Student
Faculty Mentor: Andrew Bellemer, Biology
Co-Author(s): N/A

Title: THE ROLE OF RNA BINDING PROTEINS AND CRISPR/CAS9 AS A GENE EDITING TOOL IN DROSOPHILA NOCICEPTION

Chronic pain is a major issue in the US and across the globe. Current treatments are lacking due to their addictiveness and inconsistent symptom management. To elucidate the underlying mechanisms of the pain response, we study the role that RNA-binding proteins (RBPs) play in regulating the function of pain-sensing neurons. The neurons of interest in this study are nociceptors which detect harmful stimuli. Drosophila is a powerful model organism due to its genetic tractability and high proportion of genes that have human homologs. In addition, larval and adult stages can be used to study how changes in neuronal plasticity affect nociception. This provides a wealth of experimental paradigms that can be used. To determine the role of target genes in nociception, genetic manipulations are restricted to nociceptors with the GAL4/UAS system. RNAi then targets and degrades the mRNA of these genes, silencing them at the translational level. Although this is a powerful method, there are some drawbacks including inconsistent phenotypes and off-target effects. An additional novel method uses CRISPR/Cas9 gene editing to study the function of candidate genes in nociception. My research produced a transgenic fly line that incorporates both Cas9 and GAL4/UAS technologies, though expression of Cas9 proved to be cytotoxic. Additionally, an experimental protocol to study nociception in adult flies was validated. The RBPs SC35, LaRP4B and eIF2α were found to be required for normal nociception.

PC 7

Bryan Taylor, Exercise Science Graduate Student
Faculty Mentor: Jared Skinner, Public Health and Exercise Science
Co-Author(s): Alan Needle, needlear@appstate.edu

Title: COMBINED EFFECTS OF TRANSCRANIAL DIRECT-CURRENT STIMULATION AND STATIC STRETCHING ON HIP RANGE OF MOTION

This study aimed to determine if transcranial direct-current stimulation (tDCS) combined with stretching is more effective at improving flexibility than stretching alone. Static stretching is often used to increase hip range of motion (ROM) and passive torque (PT). Recent studies have shown that tDCS can also improve ROM due to changes in pain perception (PP). Twenty-eight healthy adult subjects were assigned to receive active tDCS or a sham tDCS. In both groups, the cathode was placed over S1 of the dominant leg and the anode over the ipsilateral eyebrow. The active group received a current of 2 mA for 20 minutes. In the sham group the current was turned off after 30s. Following tDCS, all subjects underwent a passive hamstring stretch consisting of three 30-second holds at the maximum angle tolerated. Hip ROM, PT, and PP were assessed before and after stimulation and at 0, 5, 15, 30, and 60 minutes after stretching. Data were analyzed using repeated-measures ANOVA. In the active group, ROM and PT significantly increased after stimulation and stretching and remained elevated for at least 60 minutes. Improvements to hip ROM and PT were greater in the active group at all time points after stimulation. PP did not vary between the active or sham groups. The use of tDCS before stretching appears to be more effective at improving flexibility than stretching alone. Because ROM increased with no change in PP this is likely due to a change in stretch tolerance.

PC 8

Sarah Ulrich, Geography Graduate Student
Faculty Mentor: Margaret Sugg, Geography and Planning
Co-Author(s): N/A

Title: SPATIAL ANALYSIS OF MATERNAL MENTAL HEALTH CONDITIONS IN NORTH CAROLINA: A RETROSPECTIVE BIRTH COHORT STUDY

Despite affecting up to 20% of women and being the leading cause of preventable deaths during the perinatal and postpartum period, maternal mental health conditions are chronically understudied. This study is the first to identify spatial trends of perinatal mental health conditions, and relate these patterns to place-based social and environmental factors that drive cluster development. Among recorded hospital births from 2016 to 2019 in North Carolina, we analyze perinatal mood and anxiety disorders (PMAD), severe mental illness (SMI), and maternal mental disorders of pregnancy (MDP). Significant spatial clustering for all three outcomes was concentrated in smaller urban areas in the western, central piedmont, and coastal plains regions of the state. Mixed-effect linear regression modeling was used to examine the association of patient

and community-level factors with elevated cluster risk. Results indicate that age, race, ethnicity, racial and socioeconomic segregation, urbanicity, access to healthcare services, insurance, food security, and access to greenspace have significant influences on cluster risk. These results provide important contextual and spatial information concerning at-risk populations for maternal mental health conditions within the state of North Carolina, and can better inform targeted public health interventions and drive future research analysis.

PC 9

Cameron Welsh, Physics Graduate Student

Faculty Mentor: Zach Russell, Physics and Astronomy

Co-Author(s): Dr. Sayan Chandra

Title: INEXPENSIVE SURFACE PLASMON RESONANCE SETUP FOR MATERIAL ANALYSIS

Surface plasmon resonance (SPR) is a high resolution measurement technique that can be used to determine the makeup of materials, the thickness of the material, and other defining characteristics. SPR has found success in the field of biotechnology due to its ability to detect the binding of protein molecules. This allows for validation of drug processes and an increase in the knowledge of protein interactions. SPR is also important in the creation and application of nanotechnologies such as semiconductor thin films and liquid crystals, and can be used for the testing of fluids for contaminants. The broad range of applications for SPR make it a powerful tool that is not yet widely accessible to researchers due to factors such as cost and complexity. Generally SPR systems are highly specialized for their specific applications and can cost thousands of dollars. In this work, an inexpensive multi-angular SPR setup was designed to allow for wider access and exposure to this method of analysis. Our apparatus was designed using less than $100 of materials, is easily modified, easy to install, and is able to generate data with a definite resonance minimum which is characteristic of SPR and vital for analysis using SPR. Experimental data using the proposed setup will be presented. We hope that sharing these designs will allow for this approach to be more accessible to the scientific community and increase the rate that data on new materials enters literature."

PC 10

Sophia Ryan, Geography Graduate Student

Faculty Mentor: Margaret Sugg, Geography and Planning

Co-Author(s): Jennifer D Runkle, Bhuwan Thapa

Title: GREENSPACE AND ADOLESCENT MENTAL HEALTH: INVESTIGATION OF SOCIO-DEMOGRAPHIC EFFECTS MODIFIERS AND RECOMMENDATIONS FOR COMMUNITY-LEVEL MENTAL HEALTH INTERVENTIONS

Poor mental health outcomes among adolescents, including anxiety, self-harm, and suicide, have increased substantially in recent years. Given this concerning rise, more

research into low-cost mental health interventions is needed. Research suggests that greenspace may be protective of mental health. This study aims to further understanding of the greenspace-mental health association among children, adolescents and young adults. We apply publicly available greenspace datasets, which were used to derive greenspace quantity, quality, and accessibility metrics. Generalized linear models investigated the association between greenspace and community-level mental health burdens in North Carolina. Effect modification analyses investigated how age, sex, and rurality influence the association. Results indicate that greenspace metrics, most notably greenspace quantity and accessibility, are associated with population-level mental health benefits. This association varied substantially with rurality; where greenspace quantity was most protective of mental health in suburban and urban areas, greenspace accessibility was protective in micropolitan, urban and rural/isolated areas and greenspace quality was associated with protective effects in small towns and rural/isolated areas, across multiple mental health outcomes (i.e. anxiety, mood disorders). Substance use disorders were most often associated with the greatest increases in incidence, ranging from a 31-138% increase in communities with poor greenspace quantity, accessibility, and/or quality. These compelling findings indicate that greenspace interventions, regardless of urbanity, may help alleviate the community mental health burden of substance use. Furthermore, increasing greenspace quantity in urban areas may serve as a low cost intervention for self-injury; which was 58% higher in urban communities with poor greenspace quantity. Findings can be used to help guide targeted mental health interventions.

PC 11

Shamsuddin Ahmed, Geology Undergraduate Student
Faculty Mentor: Scott Marshall, Geological and Environmental Sciences
Co-Author(s): R Shane McGary

Title: USING ELECTRICAL RESISTIVITY IMAGING TO DETECT SUBSURFACE VOID SPACES AND GROUNDWATER FLOW LINKED TO CAVE FORMATION IN THE WATER SINKS AREA, HIGHLAND COUNTY, WEST-CENTRAL VIRGINIA, USA

Speleogenesis (cave formation and evolution) in carbonate bedrock occurs when water, typically acidified by CO_2, dissolves calcium carbonate ($CaCO_3$) in rocks to form void spaces. Various Silurian–Devonian carbonate units (primarily limestones) dominate the near-surface geology of the Water Sinks area, allowing the landscape to accommodate numerous karst features including sinkholes, caves, and springs. Groundwater flow in the area is thought to be guided primarily by geologic structure (folds and dipping beds) and low-permeability layers. In this study, we use direct current (DC) electrical resistivity methods to detect and characterize subsurface void spaces and groundwater flow paths in the study area. We collect dipole-dipole and Schlumberger array data along six transects at various locations within the study area using a multielectrode geoelectrical imaging setup. We then use a 2D inversion modeling software to compute

inverted resistivity models for the subsurface (from dipole-dipole, Schlumberger, and merged datasets) with varying smoothness and noise thresholds. The inverted resistivity sections confirm known void spaces near major caves in the area, and also reveal previously unknown void spaces, to be explored with future studies and expeditions. We interpret these resistivity sections within the framework of the local geology to enhance the existing narrative of the speleogenetic history and karst hydrogeology of the Water Sinks area.

PC 12

Noah Caldwell, Geology Undergraduate Student
Faculty Mentor: William Armstrong, Geological and Environmental Sciences
Co-Author(s): n/a

Title: RATES AND POTENTIAL CONTROLS ON THE RETREAT OF ALASKA'S LAKE-TERMINATING GLACIERS

While the retreat dynamics of marine-terminating glaciers have received substantial research, the rates of and potential controls on the retreat of lake-terminating glaciers have received less attention. Across Alaska, proglacial lakes have grown in both number and size over the last 40 years. In other parts of the world, glaciers with proglacial lakes are associated with faster ice flow and more negative mass balance than their land-terminating counterparts, potentially due to calving, subaqueous melt, and/or alteration of subglacial hydrology. Here we investigate the characterize the retreat rates and investigate the temporal trajectory of 54 lake-terminating glaciers across Alaska and northwest Canada using Landsat imagery from 1984-2021. We compare rates of frontal ablation on lake-terminating glaciers to their marine-terminating counterparts and investigate potential physical drivers of glacier retreat such as ice thickness, water depth, and velocity. We combine digital elevation models with ice thickness data products to estimate subglacial topography and lake water depth. Preliminary results suggest that glaciers with thicker termini retreat faster than thinner glaciers which may reflect deeper lakes experiencing more subaqueous melt and/or calving events. Further research will more closely investigate the association of water depth and glacial retreat rates to understand the stability of lake-terminating glaciers and how they differ from marine-terminating glaciers. A process-based understanding of the controls on lake-terminating glacier retreat will help predict their future evolution, with implications for sea level rise as well as downstream ecosystems and water resources.

PC 13

Tori Elliott, Psychology Undergraduate Student
Faculty Mentor: Denise Martz, Psychology
Co-Author(s): Dr. Doris Bazzini, Shraddha Selani

Title: SHE WEARS IT HOW? HAIR TEXTURE DISSATISFACTION RELATES TO RACISM AND COLORISM IN BLACK WOMEN

In 2020, Black women earned only 64 cents for every White man's $1.00 – a form of discrimination in employment that may cause Black women to deny racial identity and subscribe to the White beauty standard. Specifically, they may use toxic chemical hair relaxants to force curlier hair to be straighter. The social forces of racism and colorism may play a role in hair texture dissatisfaction. A Qualtrics survey of Black women (N = 316; 91.8% African American, 8.2% Multiracial/Biracial) on Prolific (funded by ASU OSR) examined how perceived racism and colorism measures were associated with hair dissatisfaction. Over half (55%) reported relaxing their hair a few times a year. Hair texture discrepancy (HTD) is a novel scale including visuals of straight hair (to the left) and progressively curlier hair (to the right). Women rated their current and ideal hair texture and a discrepancy score (HTD) was calculated. Another perceived hair texture dissatisfaction (HTDSS) scale was also used. Both were statistically related to racism (HTD $r = .12$, $p < .05$; HTDSS $r = .16$, $p < .01$) and colorism (HTD $r = .14$, $p < .05$; HTDSS $r = .24$, $p < .001$). Results suggest that these prejudicial social forces affect how Black women feel about their hair. These body image metrics of hair texture dissatisfaction deserve more attention in future research, particularly as Black consumers continue to be major financial contributors to the beauty industry.

PC 14

Dy'Quan Kearney, Biology Undergraduate Student
Faculty Mentor: Andrew Bellemer, Biology
Co-Author(s): N/A

Title: IDENTIFYING THE ROLE OF INSULIN SIGNALING IN THERMAL NOCICEPTION

Diabetes impacts more than 1.4 million people every year. There are two common types of diabetes. Type 1 diabetes, which is associated with the absence of insulin signaling, and Type 2 diabetes, which is when there is impaired insulin signaling. Insulin signaling is known to regulate glucose, lipid, and energy homeostasis. When the insulin signaling pathway is impacted it can lead to neuron damage. Neuron damage known as diabetic neuropathy is a common side effect associated with diabetes and can lead to pain or numbness in the legs or feet. PI3-Kinase, mammalian target of Rapamycin (mTOR), and AMP-activated protein kinase are some of the key enzymes that regulate metabolism, and function in the insulin signaling pathway. Investigating how the insulin signaling pathway controls sensitivity to noxious stimuli would provide a better understanding of diabetic neuropathy. This study is designed using Drosophila melanogaster as the model organism, to further explore the role of insulin signaling pathways in the regulation of nociception behavior. An experiment was conducted using genetic tools to knockdown PI3-Kinase in larval sensory neurons. The larvae behavior responses to noxious thermal stimuli were then tested. The behavioral responses indicate a reduction in thermal nociception. This data suggests that the PI3-Kinase enzyme is required for normal

nociceptive behavior. Future experiments will be designed to investigate other components of the insulin signaling pathway, and how they may affect nociception.

PC 15
Christopher Lucero, Geography Undergraduate Student
Faculty Mentor: Maggie Sugg, Geography and Planning
Co-Author(s): Sophie Ryan
Title: DISPARITIES IN AFRICAN AMERICAN MENTAL HEALTH DURING THE COVID PANDEMIC: A SPATIAL CLUSTERING ANALYSIS OF NORTH CAROLINA, 2016-2021
The mental health crisis within the United States is a growing issue, especially among African Americans, a traditionally underrepresented community in mental health studies. Despite their historic underrepresentation, recent studies indicate that young African Americans are seeing some of the largest increases in rates of depression, self-injury, and suicide. According to a 2021 CDC report, Black persons between 10 and 24 have been impacted the hardest, with a 36.6% increase in suicides between 2018 and 2021, the highest among any age and racial/ethnic group. The aim of this study is to identify spatial patterns of increased emergency department visits related to depression and self-injury among African Americans aged 24 and younger in North Carolina. Mental health conditions were determined using emergency department data from January 2016 to September 2021. Geospatial analysis using Kuldroff's Spatial SatScan identified statistically significant clustering of elevated depression and self-injury among African Americans across the state. The pandemic substantially disrupted many aspects of life including the healthcare system, which resulted in clusters encompassing multiple large cities such as Charlotte, Raleigh, and Wilmington while eliminating clusters in more rural populations. Relative risk ratios were as high as 2.1 in high-risk African American populations indicating areas where the actual case count is double the expected cases (p-value < 0.01). To the author's knowledge, our work is the first to examine spatial disparities in mental health among these vulnerable subpopulations and can be leveraged for future public health interventions to mitigate these health disparities.

PC 16
Joshua McNeill, Physics Undergraduate Student
Faculty Mentor: Christopher Thaxton, Physics and Astronomy
Co-Author(s): Tomas Romero, Nick Mencis, Travis Taylor, Brynn Welch
Title: DEVELOPMENT OF A REGIONAL SEAFLOOR OBJECT SCOUR AND BURIAL MODEL IN SUPPORT OF U.S. NAVAL OPERATIONS
In partnership with the U.S. Naval Research Laboratory Seafloor Science Division (NRL-SSD), Appalachian State's Applied Fluids Laboratory (AppAFL) is developing a model to predict scour and burial of objects on the seafloor - such as unexploded

ordnance (UXO), instrument platforms, and infrastructure - in support of Naval operations and site management. The model currently uses publically available historical datasets of currents, significant wave height, dominant wave period, median sediment data, and water depths mapped over regional grids of interest. The system then generates Weibull distribution statistics of forcing observables for each grid point and translates them to near-bed stresses that are then used to determine scour rates and equilibrium object burial depths. The model is designed to report peak values with associated confidence intervals back in real-time to a GUI being developed by the NRL-SSD team. Current activities include: interpolating source data on to user-defined grids; selecting appropriate statistical methods for determining confidence intervals; improving upon techniques for translating surface observables to near bed stresses; coding automated data retrieval algorithms to build archived source datasets; modifying the AppAFL physics engine based on scour amplification due to enhanced near-object turbulence production (see accompanying AppAFL abstract); and calibrating the physics engine to emerging experimental field and lab data.

PC 17

Alex Moore, Biology Undergraduate Student
Faculty Mentor: Baker Perry, Geography and Planning
Co-Author(s): Tom Matthews, Sandro Arias, Maxwell Rado
Title: RECORD SOLAR IRRADIANCE OBSERVED IN THE TROPICAL ANDES OF PERU

The tropical high Andes of southern Peru are extremely important due to their vast stores of snow and glacier ice. These key water towers provide downstream communities and ecosystems with vital fresh water. Increasing global temperatures – in combination with the high susceptibility of tropical glaciers to changes in precipitation inputs, cloud cover, and surface albedo – threaten the availability of future water resources. This poster analyzes meteorological data from a new weather station installed in July 2022 at 6,349 m on Nevado Ausangate in the Cordillera Vilcanota of Peru. We report a new record for 1-min in-situ solar irradiance in the southern hemisphere (1866.4 W/m2) at 11:00 am LST (1600 UTC) on 24 October 2022, along with 179 additional hourly observations exceeding the expected top of atmosphere radiant flux. A combination of high solar zenith angle, high elevation, cloud edge enhancement, and multiple reflectances from nearby high albedo snow surfaces likely explain these exceptionally high values. Our results suggest that melt may even be able to occur at these high elevations, despite temperatures well below freezing, due to the intense solar irradiance and thereby greater sensitivity of glaciers in the region to future climate change.

PC 18

Parker Reid, Economics Undergraduate Student

Faculty Mentor: David Dickinson, Economics

Co-Author(s): N/A

Title: HOW ONLINE GAMBLING IMPACTS PROBABILITY JUDGEMENTS IN A BAYESIAN TASK ENVIRONMENT

Little is known about how gamblers estimate probabilities from multiple information sources. This paper reports on a preregistered study that administered an incentivized Bayesian choice task to n=465 participants (self-reported gamblers and non-gamblers). The task elicits subjective probability estimates for a particular event given base rate and new evidence information, which allows for a precise measure of accuracy compared to objective Bayesian probabilities. Our data failed to support our hypotheses that experienced online gamblers would be more accurate Bayesian decision-makers. Among non-problem gamblers, those experienced in unskilled games (e.g., slot machines) made more accurate Bayesian assessments than those experienced in games of skill (e.g., poker). Exploratory analysis showed that more frequent online gamblers had lower Bayesian accuracy than infrequent gamblers. Finally, while we report no main effect of sex on Bayesian accuracy, exploratory analysis found that the decline in accuracy linked to self-reported gambling frequency was stronger for females. Our results suggest that frequent gambling does not increase one's ability to incorporate multiple sources of information and make accurate probability assessments, though this could benefit one's gambling success (i.e., in skill-based games). Additional research is needed to better understand why the decay in Bayesian accuracy associated with frequent gambling is greater in females compared to males.

PC 19

Elliot Sheehan, History/Social Sciences Education Undergraduate Student

Faculty Mentor: Michael Behrent, History

Co-Author(s): n/a

Title: URBAN RENEWAL AND THE INTERSTATE: LOSING CHARLESTON'S TRIANGLE DISTRICT, 1956-1977

Historians have increasingly shed light on the damage that the Interstate Highway and Urban Renewal initiatives have inflicted upon urban, minority neighborhoods. While there is individual scholarship on both of these federal programs, this project details how Interstate and Urban Renewal worked in tandem to destroy the Triangle District, a poor, majority-Black neighborhood in Charleston, West Virginia. The research draws upon publicized correspondence from the Department of Housing and Urban Development, archived video interviews, and dozens of Charleston newspaper articles, in order to examine how the Interstate and Urban Renewal projects both fell upon one area of the city. The thesis argues that the desire to address crime and vice, to prioritize commerce, and to deliver on political promises fueled Urban Renewal and the

construction of the Interstate, which contributed to racial tensions in the City of Charleston, West Virginia and its Triangle District. While larger cities are often the subject of such studies, this project tells the lesser-known story of a smaller population center that is equally important to the dialogue around America's racial reckoning.

PC 20

Henry Taylor, Biology Undergraduate Student
Faculty Mentor: Brooke Christian, Chemistry and Fermentation Sciences
Co-Author(s): N/A

Title: STABILIZATION OF MONOCLONAL ANTIBODIES USING CYTOSOLIC HEAT SOLUBLE PROTEIN D

Tardigrades are microscopic eukaryotes that have survived outer space, extreme temperatures, and many other high stress environments. Tardigrades retract into a tun state upon dehydration and emerge again when exposed again to water. Cytosolic Abundant Heat Soluble Protein D (CAHS D) is one of the intrinsically disordered proteins present within tardigrades thought to be partially responsible for the ability of tardigrades to survive desiccation. This protein has already shown promise in the stabilization of biologics in literature. Monoclonal antibodies are of particular interest for stabilization due their therapeutic and diagnostic applications, and we aim to use CAHS D for this purpose. CAHS D was purified recombinantly from bacteria using metal-chelate affinity chromatography on an FPLC system. CAHS D was used to stabilize desiccated monoclonal antibodies under heat stress. Stabilization was verified via Western blotting using chemiluminescence to measure antibody functionality. Current work is focused on the protection of monoclonal antibodies in solution without the need for desiccation. The stabilization of monoclonal antibodies using CAHSD will allow for better stress tolerance, resulting in increased shelf stability. This would potentially lower transportation cost and allow for the use of antibody-based technologies in areas where refrigeration is not available.

Morning Poster Session 1 - 9:00-10:30am Parkway Ballroom
Posters 21-35

Poster 21
Olivia Chapman, Exercise Science Undergraduate Student
Faculty Mentor: Jared Skinner, Public Health and Exercise Science
Co-Author(s): Lizzie Gamwell
Title: IMPORTANCE OF THE DYNAMIC WARMUP FOR THE EQUESTRIAN ATHLETE"
Intro: Intercollegiate Horse Show Association riders have exceptionally high acute injury rates, which can lead to hospitalization. In particular, these athletes have a higher risk of hospital admission than other high-risk sports, such as football. These equestrian athletes are expected to compete at maximum performance in cold temperatures on an unfamiliar horse without warming up. Lack of warmup can lead to slower reaction times due to decreased muscle temperature after cold exposure. Horses often startle and can throw their rider if the rider cannot react quickly enough to correct the situation. This investigation aims to determine if incorporating a warmup before the equestrian competition will improve athlete reaction times. Methods: A randomized, controlled trial will be conducted with two groups: experimental and control. Power analysis from preliminary data determined that 36 individuals will be needed to meet statistical power. The experimental group will perform a dynamic warmup prior to the competition. Reaction time (RT), anticipatory postural adjustment (APA), and balance will be measured pre and post-warmup over six trials. Expected results: Quicker reaction times in the experimental group and consistent reaction times for the control group. Further, improvements in APA and balance for the experimental group are expected. After qualitative analysis, we might also observe decreases in perceived performance anxiety before a competition.

Poster 22
Noah Kaufmann, Exercise Science Graduate Student
Faculty Mentor: Andrew Shanely, Public Health and Exercise Science
Co-Author(s): Dara E. Kodack, K. Bryan Taylor, Emily C. Bauer, Favian Morales, Camryn Olsen, N. Travis Triplett, Jeffery M. McBride
Title: EXAMINING THE RELATIONSHIP BETWEEN MEASURES OF SKELETAL MUSCLE STRENGTH AND POWER AND SKELETAL MUSCLE SIZE AND DENSITY
Skeletal muscle (SM) strength and mass are inversely associated with all-cause mortality. Infiltration of fat in SM (myosteatosis) is associated with disease and decreased strength in clinical populations. PURPOSE Examine the relationship between functional measures of SM strength and power and SM density and in healthy adults. METHODS Twenty-nine participants (13f, 16m; 34.6±13.5y; 26.3±7.9% body fat) volunteered for this preliminary cross-sectional study. Body composition was measured

by DEXA. SM area and density were measured by pQCT. Maximal lower body strength was measured by the back squat (BS) and leg press (LP) and lower body power was measured by the countermovement jump (CMJ). Hand grip strength (HGS) test was measured on the dominant hand. Correlations were calculated using Pearson's correlation coefficients. The ASU IRB approved this study (HS-22-8). RESULTS BS strength, LP strength, and CMJ impulse were each related to muscle area (r=.847, p<.001; r=.850, p<.001; r=.892, p<0.001, respectively) and muscle density (r=.603, p<.001; r=.436, p=.020; r=.375, p=0. 50, respectively). BS strength, LP strength, and CMJ impulse were related to HGS (r=.804, p<.001; r=.871, p<.001; r=.707, p<.001, respectively). CONCLUSION These preliminary data suggest functional measures of leg strength and power were related to both SM area and density in healthy non-diseased adults. Further, we found strong relationships between measures of leg strength and power and handgrip strength.

Poster 23

Javier Morales Dozal, Exercise Science Graduate Student
Faculty Mentor: Marco Meucci, Public Health and Exercise Science
Co-Author(s): Scott R. Collier, Robert J. Kowalsky

Title: DIFFERENCES IN BLOOD PRESSURE AND PULSE WAVE ANALYSIS BETWEEN SEATED AND SUPINE IN YOUNG ADULTS

Measurements of blood pressure (BP) and arterial wave reflection may differ when taken while seated vs. supine. Therefore, knowing the quantification of these differences in cardiovascular indices may help identify best practices for cardiovascular assessments. PURPOSE: To quantify differences in BP, pulse wave analysis (PWA), and hemodynamics after 5 minutes of rest between seated vs. supine position in healthy young adults. METHODS: 20 young adults (20.6 ± 1.1 years old) participated in this study. Participants completed one laboratory visit that included a 5 minute resting period, three BP and PWA measurements (closest two were averaged), and 5 minutes of continuous beat-to-beat hemodynamic measurements in both seated (90 degrees) and supine modes in a counterbalanced approach. Data were analyzed using a one-way ANOVA by position (supine vs. sitting). Results are given as mean ± SD and alpha set as $p \leq 0.05$. RESULTS: Measurements of brachial pulse pressure (49 ± 7 mmHg vs. 45 ± 8 mmHg; $p < 0.036$, $F = 4.7$), ejection duration (336 ± 9 ms vs. 292 ± 4 ms; $p < 0.01$, $F = 50$), stroke volume (87.4 ± 20.4 ml vs. 73.3 ± 16.5 ml; $p = 0.021$, $F = 5.8$) were greater in the supine position compared to seated. HR (73 ± 17 bpm vs. 61 ± 9 bpm; $p < 0.01$, $F = 7.9$). Total peripheral resistance (0.98 ± 0.28 mmHg vs. 0.83 ± 0.21 mmHg; $p < 0.065$, $F = 3.6$) was close to significance in the seated position. No differences in aortic and brachial systolic and diastolic BP were observed between positions. CONCLUSION: Body position should be considered during acute physiological assessments when interpreting hemodynamic and cardiovascular measurements.

Poster 24
Maya Ristanovic, Exercise Science Graduate Student
Faculty Mentor: Kym Fasczewski, Public Health and Exercise Science
Co-Author(s): N/A
Title: EFFECT ON PHYSICAL ACTIVITY BEHAVIOR IN INDIVIDUALS PARTICIPATING IN A VIRTUAL 5K PROGRAM TO BENEFIT A SELF-SELECTED CAUSE

Increasing participation in physical activity (PA) can increase quality of life and health, however over half of the population does not meet the recommendations for PA. Previous research in this lab suggests that having a connection to a charity increases motivation for participation for PA-based charity events. The previous study attempted to create a connection to a designated cause and saw marginal success. The purpose of the current study is to investigate the impact on participation and motivation when an individual is incentivized with a donation to a charity that they have a pre-established emotional connection with. Inclusion criteria included any healthy adult classified as inactive (less than 150 minutes of PA per week). A 12-week exercise intervention (walk, walk/run, or run) was implemented with a training protocol, rest days, and weekly progression. Training resources included support on nutrition, dynamic warm-ups, running form, hydration, and exercise general information. The behavior change resource provided support for goal setting, stress management, confidence, body image, and aid for long-term PA plans. Upon completion, participants received a donation to a charity of their choice. Initial evidence from the current study suggests better adherence due to the existing personal connection and increased PA motivation. The application of these findings could help to increase PA motivation and long-term adherence through charity-based exercise events.

Poster 25
Andrey Sankó, Exercise Science Graduate Student
Faculty Mentor: Kym Fasczewski, Public Health and Exercise Science
Co-Author(s): Sarah Powel
Title: INCLUSION OF SOCIAL JUSTICE IN KINESIOLOGY / EXERCISE SCIENCE CURRICULUM

Barriers to regular PA include lack of knowledge, motivation, time, money, and access (physically usable space and an inclusive and supportive environment), especially for individuals in special populations. Unfortunately, there is little focus on social justice, diversity, and inclusion of special populations in current educational curriculums. Therefore, the purpose of this study was to assess student perspectives on learning outcomes for future hands-on care with such populations. Seven enrolled undergraduate and graduate students within Kinesiology or Exercise Science programs at their respective universities were recruited for qualitative interviews via zoom. Participants were asked about their opinions of what “special population” meant to

them, if they had ever addressed working with these populations in their coursework, in what way, and if courses taught enough information. Identified barriers for proper practice were also asked. Participants defined special populations as those with physical limitations such as neurodegenerative diseases, pregnant or postpartum women, obese population, minority groups ("isms"), children and people within the autistic spectrum. Most felt their experience came from internships / jobs they had and expressed a gap existed in the coursework to apply in working with special populations. Future coursework should consider implementing specific content to systematically ensure social justice is taught in the classroom prior to practice.

Poster 26

Amber Dozier, Nutrition Graduate Student
Faculty Mentor: Alisha Farris, Nutrition and Health Care Management
Co-Author(s): Melissa Gutschal, Adam Hege

Title: ASSESSING THE UTILIZATION OF AN ON-CAMPUS SATELLITE PANTRY

Introduction: College students are a vulnerable population for food insecurity with rates ranging from 15-59% across the country, and 46% at the study site. The purpose of this study was to evaluate perceptions and use of a satellite campus food pantry and assess which pantry items were most commonly utilized in order to improve the effectiveness of the pantry. Methods: An anonymous survey collected demographics, perceptions, and use of the pantry. Weekly observational data was collected on the presence of pantry items for 7 months. Data were analyzed using frequencies. Results: Only four pantry users completed the survey. Of those, identities were majority female (40%), and white (75%). Half were unemployed, and half used the pantry weekly. Reasons for utilization were stress (50%), between pay periods (16.7%), limited time to purchase food (16.7%), and because it was the closest pantry (16.7%). Participants requested more fresh produce options in the pantry. Overall, 849 items left the pantry. The most commonly utilized items were snacks, pasta, and personal hygiene products. Conclusions: Despite a small sample size, important information can be gleaned from this study. While snack items and pasta were utilized the most, they were also the most available. Future research could observe if under-utilized items, which are also more nutritionally dense, might be more commonly taken if they became more available as options.

Poster 27

Sidneigh O'Leary, Nutrition Graduate Student
Faculty Mentor: Alisha Farris, Nutrition and Health Care Management
Co-Author(s): Danielle Nunnery PhD RDN and Laurel Wentz PhD RD

Title: THE BENEFITS OF AN INTRO TO NUTRITION AND HEALTH COURSE ON COLLEGE STUDENTS IN RURAL WESTERN NC

Introduction: College is a fundamental time for students to establish behaviors that track into adulthood. The aim of this project was to determine whether an Introduction

to Nutrition course influences diet and lifestyle behaviors of students at Appalachian State University. Methods: During Fall 2018 and 2021 semesters, students enrolled in the in-person course were recruited to complete an anonymous pre/post online questionnaire that focused on health perceptions, lifestyle practices, and changes in dietary behaviors. The questionnaire was developed from previously validated literature in conjunction with nutrition faculty familiar with college survey research. Data were analyzed for frequencies and paired t-tests. Results: Of 144 participants, the majority were female (76.8%), white (84.6%), and freshmen (60.3%). At the end of the course, students consumed significantly fewer sweets, high-salt foods, and alcohol, consumed more water and fruit, increased physical activity, and read food labels ($p<0.001$). Around 45% had dieted in the past year, and 44% were actively trying to lose weight. Common weight maintenance practices included exercise, eating more produce, and limiting fast food. Conclusion: An Introduction to Nutrition course can help students understand how to incorporate positive health practices into their lives, potentially impacting future health outcomes. Future research should evaluate the long-term impacts this course has on behavior change.

Poster 28
Victoria Whidden, Physics Undergraduate Student
Faculty Mentor: Brooke Hester, Physics and Astronomy
Co-Author(s): N/A
Title: POWER SPECTRA OF OPTICALLY TRAPPED GOLD NANOSHELLS
Gold nanoshells have had a rising importance due to their unique optical properties that arise from the surface plasmon resonance. We use a custom built optical tweezers apparatus with a position detection system in order to observe the Brownian motion of an optically trapped nanoshell in water. The corner frequency of the power spectrum of the position data is an indicator of larger or smaller optical trap strength. Here we present power spectra of single optically trapped gold nanoshells at varying optical trap powers. Future work includes the quantification of temperature and trap stiffness using our automated software program.

Poster 29
Tyler Crank, Building Sciences Undergraduate Student
Faculty Mentor: Bhuwan Thapa, Geography and Planning
Co-Author(s): Nick Schrum Josh Platt
Title: STRATEGIES FOR IMPROVING WALKABILITY ON CAMPUS: CASE OF APPALACHIAN STATE UNIVERSITY
Walkable campuses offer multiple benefits, including reducing greenhouse gas footprint, promoting active living, creating a safer environment, and possibly influencing economic growth around the campuses. The study evaluates the walkability of campus through geospatial and qualitative assessment of the walkability

infrastructure, built environment, and other related information such as pedestrian safety. We will then identify and rank specific intervention strategies to improve walkability using rational choice decision making framework. These interventions identified by students through a class project (PLN2410) were also included for the detailed analysis. The direct input from students helped us capture the feedback of active users of these infrastructures. As an outcome to this research, we will produce specific walkability solutions for Appalachian State University and the broader community of Boone, NC. These proposed solutions to improve walkability will be considered using multiple factors for providing the maximum benefits of walkability to the campus and surrounding area. The study will help develop strategies for promoting walkable campuses in NC and beyond.

Poster 30

Ella Thompson, Chemistry Undergraduate Student
Faculty Mentor: Megen Culpepper, Chemistry and Fermentation Sciences
Co-Author(s): N/A

Title: INVESTIGATING SUBUNIT INTERACTIONS BETWEEN AN ENZYME INVOLVED IN SULFUR CYCLING

The volatile sulfur compound dimethyl sulfide (DMS) plays an essential role in connecting aquatic and terrestrial forms sulfur to the atmosphere. DMS is formed predominately from the breakdown of a compound generated by phytoplankton; DMSP. Once formed, DMS serves as a signaling cue for feeding and level effect coral reef health. At warm temperatures DMS readily evaporates to the atmosphere where its degradation products lead to increased cloud nucleation sites. Increased levels of DMS result in more cloud formation, which result in solar radiation backscattering and observed decreasing temperatures, especially at the local scale. The biochemistry regarding the enzymatic metabolism of DMS is not well known. This project focuses on the enzymatic degradation of DMS to methanethiol catalyzed by dimethyl sulfide monooxygenase, a two-subunit enzyme. This enzyme is part of the FMNH2-dependent two-component monooxygenase family of enzymes. In this family, a flavin reductase B subunit provides electrons to a monooxygenase A subunit necessary for substrate conversion to occur. The transfer of FMNH2 reduced cofactor is different for different enzymes in this family. We aim to investigate how FMNH2 is transferred in the DMS monooxygenase; DmoB and DmoA subunits; specifically, whether transfer occurs by a diffusion or a channeling mechanism. In addition, we aim to determine the subunit interaction specificity with regards to primary sequence, species divergence, and protein structure.

Poster 31
Wayne Blanchette, Biology Undergraduate Student
Faculty Mentor: Mary Kinkel, Biology
Co-Author(s): MD Kinkel
Title: MAPPING GASTRIC MOTILITY GENE EXPRESSION ACROSS ZEBRAFISH DEVELOPMENTAL STAGES
Our overall research focuses on human gut motility disorders and uses zebrafish as model organisms. As in human children, the zebrafish larval gut is functionally immature and gradually develops toward adulthood. In humans and zebrafish, maturational changes are reflected by changes in gene expression. The goal of this study is to build expression maps for gut motility genes using RT-PCR. Previous work involved analyzing the literature to identify a set of intestinal genes known or suspected to be involved in gut motility. Using the NCBI Nucleotide database, Primer3, and BLAST, primers for these genes of interest were designed. Some primer sequences were obtained from the literature. Next, the intestine was removed from adult wild-type zebrafish and cut into four major functional and anatomical regions: intestinal bulb, loop, small intestine, and colon. RNA was isolated from each region and then reverse-transcribed to cDNA. In ongoing studies, the cDNA being is amplified by PCR and analyzed by gel-electrophoresis to determine which genes are expressed in each region of the adult intestine. This map of the adult intestine will then serve as a reference for understanding earlier stages of intestinal development. Future studies will involve mapping embryonic, larval, and juvenile stages of intestinal development to understand the maturation of the intestine.

Poster 32
Ally Lawing, Biology Undergraduate Student
Faculty Mentor: Rachel Bleich, Biology
Co-Author(s): Dr. Janelle Arthur, Freedom Johnson, Dom Diprospero
Title: WRINKLING PHENOTYPES OF CO-CULTURAL INTERACTIONS BETWEEN ADHERENT-INVASIVE ESCHERICHIA COLI AND ENTEROCOCCUS FAECALIS SUGGEST AN EFFECT OF BIOFILM FORMATION
Crohn's disease (CD) is a form of inflammatory bowel disease (IBD) that affects the gastrointestinal tract through chronic inflammation. CD currently has no cure or known cause and affects over half of a million of the United States population alone. IBD is influenced by an increased amount of mucosal-adherent bacteria present in the gut microbiome, specifically, pathobiont, biofilm-forming, Adherent-Invasive Escherichia coli (AIEC). Other bacteria, such as Enterococcus faecalis (E. faecalis), have also been shown to have an increased colonization rate in the gut microbial community for patients with IBD. The objective of this study is to observe microbe-microbe interactions between co-occurring CD-associated AIEC and IBD-related strains of E. faecalis to determine a beneficial interaction that increases their persistence in the inflamed gut.

When the IBD-related strains are grown in co-culture, a wrinkled phenotype is observed, suggesting an increase in biofilm formation. Biofilms are a community of bacteria that adhere to a surface and are enclosed in an exopolysaccharide matrix, and they are implicated in IBD. To examine this co-culture phenotype, isolated strains of AEIC from CD patients and a novel murine isolate of E. faecalis are studied in vitro through co-culture assays. Previous research shows E. faecalis increases E. coli growth under metal-limited conditions. Reintroducing specific metal additives, $FeCl_3$ and $Zn(OAc)_2$ have shown distinctive wrinkling patterns in the co-cultures. These results indicate increased biofilm production in limiting environments and the presence of additional metals. Currently, qRT-PCR is being implemented to study the biofilm gene expression of both mono-cultures and co-cultures.

Morning Session Oral 1 – 10:00am-11:00am – 415 Plemmons Student Union

10:00am
Rowaida Hamdan, Psychology Undergraduate Student
Faculty Mentor: Chris Dickinson, Psychology
Co-Author(s): N/A
Title: USING EYE TRACKING TO QUANTIFY AESTHETIC JUDGMENTS
The way images are perceived by the human mind is greatly influenced by the context attributed to the presented images, particularly in emotional experience. Taking on a more subjective approach when viewing these images has been found to increase perceived aesthetic evaluation. The overall purpose of this study is to investigate the influence of task instruction on perceived aesthetic judgment in relation to the subjective experience of emotion through eye-tracking technology. In doing so, we hope to explore the psychological and visual mechanisms underlying the perception of different artworks. The images presented to participants in this study are primarily setting-based, as opposed to more social images as to avoid bias of personal preference, which was investigated in Uusitalo et al. 2012, and found that representational images with interpretative content tend to arouse more emotion than more abstract images. This study will serve as a follow-up to the Cupchik et al. 2009 study in its utilization of eye-tracking technology as a measure of participants' processing of presented information. Eye-tracking is utilized here as a trusted technique to study aesthetic visual perception, and the perceived aesthetic judgment scale is used to evaluate different perceptions and compare results (Al-Lahham et al. 2021).

10:20am
Taylin Spurlock, Geography Graduate Student
Faculty Mentor: Maggie Sugg, Geography and Planning
Co-Author(s): Dr. Jennifer Runkle, and Dr. Dennis Guigent
Title: EXAMINING HURRICANE EXPOSURE ON NEONATAL OUTCOMES IN NORTH CAROLINA: A CASE STUDY OF HURRICANE ISABEL
Exposure to tropical storms and hurricanes during pregnancy can influence neonatal and birth outcomes such as low birth weight and preterm birth. These outcomes are impacted by the disruption of healthcare and infrastructure, as well as stress, injury, and changes in nutrition. However, little is known about how far from the storm center maternal and neonatal impacts occur, nor how storms affect spatial patterns of maternal health. The aim of this study is to assess spatial patterns and distance metrics for four birth outcomes (low birth weight, very low birth weight, preterm birth, and very preterm birth). The geospatial analysis included multiple buffers of 30, 60, and 100 kilometers and local spatial autocorrelation statistics. The results were predominately insignificant, with some key exceptions. The difference-in-difference analysis found a statistical

association between hurricane exposure and preterm birth, with reductions, post-storm. Across all three models, we found exposure to Hurricane Isabel and low birth weight was statistically significant at the 30 and 100-km spatial buffers. We also found preterm birth was also associated with exposure at the 30km buffer. We have also found significant differences in clustering before and after Isabel made landfall, with new clusters forming along the storm track. Our findings will provide a framework for emergency preparedness during tropical cyclones for mothers and their children.

10:40am
Lily Vowels, Geology Undergraduate Student
Faculty Mentor: William Armstrong, Geological and Environmental Sciences
Co-Author(s): Brianna Rick. Irina Overeem. Dan McGrath
Title: QUANTIFYING CHANGES IN PROGLACIAL SUSPENDED SEDIMENT CONCENTRATION USING LARGE SCALE REMOTE SENSING
Glaciers are prolific sediment producers, and climate-forced glacier retreat, often accompanied by proglacial lake formation, will impact downstream sediment dynamics. In this work, we characterize changes in fluvial suspended sediment concentration (SSC) following glacier retreat using satellite data, which enables SSC estimation at large scale in remote environments where in situ measurements are too costly or otherwise infeasible. We extend a previously-developed technique for satellite-derived SSC estimates and find it performs well in proglacial systems (r2= 0.80). Combined with a previously-published inventory of Alaskan proglacial lakes and their change over the Landsat-era, we analyze SSC trends as these glacier-lake-stream systems have evolved in response to modern climate warming. We use Google Earth Engine to generate SSC time series spanning 1984 - 2021 downstream from glaciers with and without proglacial lakes during peak flow. Results show that some sites showed a statistically significant change in SSC over the study period. Additionally, we investigated the connection between glacier and lake properties and observed SSC trends. These findings present a first-order estimate of how sediment fluxes in Arctic rivers are changing in a warming world, with impacts for aquatic habitat and water resources.

Morning Session Oral 2 - 11:00am-12:00pm 417 Plemmons Student Union

11:00am
Gracie Portagallo, Engineering Physics Graduate Student
Faculty Mentor: Brooke Hester, Physics and Astronomy
Co-Author(s): Caroline Donaghy, Lucian Murray, Megen Culpepper
Title: MEASUREMENTS OF PROTEIN BINDING VIA FLUORESCENCE ANISOTROPY
The chemical dimethyl sulfide (DMS) plays an important role in the sulfur cycle within Earth's atmosphere, including contributions to cloud formation and global cooling. The enzyme DMS monooxygenase, which breaks down DMS, works through two subunits, DmoA and DmoB. We detect fluorescence signals from DmoB in order to learn more about the enzyme components. To do this, we use a custom-built fluorescence instrument that is coupled with a pulsed laser and with low-noise avalanche photodiodes (APD) to detect fluorescence emissions within the desired wavelength range. DmoB is labeled with a fluorophore to monitor its behavior when DmoA is introduced to the system. When the expected binding occurs, the motion of the DmoB is monitored and analyzed via fluorescence anisotropy. Calibration of this experiment is performed by labeling various concentrations of glycerol with a fluorescent dye to ensure expected anisotropy measurements for a known system. We present here our calibration measurements for the fluorescence anisotropy system as well as our observations of protein binding.

11:20am
Hunter Hixon, Physics Undergraduate Student
Faculty Mentor: Brooke Hester, Physics and Astronomy
Co-Author(s): Nate Parillo
Title: ENGINEERING A CUSTOM-BUILT OPTICAL TWEEZERS MICROSCOPE INSTRUMENT
Optical tweezers instruments are widely used to study nanoscopic to microscopic biological and physical systems. Our laboratory houses a custom-built optical tweezers apparatus which is shared by several researchers. Here, we are focusing on the engineering of an additional custom-built optical tweezers apparatus for use in the laboratory. The additional apparatus will allow for more researchers to have more access to this important technology. The custom-built optical tweezers presented here utilize a collimated laser focused with a microscope objective lens to confine small objects such as glass microspheres in a nanoscopic region. A second laser is included for position detection of the confined microscopic object. This allows for highly precise measurements of displacement. The new custom-built optical tweezer setup consists of a bright field microscope and camera coupled with two lasers via many mirrors and lenses that must be precisely positioned and adjusted for optimal placement of the

lasers into the microscope objective lens. Each laser focus produces a reflection which we can view with the microscope and camera for optimal laser alignment. Here, we present the design and implementation of the new custom-built optical tweezers instrument.

11:40am
Henry Kolesar, Physics Graduate Student
Faculty Mentor: Brooke Hester, Physics and Astronomy
Co-Author(s): Brooke Hester
Title: LASER TRAPPING RAMAN SPECTROSCOPY
Raman scattering is a phenomenon that occurs when light is incident on a material and the energy of the incoming light photons is shifted based on molecular vibrations in the material. When the incoming light is monochromatic, like that of a laser, a set of the outgoing photons of a different wavelength are what is called the Raman spectrum. The Raman spectrum is unique to any given material because the molecular vibrations of each material is unique. Measured Raman spectra can be compared to known Raman spectra, allowing for the determination of what a material is at the molecular level. We have constructed a custom Raman spectroscopy apparatus which utilizes optical tweezers to isolate a single microscopic particle into the most intense region of the Raman excitation beam while the Raman scattering occurs, allowing for a brighter and more detectable Raman signal. Here we present Raman spectra of well-known materials to demonstrate the functionality of the Laser Tweezer Raman Spectroscopy (LTRS) instrument. In the future, the LTRS will be fully automated to increase the throughput of the apparatus.

Morning Poster Session 2 - 10:40am-12:00pm Parkway Ballroom
Posters 40-75

Poster 40
Jennifer Belk, Biology Undergraduate Student
Faculty Mentor: Matt Estep, Biology
Co-Author(s): N/A
Title: ADDING POPULATIONS TO OUR UNDERSTANDING OF GENETIC DIVERSITY IN LIATRIS HELLERI PORTER (ASTERACEAE)
Liatris helleri Porter (Asteraceae) is a federally listed rare Southern Appalachian perennial herb. This species is restricted to high-elevation rock outcrop communities in Western North Carolina. An understanding of the genetic diversity and population structure of L. helleri will provide valuable information for future management activities. Building on past research, two further populations were sampled and genotyped utilizing 12 microsatellite markers. These populations include the type locality and an A-ranked population from the northwestern portion of the species range. Genetic diversity estimates for these two populations will be presented. Implications of this data on land management and comparisons to populations with existing diversity estimates will also be discussed

Poster 41
Megan Clements, Biology Graduate Student
Faculty Mentor: Matt Estep, Biology
Co-Author(s): Matt Estep
Title: DEVELOPMENT OF MICROSATELLITE MARKERS USING SEVERAL POPULATIONS OF SANGUINARIA CANADENSIS TO INFORM CONSERVATION EFFORTS.
Sanguinaria canadensis L. (Papaveraceae) is an herbaceous perennial that produces a brilliant white flower, has a distinct leaf shape, and a red-orange rhizome that is the basis for its common name - Bloodroot. It has been used by Native Americans to treat a range of ailments, although claims to its usefulness in current medicinal and medical practice have been debated. This potential to possess powerful medicinal alkaloids could encourage overharvesting or exploitation of wild populations before we fully understand Sanguinaria's role in the understory environment as well as its genetic diversity and population structure. The first steps in marker development include low pass sequencing of the genome. Followed by identification of microsatellite loci within the sequence data. Primers can then be designed to amplify these loci. These steps are then followed by screening a diverse selection of individuals to identify polymorphic loci that can be useful in diversity studies. Effective conservation strategies rely not only on knowledge of endangered or rare species but of thriving species as well. A better understanding of common Appalachian natives can provide a more effective framework

for making conservation decisions, especially for those species that possess potential medicinal properties.

Poster 42
PJ Coleman, Biology Undergraduate Student
Faculty Mentor: Jennifer Geib, Biology
Co-Author(s): Paul Super, Ally Jacob, Nicole Lowder, Jennifer Geib
Title: SYRPHIDAE OF THE SOUTHERN APPALACHIANS: DIVERSITY AND DISTRIBUTION
Flies in the family Syrphidae, commonly known as hoverflies, play an important role in the pollination of native flora. Despite being one of the most frequent flower visitors across a variety of plants, Syrphid Flies are often overlooked compared to more conventional pollinators such as bees. Thus, this project aims to inventory and model the distribution of Syrphid species that are present along the Blue Ridge Parkway (BRP). Hoverflies were collected through both passive (2018,2019) and active (2020) sampling methods at 64 sites along the parkway in NC and VA. Sites were chosen to include a range of habitats while also focusing on areas rich in floral resources. Specimens were brought back to the lab where they were identified to species and pinned for future study. Over 70 species of hoverflies were observed along the parkway throughout the sampling period. Using this data, suitable habitat within the BRP boundaries will be mapped for the various groups of Syrphidae in an effort to guide future surveys and conservation projects. The initial results of this pilot study have revealed an impressive diversity of hoverflies in the region which had previously been undocumented. Understanding which species exist and where will prove beneficial in both environmental and agricultural management as other more pollinating species continue to face declines.

Poster 43
Emily Gillikin, Biology Undergraduate Student
Faculty Mentor: Lynn Siefferman, Biology
Co-Author(s): Clarice Perry
Title: IMPACTS OF HABITAT QUALITY AND PARASITISM ON GROWTH OF NESTLING SONGBIRDS
The goal of our research is to determine whether ecological factors and parasitism affect the reproductive output of tree swallow nestlings (Tachycineta bicolor). Tree swallows are aerial insectivores and past research in this local population demonstrates that prey abundance is higher in territories with greater percent grassland and fewer trees. Tree swallows also prefer to settle in grassland habitat. Further, nestling tree swallows are often parasitized by blood-sucking blowflies (Protocalliphora sialia) which can kill nestlings and slow the growth of surviving nestlings. Further, nestling songbirds that grow are less likely to survive to adulthood. We hypothesize that parasitism and certain

ecological factors can have a negative impact on reproductive outcomes such as nestling growth and fledging success. However, nestlings that are highly-parasitized may grow normally if they are reared in high-quality territories with ample prey abundance. To test the hypothesis, we monitored 300 nest boxes in Watauga County and followed 118 breeding pairs. We documented the number of eggs, the number of nestlings that hatched and the number of offspring that successfully fledged from each nest. Further, we measured nestling weight at ages 2, 5, 8, 11, 14 post hatch to estimate growth rates during the entire juvenile growth period. Once offspring had fledged the nest, we quantified the number of blowfly larvae to determine the parasite load. Next, we quantified land use in a 300 m radius around each nest to determine percent grassland and cropland 'openness' and percent area covered in trees. Our data reveal that nesting success is influenced by complex interactions between parasite load and habitat quality. Although tree swallows are not a threatened species, this research would help us understand how wildlife populations are influenced by interactions between environmental factors including habitat quality and parasitism.

Poster 44

Alan Huff, Biology Undergraduate Student
Faculty Mentor: Howard Neufeld, Biology
Co-Author(s): N/A

Title: INFLUENCES OF LEAF INCLINATION AND ORIENTATION ON WINTER GAS EXCHANGE IN YUCCA FILAMENTOSA

Yucca filamentosa is an evergreen C3 plant native to the southeast that has long narrow leaves displayed in a radial arrangement. Newly produced leaves are steeply inclined but become more horizontal with age. Inclination, radial orientation, and season may impact light interception and gas exchange, but this has not been studied in this species. The goal of this project was to investigate the gas exchange of Yucca filamentosa plants located on the Appalachian State University campus during the winter season. Measurements were made on north-facing leaves of different ages using a portable gas exchange system (either Li-6400 or 6800). Maximum rates of photosynthesis were 10.3 μmol m-2 s-1 for leaves of the same orientation on different plants in October. Results show that rates of photosynthesis decline as leaves age. With north facing leaves on one plant, we found maximum rates of 13.2 μmol m-2 s-1 for a non-bent leaf facing up by 45°, 5.5 μmol m-2 s-1 for a leaf bent down at 51° below the horizontal, and 7.8 μmol m-2 s-1 for a leaf bent down to 45° below the horizontal. Yucca leaves in sun were found to be several degrees warmer than ambient air, which may facilitate gas exchange during cold weather. In the future we will measure dark-adapted fluorescence to determine the degree of photoinhibition due to cold temperatures and high light. These results will help determine the ecophysiological strategies that this species uses to survive at high elevations in the mountains.

Poster 45
Ishani Chattopadhayay, Biology Graduate Student
Faculty Mentor: Andrew Bellemer, Biology
Co-Author(s): Dr. Andrew Bellemer
Title: THE ROLE PVR, A GROWTH FACTOR RECEPTOR, PLAYS IN THERMAL NOCICEPTION IN DROSOPHILA
Nociception is the sensory nervous system's behavioral and physiological response to noxious stimuli. This noxious stimulus can present itself in various forms such as mechanical, thermal, chemical or UV radiation, and can trigger pathways that elicit a response behavior. This research project utilizes a Drosophila model of thermal nociception in order to understand the role that a growth factor receptor, Pvr, plays in thermal nociception. This model organism is utilized to make genetic manipulations that modify genes involved in nociception. Pvr is a cognate receptor related to the platelet derived growth factor (PDGF) and vascular epithelial growth factor (VEGF), that regulates several physiological processes in humans and other vertebrates. Previous experiments have established that Pvr is required in nociceptive sensory neurons for regulating baseline mechanical nociception, however, the role of Pvr in thermal nociception is not well understood. This project aims to knockdown and overexpress Pvr in the multidendritic neurons of Drosophila and assess the thermal nociception phenotypes that result. The thermal nociception assay demonstrated that manipulations of Pvr do not produce a significant defect in baseline thermal nociception. However, Pvr overexpression caused behavioral hypersensitivity to weak noxious stimuli. The hypersensitivity caused due to Pvr overexpression suggests that Pvr receptor activation may act to sensitize sensory neurons to noxious stimuli. In order to better understand the role of Pvr in sensitization, a tissue-damage assay will be performed using UV radiation to induce nociceptive hypersensitization in Drosophila with Pvr knockdown.

Poster 46
Lily Elkin, Biology Undergraduate Student
Faculty Mentor: Rachel Bleich, Biology
Co-Author(s): Emma Metcalf
Title: THE ROLE OF INHERENT INVASIVE E. COLI ON INFLAMMATORY BOWEL DISEASES
Inflammatory bowel diseases (IBDs) can cause many health issues, and the number of affected individuals is tremendously growing. Research has shown that a specific type of Escherichia coli, also known as adherent-invasive E. coli (AIEC), can be linked to IBDs such as Crohn's disease (CD). While there has been development on Crohn's disease and the chronic inflammation of the whole gastrointestinal tract, there is little to no research on how the jejunum, an upper gastrointestinal component, is involved in chronic inflammation and CD. This research focuses on uncovering more information about what specifically allows for successful colonization of jejunal tissue, and how AIEC

contributes to inflammation. The main objectives of the study as a whole are to discover the degree to which AIEC strains can colonize the jejunum, and to identify similarities in high colonizing strains. My specific objective is to determine the impact on jejunal inflammation through quantitative PCR of inflammatory cytokines. The additional analysis of the microbiota of gastrointestinal tissues within a Crohn's disease model could allow for further advancements on disease characterization and treatment. To do this, jejunal RNA was extracted to perform qRT-PCR to measure the abundance of each strain. The RNA was extracted using Trizol reagent and treated with DNaseI. The RNA was then synthesized into cDNA. Amplification was done in duplicate with SYBR green dye using primers for different cytokines, including Gapdh, Tnfa, Il1b, Ifnγ, Il12b(p40), Il6, and Il17. The results will then be analyzed to determine activity. The expected results are that there will be increased inflammation of the jejunum with the presence of AIEC.

Poster 47

Hannah Lilly, Biology Undergraduate Student
Faculty Mentor: Dr Howard Neufeld, Biology
Co-Author(s): N/A

Title: VARIATION AMONG INDIVIDUAL PLANTS OF GOLDEN RAGWORT (PACKERA AUREA) WITH REGARDS TO THE PRESENCE OF ABAXIAL ANTHOCYANINS IN OVERWINTERING BASAL LEAVES

The herbaceous perennial, Packera aurea, is widespread across the southeastern United States. Commonly found growing in the understory of temperate forests, it has been observed to feature anthocyanins on the abaxial side of its leaves, particularly in winter and early spring prior to canopy leaf out. Within a community some individuals have deep purple abaxial coloration, a few show anthocyanins on both leaf surfaces, while others have no purple coloration at all, even though they are growing adjacent to each other. This population variation brings into question what stimulates the production of anthocyanins and what benefit such pigmentation can bring to the physiological functioning of the plant. The currently accepted hypothesis is that abaxial anthocyanins function in photoprotection from periods of high light, i.e., sunflecks, but this does not explain why some individuals can survive without anthocyanins. We measured pigment concentrations in these morphs and in December, purple morphs, as expected, had higher anthocyanin contents, but the two morphs did not differ in their chlorophyll concentrations. We plan to make gas exchange measurements of basal leaves of each morph during the leafless winter season coupled with fluorescence measurements (Fv/Fm) to determine whether individuals differ in rates of gas exchange and cold/high light stress. Measurements will continue throughout the spring and summer to determine ontogenetic changes in pigment concentrations and how this is related to photosynthesis and protection against stress. The results of this study should help to

explain what causes plants to produce abaxial anthocyanins and what evolutionary benefit such pigments provide to the success of a plant's photosynthetic functioning.

Poster 48
Justin Price, Biology Undergraduate Student
Faculty Mentor: Rachel Bleich, Biology
Co-Author(s): n/a
Title: METABOLITES FORMED BETWEEN PROINFLAMMATORY MICROORGANISMS LINKED TO INFLAMMATORY BOWEL DISEASES
Inflammatory Bowel Diseases (IBD) are chronic inflammatory conditions in the gut known to affect at least 1.6 million Americans. In those who have an IBD, it has been shown that there is an increase in tissue-associated microbes within the gastrointestinal (GI) tract. These alterations to the gut microbial community include an increase of Escherichia coli and Enterococcus faecalis, which are biofilm-forming bacteria that bloom together in the presence of inflammation. Our goal is to understand how these two bacteria could be interacting to increase persistence in the GI tract. We hypothesize that these two microbes interact with each other through small molecule signaling, which allows for colonization and permanence in the GI tract. This project aims to identify metabolites formed by interactions between E. coli and E. faecalis not found to normally be produced through use of High-Performance Liquid Chromatography and characterize these metabolites using Mass Spectrometry. E. coli and E. faecalis are allowed to grow in the liquid cultures separately, and then together to mimic an in vitro interaction. This allows for metabolites being formed to be easily identified as unique to an interaction between the two microbes as opposed to metabolites normally formed by these microbes. Information obtained from this project can be used in the future for pharmaceuticals that will target these interactions to prevent biofilm formation that causes IBDs.

Poster 49
Cara Cywinski, Environmental Science Undergraduate Student
Faculty Mentor: Sarah Carmichael, Geological and Environmental Sciences
Co-Author(s): Peter Königshof
Phuong Ta Hoa
Title: GEOCHEMISTRY OF ULTRAPURE CARBONATES ACROSS THE FRASNIAN/FAMENNIAN BOUNDARY INTERVAL IN SOUTHEAST ASIA (XOM NHA FORMATION, CENTRAL VIETNAM)
The Late Devonian Kellwasser Crises generally exhibit characteristic black shales and/or black limestones in many successions. To develop a set of best practices for detecting ocean anoxia in ultrapure carbonates, Upper Devonian carbonates deposited through the Frasnian/Famennian (F/F) boundary within the Xom Nha Formation in Vietnam were studied using whole rock geochemistry and cathodoluminescence. The

sedimentological record of the studied section shows a continuous lithology without black shales or black limestones, but rather pure carbonates instead. Microfacies analysis suggests a hemipelagic setting on an outer shelf or outer platform environment with low sedimentation rates. The section is composed of calcite with a maximum of 4 wt % SiO2 and 1.04 wt % Al2O3 (average values of 0.39 wt % SiO2 and 0.87 wt % Al2O3), and there is no differentiation in mineralogy at the F/F boundary. During cathodoluminescence, minor fluid alteration was observed in some of the samples, most samples do not show evidence of alteration. Trace element geochemical analysis shows remarkably stable signatures in all major, trace and rare earth elements, with the exception of the boundary area between the Palmatolepis rhenana conodont zone and the Palmatolepis linguiformis conodont zone, which contains excess barium and a cerium anomaly. These excursions correspond to the Kellwasser Crisis (it is not possible to differentiate whether it is the upper or lower Kellwasser Event). There is no mercury anomaly across this boundary, indicating that volcanism was not severe enough to result in a global Hg anomaly, and was thus not likely a factor in the F-F extinction. Although challenges remain in regards to interpretation of these two geochemical proxies, excess barium (associated with primary productivity changes) and cerium anomalies (associated with changes in redox conditions) become critical for providing information about changes in ocean chemistry in ultrapure carbonate rock units."

Poster 50

Jacqui Foronda, Environmental Science Undergraduate Student
Faculty Mentor: Sarah Carmichael, Geological and Environmental Sciences
Co-Author(s): Cara Cywinski, Peter Königshof, Ariuntogos Munkhjargal, Sersmaa Gonchigdorj, Dalaijamts Gantumur, Johnny Waters, Will Waters, Catherine Crônier, and Magnus Kallner

Title: MAPPING THE MIDDLE TO LATE DEVONIAN IN THE SHINEJINST REGION OF THE SOUTHERN GOBI DESERT, MONGOLIA

The Shinejinst region of southwestern Mongolia is Middle Ordovician to Permian in age, and most likely represents deposition within a volcanic-arc setting. This region has been studied but detailed maps of the area containing Early Devonian to Early Carboniferous sediments do not yet exist. This area has experienced extensive faulting, and published stratigraphic sections likely cross faults that are not clearly visible from the ground. In 2022 we re-mapped and re-sampled an Early to Late Devonian section across the Chuluun, Tsagaankhaalga, and Gobi-Altai Formations, and a Late Devonian to Early Carboniferous section across the Gobi-Altai and Indert Formations. We used standard geologic mapping methods with drone imagery in order to construct a stratigraphic column through the regions that avoided crossing through highly faulted areas. The Early Devonian section represents a biostromal carbonate environment with intermittent volcanic material, and thin organic-rich black shales/siltstones. Preliminary field observations indicate that the Middle Devonian part of the Chuluun

Formation preserves an ocean anoxia event. The Late Devonian section contained pyroclastics and pillow basalt units at its base and crinoidal limestones at the top, ending in an unconformity with reef complexes. The Kellwasser ocean anoxia events and Frasnian-Famennian boundary were tentatively identified at the boundary between the Gobi-Altai Formation and the Indert Formation as an organic-rich siltstone.

Poster 51
Anna-Maria Riley, Biology Graduate Student
Faculty Mentor: Sarah Carmichael, Geological and Environmental Sciences
Co-Author(s): Dr. Suzanna Bräuer
Title: HUMAN IMPACT IN APPALACHIAN CAVE SYSTEMS: HOW THE PRESENCE OF PEOPLE INFLUENCES THE NATIVE MICROBIAL CAVE SPECIES
Little is known about the community composition and diversity of microbes in Appalachian cave systems or how much can be attributed to human impact. Human debris such as hair, skin flakes, and respiratory droplets could introduce microbial species into caves that would otherwise not be present. Herein, three caves with different levels of exposure to human-associated microbes are investigated. Linville Caverns is a frequented, developed show cave that receives over 100,000 visitors to travel 600 feet of the cave each year. Worley's Cave is a larger, wild show cave that is less frequented and less developed, with fewer visitors traveling 4,000 feet of the cave each year. Daniel Boone Caverns is a privately-owned show cave that rarely has human visitors. DNA was extracted from nine samples acquired from Linville Caverns and sequenced via Illumina amplicon sequencing technology. The sequence reads were analyzed via DADA2, Phyloseq, and R. NMDS plots demonstrate that samples from Linville Caverns cluster separately from those collected in the other two caves. Preliminary analyses indicate a unique mineralogy for Linville Caverns and high concentrations of titanium. Sites with frequent human presence within the show caves have a noticeable difference in the mineralogy and types of microbes present compared to sites without frequent human presence. Anthropogenic impact is likely having an adverse effect on these ecosystems and may also impact biomineralization processes.

Poster 52
Carter Smith, Environmental Science Undergraduate Student
Faculty Mentor: Cole Edwards, Geological and Environmental Sciences
Co-Author(s): N/A
Title: INVESTIGATING THE LATE DEVONIAN FRASNIAN-FAMENNIAN MASS EXTINCTION THROUGH PAIRED CARBON AND SULFUR STABLE ISOTOPES
The Devonian period is known both for the proliferation of forests on land and as a time of several extinctions of marine life. Though the Late Devonian mass extinction (372 million years ago) at the Frasnian-Famennian boundary (FFB) is one of the "big five" in earth history, the main driver(s) are not fully understood. Ocean anoxia was likely an

important driver as positive carbon isotope (δ13C) excursions occur during extinction pulses, similar to other mass extinctions; however, additional evidence is needed to truly confirm anoxia was the driver of this δ13C excursion and extinction. In this project, δ13C values were measured and combined with sulfur isotopes (δ34S) collected from five age-equivalent sections in the Great Basin region (western USA) across the FFB. Were anoxia a major cause of this extinction, the isotopic data we generated for δ13C and δ34S would trend together, helping to confirm anoxia as an extinction driver and not the result of other causes (i.e., alteration). Our results show that evidence for anoxia is preserved, but the timing is not always synchronous across the FFB. Preservation of seawater signals can be confirmed with microscope analysis, and in this study suggests alteration is not a major factor in affecting isotopic trends. Further work is needed to better understand why the magnitude of signals differ between sections, but the co-occurrence of isotopic excursions across the FFB suggest anoxia as an important driver of this mass extinction.

Poster 53

Alyssa Wurtz, Geology Undergraduate Student
Faculty Mentor: Andrew Heckert, Geological and Environmental Sciences
Co-Author(s): N/A

Title: A NEW MICROVERTEBRATE ASSEMBLAGE FROM THE UPPER CRETACEOUS (CAMPANIAN-MASSTRICHTIAN) WILLIAMS FORK FORMATION, NORTHWESTERN COLORADO, USA

Rebecca's Hollow (RH) is a microvertebrate fossil site in the Williams Fork Formation (WFF) part of the Mesaverde Group in northwestern Colorado. Surface collections from RH are predominantly cm-scale lepisosteid (gar) scales and shell fragments of trionychid turtles. Screen washing with hydrogen peroxide has resulted in the recovery of several thousand more mm-scale specimens. The RH assemblage thus far includes osteichthyans (bony fish), amphibians, turtles, crocodiles, dinosaurs, mammals, and coprolites. Osteichthyans are represented by numerous scales, vertebrae, gar teeth, amiid teeth, and pycnodontid pharyngeal teeth. Amphibians are represented by two salamander dentaries. Crocodilian fossils include osteoderms, vertebrae, skull fragments, and teeth, some of which are robust (durophagous) and considered aff. Brachychampsa sp. Some fragmentary osteoderms may pertain to lepidosaurs. The dinosaurs consist of hadrosaurs, theropods, and ceratopsians, all identified from teeth. Mammals are represented by two teeth: an upper right molar of Alphadon sp. and a multituberculate premolar. To date, the mudstone-hosted RH locality lacks chondrichthyans, which are a common component of WFF sandstone-hosted assemblages. Previous WFF collections are fragmentary but diverse, with most cataloged specimens being mammals and dinosaurs, rendering comparisons complex. We interpret RH as a floodplain deposit based on the occurrence of the fossils in a drab mudstone with some pedogenic nodules.

Poster 54
Michael Dickerson, Geology Undergraduate Student
Faculty Mentor: Jamie Levine, Geological and Environmental Sciences
Co-Author(s): Gabriele Casale
Title: INVESTIGATING CLASTIC SEDIMENTS DEPOSITED DURING RIFTING: EBSD AND MINERALOGICAL ANALYSIS OF THE LATE PROTEROZOIC GRANDFATHER MOUNTAIN METACONGLOMERATE OF WESTERN NORTH CAROLINA
The Grandfather Mountain Formation (GMF) conglomerate, exposed within the Grandfather Mountain Window, was deposited during late Proterozoic rifting of Laurentia and was metamorphosed to greenschist facies during the Alleghenian orogeny. We used optical and scanning electron microscopy to investigate the GMF to determine deformation temperatures, strain intensity, and mineralogy. We collected samples from four different outcrops of the GMF. In order to determine crystallographic preferred orientation (CPO) in quartz, grain maps were created using Electron Backscatter Diffraction and were used in Rf-phi and Fry analysis. We found two recrystallization textures in quartz clasts. Rough, irregular boundaries between quartz clasts consistent with bulging recrystallization are common in the samples. We also observed larger polygonal recrystallized grains with smooth, straight borders, similar in size and shape to adjacent subgrains, indicative of subgrain rotation. Bulging and subgrain rotation recrystallization occur at greenschist facies conditions. Quartz c-axis pole figures from matrix grains are broadly consistent with greenschist facies conditions; clast pole figures lack a strong CPO. Differing orientations and strain intensities as well as pole figure variations between the clasts and matrix indicate that the clasts may have experienced a previous deformational and metamorphic event at greater than greenschist facies conditions.

Poster 55
Vanya Dill, Geology Undergraduate Student
Faculty Mentor: Brian Zimmer, Geological and Environmental Sciences
Co-Author(s): Scott Marshall, and Cynthia Liutkus-Pierce
Title: DETECTING EROSION AT THE ENGARE SERO FOOTPRINT SITE, TANZANIA
The Engare Sero footprint site in Tanzania is home to over 400 early hominin footprints which provide insights into the physical stature and social groupings of the printmakers. However, the conditions that favor the preservation of footprints often correspond with those that make uncovered footprints highly susceptible to erosion and the more eroded a print is, the less reliable stature estimates made from it become. This is the case with the Engare Sero footprints. Located in an ephemeral stream channel, the site floods on a regular basis. A previous study (2010-2017) quantified the rate of erosion at three individual prints and noted significant degradation during the study interval. For this study, we used images collected from the same three prints in 2017 and 2022 to

photogrammectrically create 3D models. We then compared these models to identify areas of change. The purpose of this study is to assess the efficacy of a wall and fencing system, installed around the site between 2013 and 2015, in reducing erosion rates by keeping both people and moving water off the footprinted strata. This will help conservationists decide whether walls are a cost-effective way to reduce erosion at other vulnerable sites and whether additional mitigation techniques are needed for the long-term sustainability of this site.

Poster 56

Emma Ferm, Environmental Science Undergraduate Student
Faculty Mentor: Sarah Evans, Geological and Environmental Sciences
Co-Author(s): Sarah E. Godsey, Key Hatch, Rachel Harris, Brandon Yokeley
Title: TEMPERATURE OF RAINFALL IN ARCTIC REGIONS UNDERLAIN BY CONTINUOUS PERMAFROST

Arctic regions are expected to experience warming along with increased precipitation rates and magnitudes, in turn impacting hydrologic fluxes in Northern latitudes. Increased precipitation in Arctic hillslopes in the coming years is predicted to be primarily as summer rainfall. Despite this understanding, little is known about the precipitation dynamics of Arctic landscapes and the influence of heavy precipitation events on ground temperatures and the thawing perennially frozen ground or permafrost. While previous studies assume that precipitation temperature is equivalent to that of air temperature, the accuracy of this assumption is unclear. Here we show that the temperature of precipitation is typically cooler than that of the air temperature for two study sites on the North Slope of Alaska. Results suggest that during summer rain events yielding more than 5 mm of precipitation, the rain temperature typically differed from the air temperature by approximately 0.1-1.6°C, with the majority of differences indicating a cooler rain temperature. These typically cooler rain temperatures indicate the assumption that rain temperature is equivalent to air temperature is not always valid. These findings will aid in our understanding of the controls of increasing rainfall on the land surface in the Arctic which influences ground temperatures and permafrost thaw.

Poster 57

Rachel Harris, Environmental Science Undergraduate Student
Faculty Mentor: Sarah Evans, Geological and Environmental Sciences
Co-Author(s): Dr. Sarah G. Evans (Appalachian State University), Dr. Scott T. Marshall (Appalachian State University), Dr. Sarah E. Godsey (Idaho State University), Emma Ferm (Appalachian State University), Key Hatch (Appalachian State University), Brandon Yokeley (Idaho State University)

Title: USING GEOPHYSICS TO CONSTRAIN SUBSURFACE MASSIVE ICE FORMATIONS ALONG PERMAFROST HILLSLOPES ON THE NORTH SLOPE OF ALASKA, USA

In areas of the Arctic that are underlain by perennially frozen ground known as permafrost, less than half of the subsurface material is ice. However, in some subsurface areas, there are extensive ice formations called massive ice that can be greater than one meter in size and consist almost entirely of ice. The presence of subsurface massive ice exerts a large control on water flow, ground collapse, and consequently, carbon release in permafrost landscapes. While we expect that massive ice exists along hillslopes with seasonally saturated streams underlain by continuous permafrost, it has yet to be accurately mapped and identified. Here, we employ Ground-Penetrating Radar (GPR) surveys and soil cores to suggest that subsurface massive ice chunks known as ice wedges may be present along a seasonally saturated permafrost stream on the North Slope of Alaska. Results from the GPR surveys collected in June 2022 indicate strong reflections at depth, potentially indicating the presence of ice wedges. Soil coring along one of these GPR survey profiles suggests that the ice wedges observed by the GPR survey are deeper than 80 cm. Ongoing inverse modeling using matGPR of the GPR radiograms will help us better constrain the presence of ice wedges in the subsurface. Together, these findings will aid in our understanding of the presence of massive ice formations on continuous permafrost hillslopes, a previously overlooked, but potentially critical source of carbon release in the Arctic.

Poster 58

Luke Rose, Geology Undergraduate Student

Faculty Mentor: Andrew Heckert, Geological and Environmental Sciences

Co-Author(s): N/A

Title: SEDIMENTOLOGY, STRATIGRAPHY, AND TAPHONOMY OF THE UPPER TRIASSIC (REVUELTIAN:NORIAN) HOMESTEAD SITE IN EAST-CENTRAL NEW MEXICO, U.S.A.

The Homestead Site of east-central New Mexico is an extremely diverse Upper Triassic microvertebrate fossil assemblage. Homestead is located in the Garita Creek Fm and represents a non-marine environment. However, its stratigraphic position and deposition are not yet fully understood. The site includes many osteichthyans, tetrapods, and the hybodont shark Reticulodus, a Revueltian (early-mid Norian) index fossil. Strata encompassing Homestead are ~8m thick and correlate to a level ~15-23m above the base of the nearby ~70m thick Garita Creek type section. The Homestead sediments consist of sublitharenite layered with conglomerate, underlain by sandy/silty mudstone and poorly sorted lithic wacke. The fossiliferous horizon lies at the bottom ~0.35m of the site and has weathered out; it is composed of greenish-gray siltstone overlain by reddish-brown mudstone that both exhibit color mottling. This suggests that the depositional conditions involved periods of seasonal drought in a low energy

environment. The water table would have fluctuated, resulting in alternating anoxic and aerobic conditions, producing sediment rich in ferrous (green) and ferric (red) iron respectively. Therefore, Homestead was likely a lacustrine environment, possibly an oxbow lake that filled in and underwent pedogenic modification (soil formation). This would allow for frequent burial of fossils by the accumulation of clays, which preserve many fragile elements that are undistorted yet disarticulated.

Poster 59
Skye-Anne Tschoepe, Environmental Science Undergraduate Student
Faculty Mentor: William Anderson, Geological and Environmental Sciences
Co-Author(s): N/A
Title: MANAGING STORMWATER RUNOFF IN THE HIGH COUNTRY: AN ASSESSMENT OF SALT TRANSPORT THROUGH A CONSTRUCTED WETLAND IN BOONE, NORTH CAROLINA
The South Fork New River (SFNR) watershed in Boone, NC, includes the SFNR and other streams. Road salt affects streams in the watershed through stormwater runoff, and as Boone has urbanized, levels of salinity in the watershed have increased. Stream restoration efforts have not removed salt from the environment. One such location, a constructed wetland parallel to the SFNR, called the Clawson-Burnley Wetland (CBW), is the site of our study. Although there is no significant source of salt in this watershed outside of sodium chloride (NaCl) used for road deicing, an explanation for year-round elevated salinity at this location is that reversed-gradient events, occurring during storms, drive saline water into floodplain aquifers, or in the case of CBW, move salt from the wetland to the SFNR through the floodplain aquifer. We have observed salinities and water levels in the CBW, groundwater, and SFNR to construct a mass-balance of salinity at the CBW to estimate the primary pathways of salt migration. Water level data has shown that, in the winter, approximately 75% of the water entering the CBW is lost before it reaches the outlet where it is directed into the SFNR. We argue that these losses are primarily to the aquifer between the CBW and SFNR, as evapotranspiration is negligible compared to the larger-scale fluxes in surface and ground water. This process prolongs the residence of NaCl in the watershed and directs a consistent flow of salt-laden water into the SFNR year-round.

Poster 60
Jonah Bird, Geography Graduate Student
Faculty Mentor: Bhuwan Thapa, Geography and Planning
Co-Author(s): Stephen Poupart
Title: ARE APPALACHIAN TOWNS & CITIES PREPARED FOR CLIMATE CHANGE? CLIMATE INITIATIVES IN TOWNS & CITIES OF APPALACHIA REGION
Appalachia is facing significant risks to climate change, including flood vulnerability, drought, and forest loss. The region has seen an increase in extreme rainfall in the

recent past, and it is projected that heavy rain and hurricanes will become more frequent and intense (Kunkel et al, 2020). To address increasing climate risks, while some communities have begun implementing mitigation initiatives and strategies, many small towns and cities face significant resource challenges for managing climate risks, with limited financial and technical resources restraining their capacities to incorporate climate change into their planning toolbox. This research evaluates initiatives and strategies undertaken by towns and cities in Appalachia to manage climate risks, and to identify gaps and challenges for managing these risks. The content analysis is conducted on policies and plans regarding climate change, sustainability, and urban green space initiatives of 40 urban areas in the Central, North Central, and South Central regions of Appalachia with populations exceeding 10,000. These urban areas are selected randomly based on location and size. The study contributes to helping better understand the state of climate initiatives in large and small towns in Appalachia.

Poster 61

Vennice Rondinelli-Albarran, Sustainable Development Undergraduate Student
Faculty Mentor: Bhuwan Thapa, Geography and Planning
Co-Author(s): Winifred Rhea-Unruh, Taylor Apel
Title: NATURE-BASED SOLUTIONS FOR CLIMATE RISK MANAGEMENT IN BOONE, NC

Nature-based solutions (NBS) such as open green spaces, riparian buffers, and community gardens offer multiple benefits. The purpose of this study is to identify and evaluate existing nature-based solutions across the Town of Boone including Appalachian State University. Based on literature review, case studies, and interviews with the on-campus Office of Sustainability and other stakeholders, the study will qualitatively document the potential impact of different nature based solutions for reducing climate risk and providing ecosystem services. In addition, we will evaluate specific case studies of NBS that are relevant to ASU and the Town of Boone. The implementation of nature-based solutions could not only provide stormwater benefits, but also create open space and potentially provide mitigation and adaptation benefits to build a city's resilience to climate change and variability. These interventions are likely to strengthen mitigation and adaptation to the town of Boone and the Appalachian University.

Poster 62 Withdrawn

Poster 63

Grace Waugh, Sustainable Technology Undergraduate Student

Faculty Mentor: Jeremy Ferrell, Sustainable Technology and the Built Environment

Co-Author(s): N/A

Title: WASTE TO RICHES: HEATED VERMICOMPOSTING BIN FROM A REPURPOSED SOLAR THERMAL COLLECTOR

In climates such as the high country, frigid winter temperatures and erratic weather patterns often limit the composting and other agricultural endeavors of growers. This project attempts to mitigate this constraint by repurposing an outdated flat plate solar thermal collector into a heated vermicompost bin as a means of maintaining the ideal conditions for vermicompost production year round, allowing farmers not only a means of processing organic waste and creating a nutrient rich soil amendment through the winter, but also creating a secondary revenue stream given the high commercial value of vermicompost and composting worms. The bin was constructed in the late summer and data collection began in the early fall. The system operated unheated through several significant temperature fluctuations until the heating component was added in early December. Data was collected on the bin's internal temperature as well as the heater's energy usage through early February. Over the course of these four months, the worms inside were fed regularly with their productivity qualitatively measured. The resulting data proves promising. While unheated, the bin's environment was largely subject to external temperatures. The addition of the heating component allowed the bin to remain at an almost constant interior temperature at or around the set temperature with relatively little energy input, and the bin was able to process organic waste at regular intervals despite harsh external conditions.

Poster 64

Duncan Burns, Sustainable Technology Undergraduate Student

Faculty Mentor: Sohad Abu-Elzait, Sustainable Technology and the Built Environment

Co-Author(s): Robert Conolly

Title: SMALL WIND AND PHOTOVOLTAIC MICROGRID PERFORMANCE TESTING

As our electric grid experiences higher penetrations of renewable energy it becomes essential to increase our understanding of the way these systems perform in regards to each other. This study will observe the performance of a small wind turbine and photovoltaic array assessing both the systems variability and their overall efficiency. The two systems are connected to a 8.5 kWh lead acid battery storage system within the Sustainable Technology and the Built Environment (STBE) Mobil Lab. The Mobil Lab will serve as both the load for the system and a location for students to monitor the system's power output. The performance of a Primus Air Silent X wind turbine will be tested following the guidelines stipulated by IEC 614100-12 standards. In order to evaluate the turbine the actual power output will be compared to the estimated power output given the wind resource available. The photovoltaic system being observed is a

3kW system installed on top of the Mobil Lab. The output of the systems will be recorded by a CR800 Campbell data logger receiving input from a variety of measurement devices including voltage transducer and current transducers from CR magnetics, NRG 40H anemometers, NRG 200P Wind Vanes, and an NRG T60 Temperature Sensor.

Poster 65
Brandon Ellis, Exercise Science Graduate Student
Faculty Mentor: Dr. Jared Skinner, Public Health and Exercise Science
Co-Author(s): Dr. Travis Triplett, Dr. Ashely Marshall, Bryson Campbell, Hunter Anderson
Title: THE EFFECTS OF COLD WATER IMMERSION ON PREFRONTAL CORTEX OXYGENATION, SALIVARY CORTISOL LEVELS, AND EXECUTIVE FUNCTIONING
PURPOSE: Cold water immersion (CWI) is a form of voluntary cold exposure. During CWI, survival becomes paramount, and executive functioning (EF) becomes imperative. Difficulty with EF is associated with impairments in working memory. This investigation aims to examine effects of CWI on brain activation in the prefrontal cortex (PFC) and EF in young adults. METHODS: 5 healthy young adults (3M; 24.5∓4 yrs) participated. PFC O2Hb levels were collected using near-infrared spectroscopy (fNIRS) and scores on a verbal categorization task (VCT) and NIH Examiner were assessed pre and post-CWI. After baseline collections, participants were immersed in 55℉ water up to the clavicles, for 10 minutes. During immersion, a verbal discomfort scale and a VCT were administered. fNIRS data and VCT data were analyzed using repeated measures ANOVA, and post hoc t-tests were performed. RESULTS: Examination of fNIRS data indicated that change in prefrontal recruitment from baseline to NIH Examiner before CWI was greater than Post CWI (Pre: 2.41∓2.6 vs. Post: 0.30∓0.97, p=0.13). Additionally, change in prefrontal recruitment from baseline to VCT before CWI was higher compared to Post CWI (Pre: 1.78∓1.8 vs. Post: 0.35∓0.97, p=0.06). There were no significant differences and VCT scores pre and post-CWI. CONCLUSION: This study provides preliminary evidence that acute CWI does affect O2Hb levels without negatively affecting EF.

Poster 66
Breanna Gibson, Exercise Science Undergraduate Student
Faculty Mentor: Jared Skinner, Public Health and Exercise Science
Co-Author(s): N/A
Title: ASSESSING HABITUAL AND EXERCISE ACTIVITY OF PERSONS WITH PARKINSON'S DISEASE FOR THE PREVENTION OF FALLS
Falls significantly threaten the independence and quality of life of those with Parkinson's disease (PD). The combination of aging, disease-specific degeneration, and a sedentary lifestyle is linked to increased fall risk. The purpose of this investigation was

to identify which self-reported questionnaires best predicted the differences between healthy older adults and people with Parkinson's Disease. Methods: PD participants were divided into two groups; High sedentary, HS (>6 hrs; n=5, 67.2∓2.4 years) and Low sedentary, LS (<6 hrs, n=4, 71.1∓1.9 years). The questionnaires completed were the Simple Physical Activity Questionnaire (SIMPAQ), the Activities-Specific Balance Confidence scale (ABC), and lastly, the Mini-Mental State Examination (MMSE). Strength was measured by determining the participant's ten repetition max on a leg press, leg extensions, leg curls, back extension, chest press, and overhead press. Results: Significant differences were found between self-reported measures of activity, including sleeping (p=0.002) and recreational exercise (p<.001). ABC scores were significantly lower in the HS group (79.9 vs. 55.2, p=0.04). Cognition scores were significantly lower in the HS group(p=0.03). Strength values were significantly lower for the HS group than the LS group (p=0.04). Conclusion: Assessment of physical activity levels could assist in screening fall risk for individuals with PD.

Poster 67

Natalie Thulien, Exercise Science Undergraduate Student
Faculty Mentor: Jared Skinner, Public Health and Exercise Science
Co-Author(s): Ansley Patton

Title: EFFECTS OF AGING ON GAIT, HAND GRIP STRENGTH AND CORRELATING PHYSICAL ACTIVITY LEVELS FOR OLDER ADULTS IN THE HIGH COUNTRY

Background: Physical function declines with age, but data distinguishing between generations is limited. We aim to identify how gait parameters change with age and how physical activity plays a role in these changes. Methods: Gait parameters were measured using an instrumented walkway in 94 adults (60-92 yr). Groups were separated per decade, Old (60-69), Older (70-79), and Oldest (80+). Qualitative data was collected using the Simple Physical Activity Questionnaire (SIMPAQ), and bilateral hand grip strength was collected using a handheld dynamometer. Group SIMPAQ data were averaged across participants. The average mean for spatiotemporal gait and handgrip strength variables were analyzed. Results: Data revealed significant differences (p<0.05) between the Oldest and other groups in mean and CV. The Oldest group had lower step length (p=0.0216) and velocity (p<00.1) than other groups and increased stride length and velocity gait variability. Handgrip strength was significantly lower in the Oldest group (mean difference=-17.1 lbs, p<0.05) than in the other groups. SIMPAQ data also showed significant differences between groups. Conclusions: This data indicates that our community experiences an overall decline in gait and hand grip strength with age, most significantly in the 80+ group. This data suggests that severe decline in gait function is not as prevalent in the 60-79 age group, possibly due to the increased self-reported physical activity.

Poster 68
Ben Estorge, Nutrition Graduate Student
Faculty Mentor: Manan Roy, Nutrition and Health Care Management
Co-Author(s): Alisha Farris and Danielle Nunnery
Title: EVALUATION OF NUTRITION POLICIES AND PROGRAMS IN INDIA: A LITERATURE REVIEW
Indian policymakers invested in grain crop yields1. While reducing hunger, the policies encouraged minimally diverse diets, increasing access to cheap calories, while promoting obesity rates,2. The prevalence of obesity may triple among Indian adults by 2040.3 Meanwhile, India struggles with anemia4. This study aims to inform policies and programming (P&P) by summarizing existing literature evaluating nutrition P&Ps. Articles from the last 10 years in Science Direct and Pubmed. Search Terms: Obesity, Diabetes, Chronic Disease (CD), Dietary, Food Systems Nutrition Transition, India, programs, programming, Interventions, policies, and prevention, yielding 18 articles. Studies assessed for rigor in evaluating the impact of governmental P&P on obesity and CD trends. All 18 studies included. Findings support a dearth of P&P initiatives addressing burdens of obesity and CDs. Studies focus primarily on women and children. Leveraging female roles at home and in agriculture may yield positive health outcomes for families 5,6,7. Multiple lifestyle interventions and Diabetes Prevention Programs have shown behavior change, weight loss, and CD reduction for adults,9. Short-term, education-based interventions have not changed adult behaviors4,10.Global dietary exposure correlates with obesity in adolescents, increasing risk of developing CDs4,11,12. Researchers call for policies prioritizing nutrition education, increased availability of nutrient-dense foods, and community partnerships 1,2,13.

Poster 69
Megan Hall, Nursing Graduate Student
Faculty Mentor: Rebecca Turpin, Nursing
Co-Author(s): N/A
Title: IS IT TOO LATE FOR US? IMPROVING INTERPROFESSIONAL COMMUNICATION POST LICENSURE
Problem: While interprofessional collaboration is taught to pre-licensed healthcare students during undergraduate studies, continued interprofessional education post-licensure is rare. Background: Through interprofessional collaborative efforts, patient-centered care is enhanced when all members of the patient's care team collaborate to develop realistic mutual goals. The interprofessional team also experiences greater job satisfaction and career fulfillment. Purpose: US Military veterans are a unique patient population requiring specific care for comorbidities related to work-related exposures and injuries, including physical therapy. Guided by theoretical frameworks, this project will provide continuing education for registered nurses and physical therapists by implementing an interprofessional development

module. The module will be delivered within the Veterans Affairs Medical Center. Methods/Summary: An intended audience of physical therapists and registered nurses will collaborate virtually to discuss their roles, education, and training. Afterward, the interprofessional group will analyze a case study collaboratively to develop mutual patient goals and outcomes. A pre and post-educational survey will be implemented to determine initial perceptions and judgments followed by concluding perceptions, judgments, and interest in increased utilization of interprofessional collaborative teams. Results: It is hoped that an increased understanding of healthcare roles from different practice backgrounds will demonstrate knowledge gains. Interprofessional communication gains are expected, as evidenced by newly developed communication strategies across disciplines. An increase in interprofessional collaboration results is expected, as evidenced by participation in mutual patient goal-setting and dual identity development. Participants will hopefully indicate a strong desire to participate in further interprofessional education, as noted by post-survey results.

Poster 70
Rachel Stern, Psychology Undergraduate Student
Faculty Mentor: Doris Bazzini, Psychology
Co-Author(s): N/A
Title: A STUDY ON IMAGINED EVENTS IN ROMANTIC RELATIONSHIPS
The anticipation to expect, perceive and overreact to signs of rejection is a personality trait referred to as rejection sensitivity (RS). Although it is normal to sometimes experience doubt about a romantic partner's commitment, some people are more vulnerable to cues of feared threat. Individuals' hypervigilance to perceived threat in a romantic relationship could lead to an overreaction to ambiguity, inducing insecurity and apprehension. The purpose of this study is to implement the perception of doubt within a romantic relationship (via an imagined hypothetical situation) in order to better understand how RS might influence relationship security and confidence. Raising the possibility of doubt in a relationship is necessary to investigate how a person's RS may affect how they interpret their sense of security and fulfillment in a relationship. Individuals will complete measures of participation in a study involving questionnaires on RS, relationship security and relationship confidence. Additionally, participants will be shown either a high doubt or a low doubt scenario in order to implement doubt manipulation. We hypothesize that people with greater RS will experience a decrease in relationship security and confidence when exposed to a high doubt scenario, as opposed to those low in RS; there will be less differentiation in interpretation for those low in RS. Understanding these factors might give insight into predictors of relationship longevity and satisfaction.

Poster 71
Will Swofford, Chemistry Undergraduate Student
Faculty Mentor: Alexander Schwab, Chemistry and Fermentation Sciences
Co-Author(s): N/A
Title: EQUILIBRIA AND MECHANICAL PROPERTIES IN COPPER(II) CROSSLINKED BIPYRIDINE TERMINATED POLY(DIMETHYL)SILOXANE
Poly(dimethylsiloxane) terminated with 2,2'-bipyridine (bpyPDMS) can be "crosslinked" with Cu(BF4)2. Cu(II) is known to form a variety of complexes with bipyridine (e.g. Cu(bpy)2+, Cu(bpy)22+, Cu(bpy)32+) leading to a complex network structure when bpyPDMS is mixed with Cu(BF4)2. To better understand this network structure, UV-Vis titrations of bpyPDMS solutions with Cu(BF4)2 were performed, and the spectra taken during these titrations were analyzed via model-based deconvolution to extract the molar absorptivity spectra (ϵ) of the individual species. The ϵ are then used to determine the composition (i.e. network branching) in neat films of Cu(BF4)2/bpyPDMS. Furthermore, the network structure is correlated to mechanical properties measured via oscillating shear rheometry. Though four molecular weights of bpyPDMS are available (3300, 6100, 26200, 50000 g/mol) this work is focused on the lowest since it inherently provides a higher concentration of bpy end groups.

Poster 72
Carson Shivers, Chemistry Undergraduate Student
Faculty Mentor: Nicholas Shaw, Chemistry and Fermentation Sciences
Co-Author(s): Freedom Johnson
Title: SYNTHESIS OF 4-AMINO-3-HYDROXYPYRROLE-2-CARBOXYLIC ACIDS FOR NUCLEOTIDE SEQUENCE RECOGNITION
Polyamide-fluorescence resonance energy transfer (FRET) conjugates may detect a signature DNA sequence noted in Crohn's disease in a high-throughput chemical-based approach to gene detection. Binding to a specific sequence of DNA can be achieved with heterocyclic rings that are covalently bound together through repeating amide bonds to form crescent-shaped molecules known as polyamides. The structure of these polyamides allows them to bind the deep and narrow minor groove of DNA and can be engineered to recognize sequences of DNA with high specificity and high affinity. Polyamide-FRET conjugates that consist of repeating N-methyl imidazole and N-methyl pyrrole monomers covalently linked to FRET chromophores will be synthesized. In this system, a polyamide, engineered to specifically bind the 'first half' of the sequence of interest, is covalently bound to a FRET donor fluorophore. Then, a separate polyamide, engineered to specifically bind the 'second half' of the sequence of interest, is covalently bound to a FRET acceptor fluorophore. When introduced to DNA containing the sequence of interest, the two polyamide-FRET conjugates bind their respective portions

of DNA, subsequently placing the FRET donor and acceptor fluorophores in proximity, and FRET activity is observed.

Poster 73
Carter Rodgers, Chemistry Undergraduate Student
Faculty Mentor: Christian Wallen, Chemistry and Fermentation Sciences
Co-Author(s): N/A
Title: COORDINATION OF SMALL PROTIC LIGANDS TO METAL COMPLEXES WITH SECOND-SPHERE HYDROGEN BONDING
Hydrogen sulfide is found in petroleum feedstocks and is poisonous to humans and industrial processes. The Clauss process is the state-of-the-art process that removes ~95% of the hydrogen sulfide from the "sour" gas. Secondary treatment of Claus tail-gas is necessary, but each of these processes have fundamental limitations. The Wallen research group aims to synthesize compounds that utilize second-sphere hydrogen bonding in late first-row transition metal complexes to promote selective binding of hydrogen sulfide for eventual conversion to forms of sulfur that are safer to handle and store. The synthesis of an asymmetric tetradentate sulfonamidate-pyridine ligand and coordination with cobalt(II), nickel(II), copper(II), and zinc(II) will be presented with spectroscopic and crystallographic characterization and computational modeling using DFT methods. The reactivity of these complexes with industrially-relevant small protic molecules, such as hydrogen sulfide, hydrazine, and hydroxylamine will also be discussed.

Poster 74 Withdrawn

Poster 75
Rachel Lowell, Art and Visual Culture Undergraduate Student
Faculty Mentor: Erin Peters, Art
Co-Author(s): N/A
Title: THE PREVALENCE OF DEITIES IN CHILDBIRTH AND FERTILITY ART AND ARTIFACTS FROM ANCIENT EGYPT
In ancient Egypt, art objects that pertain to childbirth, fertility, and the protection of women were closely linked to the ancient Egyptian religion, and Egyptian deities were integral to their function. Objects such as apotropaic wands, birthing bricks, and fertility figurines rely on their connection to protective and childbirth deities Hathor, Taweret, Bes, and Meskhenet for their magical and protective properties. One of the central aspects of ancient Egyptian religion is the concept of rebirth into the afterlife. Therefore, objects related to childbirth and fertility had significance twice in an Egyptian's life. The objects that were used by their parents for their conception and protections as a baby were used a second time in their tombs to aid their rebirth, which is why many of these objects have been found as part of funerary collections. The presence of the deities and

the function of the object cannot be separated, since it is the connection of the object to a deity that gives the object its properties.

Afternoon Oral Session 3 - 1:00pm-2:20pm 415 Plemmons Student Union

1:00pm
Josie Beasley, Biology Undergraduate Student
Faculty Mentor: Chequita Brooks, Biology
Co-Author(s): Rachel Bleich, Kevin Zwetsloot, Michael Opata
Title: INVESTIGATING EXERCISE'S IMPACT ON INTESTINAL INTEGRITY AND IMMUNE ACTIVATION
Exercise is an important component in maintaining physical health. Participation in regular aerobic exercise is associated with a reduction in systemic inflammation which is particularly beneficial in ameliorating cardiovascular and respiratory conditions. However, little is known about exercise's impact on the health of the gastrointestinal tract. The intestinal immune system plays an important role in maintaining homeostatic control through interaction with commensal microbiota and foreign pathogens. Macrophages have a unique role in this dynamic through clearing of penetrating bacteria from the epithelial surface into the lamina propria of the intestines. In addition, macrophages can impair epithelial integrity through cytokine release, contributing to endotoxemia and thus systemic inflammation. We investigated the effect of exercise on macrophage presence in the small and large intestine and gut integrity using a murine exercise model. Mice were randomly assigned to sedentary or free-wheel running conditions for nine weeks. Intestinal permeability was quantified using FITC-dextran oral gavage and detecting FITC concentration in serum. Proportion of macrophages was determined by flow cytometric analysis. This study allows us to characterize the interplay between exercise and its effects on gut health which could be used in future treatment recommendations for patients with inflammatory conditions.

1:20pm
Francois Desautels, Biology Undergraduate Student
Faculty Mentor: Andrew Bellemer, Biology
Co-Author(s): N/A
Title: THERAPEUTIC TREATMENTS FOR EPILEPSY IN DROSOPHILA MELANOGASTER
Epilepsy affects approximately 50 million people worldwide. Epilepsy is characterized by seizures, which is the result of abnormal electrical activity within neuronal networks causing convulsions, muscle spasms, and unconsciousness. Drosophila melanogaster is an excellent model organism for studying epilepsy because 60% of their genes have a homologous human gene, they have short generation periods, and they are powerful genetic tools that allow us to investigate the molecular mechanisms of nervous system function. In this study we examined possible therapeutic treatments for epilepsy using a "bang-sensitive" seizure-prone mutant fly line (Para(bss1)) which contains a gain-of-function mutation within the alpha subunit of its sodium voltage-gated

channels. Previous literature has shown that anandamide (AEA) and its metabolite arachidonic acid (AA) reduce the proportion of para(bss1) flies that seize following mechanical stimulation, but no one has asked what their effects on seizure severity may be. We define seizure severity as the time it takes the flies to recover from a seizure. We demonstrate that AEA, its metabolite AA, and fish oil reduce seizure severity in para(bss1) flies showing promise as possible therapeutic treatments for epilepsy. The exact mechanisms by which these manipulations reduce seizure severity is not fully understood and are still under investigation within the lab. Additionally, we are currently testing AA metabolites and drugs that are inhibitors of enzymes that metabolize AA to see how they may affect seizure severity.

1:40pm
Madeline Wight, Biology Graduate Student
Faculty Mentor: Rachel Bleich, Biology
Co-Author(s): Aline M. A. de Souza, Chequita Brooks, Crystal A. West
Title: IMPACT OF SEVERE FOOD RESTRICTION ON GUT MICROBIOME DIVERSITY AND THE CARDIOVASCULAR SYSTEM
Intestinal bacteria live in a complex environment and play an essential role in nutrition and energy expenditure. With approximately one trillion gut microbes, the human gut microbiome plays a crucial role in human health and is strongly controlled by dietary factors. Food restriction, commonly found in people with eating disorders such as Anorexia Nervosa, is characterized by a persistent and intense reduction in calorie intake. Chronic restrictive eating is known to cause abnormalities in the body, including in the cardiovascular system. Post-recovery, these abnormalities can leave a lasting impact on the body. In addition, severe food restriction (SFR) adversely affects the composition of the gut microbiome. These changes are linked to the activation of the Renin-Angiotensin-Aldosterone System, which increases the risk for cardiovascular disease. Loss of microbial diversity in the gut could adversely affect nutrient absorption and utilization, resulting in weight gain difficulties and possible long-term health consequences. Using a severe food restriction model, we aim to examine the change in microbial species diversity of Sprague rats' gut microbiome. Rats in the experimental group undergo 60% of their normal rat diet for two weeks, while the control group receives their normal diet. After two weeks of caloric restriction, rats proceed through 3 months of refeeding. In both groups, fecal samples are collected. DNA is extracted and applied to 16S rRNA sequencing analyses to identify bacterial taxa and assess biodiversity changes. Phylogenetic analysis of 16S rRNA sequences after two weeks of caloric restriction indicates changes in Lactobacillus and Bacteroides populations. Although the data analysis was focused on a 1% or greater abundance of species, changes were evident. The results of our study emphasize the importance of diet and calorie intake in maintaining a healthy microbiome, which contributes to the maintenance of well-being.

2:00pm

Elva Swibold, Biology Undergraduate Student

Faculty Mentor: Lynn Siefferman, Biology

Co-Author(s): N/A

Title: THE EFFECTS OF HIDDEN NEST ECTOPARASITES ON THE DEVELOPMENT OF A SEXUALLY SELECTED TRAIT IN JUVENILE EASTERN BLUEBIRDS

Communication styles become signals when a behavior is elicited from the receiver. Because Eastern bluebirds (Sialia sialis) retain their natal flight plumage into their first breeding season, they are a model wild organism to study how natal condition affects the development of ornamental traits. Reliable signals of body condition can mediate parent-offspring interactions–perhaps to offset effects of parasites–as well as play a role in sexual selection, when the ornament is perceived as a measure of quality. Our research goal was to elucidate the effects of ectoparasitism by Protocalliphora sialia blowflies on bluebird plumage coloration. We experimentally modified parasite presence in nest boxes using pesticide fumigation or a sham fumigation treatment and incorporated nests with natural variation in parasite load. We then monitored the growth of nestlings in the 2021 and 2022 breeding seasons in Watauga Co. NC. Just prior to fledging, we collected feather samples to measure feather brightness, and after fledging, we collected nests to quantify parasite load. We found an interaction between sex and parasite presence, suggesting that parasitized female nestlings grew duller feathers while males did not. Our results suggest that UV-blue structural plumage in female juvenile Eastern bluebirds is at least partially condition-dependent and may help to explain why plumage color predicts parent-offspring interactions and reproductive success in Eastern bluebirds.

Afternoon Poster Session 1 - 1:00pm-2:30pm Parkway Ballroom
Posters 80-107

Poster 80
Gabby Andux, Recreation Management Undergraduate Student
Faculty Mentor: Jill Juris, Recreation Management and Physical Education
Co-Author(s): Jack Carson, Katherine Uva, and Raven Weaver
Title: LEISURE AS COPING DURING COVID-19: A STUDY OF COLLEGE STUDENTS
College students are prone to stress. COVID-19 was especially stressful due to uncertainty and drastic changes to everyday life. College student stress can lead to maladaptive coping behaviors such as poor eating habits and binge drinking. Leisure can be thought of as the participation in meaningful activities (i.e. reading, playing sports) during a time free of responsibilities and obligations. Leisure coping can provide short-term (i.e., reduction of stress) and long-term outcomes (i.e., overall good health). The purpose of this study is to evaluate the relationship between college students' leisure coping (beliefs and strategies) and their health status during one semester of COVID-19 (Spring 2020). Students (n=273) enrolled in two universities located in the Northwest and Southeast regions of the United States completed an online survey that included Iwasaki and Mannell's (2000) Hierarchical Dimensions of Leisure Stress Coping Model and a single-item question of health status. Results from scatter plots and correlations analysis will indicate the relationship between leisure coping and self-reported health status. Implications will be discussed of how universities can benefit from knowing how to mitigate stress in college students by offering leisure activities.

Poster 81
Caeden Carter, Geology Undergraduate Student
Faculty Mentor: Andrew Heckert, Geological and Environmental Sciences
Co-Author(s): Luke Rose
Title: TAPHONOMY, WITH AN EMPHASIS ON PRESERVATION BIAS, OF THE REVUELTIAN (UPPER TRIASSIC: NORIAN) AGED HOMESTEAD SITE VERTEBRATE FOSSIL ASSEMBLAGE FROM THE GARITA CREEK FORMATION OF EAST-CENTRAL NEW MEXICO, USA
Microvertebrate sites contain vast and diverse detailed indicators of paleofauna, with an abundance of teeth, bones, coprolites, and other fossil evidence potentially creating a clear picture of the paleoenvironment. The Homestead site is in the Garita Creek Formation of east-central New Mexico, which is part of the Chinle Group, and is Revueltian (late Tr: Norian) age. The HS assemblage fossils consist of picked bags (bags of fossils, picked by a professional collector) and the remaining concentrate (sediment left over from being picked). Previous students studies demonstrate that the sample from the picked bags were 4% coprolites, 51% bones, and 45% teeth with a sample size

of 1442 fossils. To examine the smaller fossils we used three different sizes to separate the picked bags: 4mm, 2mm, 1mm. The FFF (Finding Fossils on Friday) volunteers sort and label all fossils that were found; diagnostic fossils are immediately labeled and placed within a plastic vial and others sorted on a picking grid. After a volunteer has finished picking, they then input this data into a spreadsheet. Three picked bags have been sorted, labeled, and counted with a total sample size of 655 fossils. The breakdown of the picked bags is 4mm having 74% tooth fragments, and 26% bone fragments. For 2mm: 88% tooth fragments, and 12% bone fragments. For 1mm: 92.2% tooth fragments, 5.2% bone fragments, and 2.6% scales. This shows that screen washing concentrate should recover disproportionate teeth.

Poster 82

Renee Dunn, Geology Undergraduate Student
Faculty Mentor: Andrew Heckert, Geological and Environmental Sciences
Co-Author(s): Alyssa Wurtz

Title: HYDROGEN PEROXIDE BREAKDOWN OF FOSSILIFEROUS SEDIMENTS FROM UPPER CRETACEOUS MICROVERTEBRATE SITES IN THE WILLIAMS FORK FORMATION, NORTHWESTERN COLORADO

Vertebrate paleontologists identify the bulk of past diversity by collecting microvertebrate fossils. Sediments have been collected from the Upper Cretaceous (Edmontonian), Williams Fork Formation in northwestern Colorado from microvertebrate sites Rebecca's Hollow (RH) and Super Charger Heaven (SCH). Rebecca's Hollow yields osteichthyans (bony fish), amphibians, turtles, crocodiles, dinosaurs, and mammals. Due to close proximity, we expect similar results from SCH. Screen washing is a technique commonly used by paleontologists to reveal microvertebrate fossils from collected sediment for further studies. Traditional screen washing methods consist of soaking sediments in water with agitation. Screen washing with water showed an average of 15-40% sediment breakdown at RH and 93% at SCH. Anecdotal reports suggest that the addition of hydrogen peroxide (H_2O_2) has increased the amount of sediment breakdown. Greater breakdown means a higher concentration of fossils relative to sediment, making it easier to pick and sort. Thus we soaked sediments in hydrogen peroxide for 5-20 minutes, observing off gassing as it breaks down the clays, then we rinsed it in water for 24 hours. This method causes no visible damage to fossils and has shown an increased average percent breakdown of 87% for RH and 96% for SCH. The addition of hydrogen peroxide has reduced sediment for picking by 50% making this a more efficient method of screen washing.

Poster 83

Trishlyn Pannell, My major was not listed Undergraduate Student

Faculty Mentor: Bhuwan Thapa, Geological and Environmental Sciences

Co-Author(s): N/A

Title: UNDERSTANDING THE RELATIONSHIP BETWEEN WINDBREAKS AND WIND-RELATED CROP LOSS

Windbreaks are linear plantings of trees and shrubs designed to provide economic, environmental, and community benefits. These practices can help reduce soil erosion, improve water quality, and protect crops and livestock. The study will investigate the relationship between windbreaks and wind-related crop loss. First, we will synthesize existing literature that documents the relationship between windbreaks and crop loss. Second, we will evaluate the relationship between the distribution of crop loss and wind events for Nebraska and Kansas. Windbreaks could provide an effective and low-cost strategy for wind damage reductions in while providing a range of benefits that can help to protect farms, communities, and the environment from the impacts of wind events and other climate-related risks.

Poster 84

James Auwn, Biology Undergraduate Student

Faculty Mentor: Andrew Bellemer, Biology

Co-Author(s): N/A

Title: IDENTIFYING THE ROLE OF EUKARYOTIC TRANSLATION INITIATION FACTOR 3G1 IN NOCICEPTION

The Bellemer lab seeks to investigate the cellular and molecular factors that influence nociceptor sensitivity. Nociceptors, or the neurons involved with the perception of pain, can be manipulated using tissue specific knockdown in Drosophila melanogaster. The D. melanogaster model is a powerful tool for investigating novel genetic factors involved with nociception. The roles of these novel genetic factors in nociception can be identified via RNAi knockdown; behavioral, molecular, and microscopic assays are then used to assess the effect produced. The knockdown of eukaryotic translation initiation factors have previously produced defects in nociceptor morphogenesis and behavioral response. Eukaryotic translation initiation factor 3 subunit g1, or eIF3g1 when knocked down results in high order branch loss and a decrease in total dendrite length, along with significant latency in larval nociceptive response time. As an ongoing project to investigate the roles of all seven eIF3 subunits in D. melanogaster nociception, thermal nociceptive assays were conducted to report the role of eIF3g1 in the behavioral facet of nociception. Based on the results, several models of eIF3g1 function in the pathway for nociceptor development are proposed, and plans for investigating the behavioral, molecular, and morphological effects of this subunit–and future subunits–on nociception are discussed.

Poster 85
Benjamin Crawford, Biology Undergraduate Student
Faculty Mentor: Annkatrin Rose, Biology
Co-Author(s): Annkatrin Rose
Title: SEQUENCE IDENTIFICATION AND METABOLIC ANALYSIS OF ENDOPHYTES IN SHINING CLUBMOSS (HUPERZIA LUCIDULA)
The objective of this research project is to extract, analyze, and sequence the endophytic fungi found in the Shining Clubmoss (Huperzia lucidula). Endophytes are fungi or bacteria that live symbiotically within or near the healthy plant tissue. ~300 endophytes have been isolated, with around 20 highlighted to be of interest through a metabolite analysis. Fungi can produce secondary metabolites of special interest to medicinal research, such as Huperzine A. This secondary metabolite inhibits Acetylcholinesterase (AChE); found to be effective in treating Alzheimer's disease. Several strains were tested via HPLC analysis and an enzyme inhibition assay. This proved there is a presence of Huperzine A at varying amounts. Only the highest producing endophytes were processed for identification. The process began with a DNA extraction and polymerase chain reaction (PCR) to amplify the target DNA sequences. The DNA was then cloned into plasmids and sent off for DNA sequencing. The results elicited that we isolated endophytes both from the Ascomycota and Zygomycota phyla. Results from this study can be utilized in future projects to indicate target endophytes that can be cultured for the production of Huperzine A. Further research is being performed to examine the endophytic profile of the plant and surrounding soil using metagenomic sequencing. This will allow for the identification of endophytes unable to grow on medium as well as how they interact with the environment.

Poster 86
Matthew Johnson, Biology Undergraduate Student
Faculty Mentor: Jennifer Geib, Biology
Co-Author(s): Emma Rasco, Mary Frances Burrow
Title: VIRAL SPILLOVER FROM HONEYBEE APIARIES IN NATIVE BEE POPULATIONS
The objective of the study is to quantify infection rates in populations of honeybees (Apis mellifera) and native bees found near apiaries in the Piedmont of North Carolina. Previous literature shows that honey bee viruses are a prime malignant force on honeybee health and are also spilling over into populations of native bees. These viruses harm bees by causing paralysis and death and are spread through sharing of floral resources and parasitic mites. 400 bees were sampled near two large commercial apiaries. Samples were labeled and stored at -80oC until viral identification. In order to quantify viral infection rates, samples will be homogenized and RNA will be extracted, converted to DNA, and amplified with primers specific to the 2 viruses being tested (Deformed Wing Virus type A and type B). The amplified DNA will then be run through

a gel to separate each amplified Viral DNA by size for identification. This research will be useful to understand the potential for harm to local bee populations of importing non-native species like honeybees for commercial agricultural pollination. Infected honeybees may also transmit these infections to other honeybee apiaries causing a decline in the apiary populations as well.

Poster 87 Withdrawn

Poster 88
Bryce Norvell, Biology Graduate Student
Faculty Mentor: Suzanna Brauer, Biology
Co-Author(s): Sarah Carmichael
Title: THE EFFECTS OF SUBSTRATE GEOCHEMISTRY ON THE DISTRIBUTION OF MANGANESE OXIDIZING BACTERIA IN CAVES
The upper Tennessee River Basin is rife with caves, which are abundant in manganese oxidizing bacteria. However, the composition of these microbial communities has been rarely studied and is poorly understood. This experiment aims to document and compare the microbial communities of Worley's Cave in Sullivan County, Tennessee, Daniel Boone Caverns in Scott County, Virginia, and Linville Caverns in North Carolina. More specifically, how substrate geochemistry effects the distribution of microbial taxa within the caves. Bacteria taxa and relative abundance will be quantified via Illumina Miseq, using the bacterial 16S RNA gene sequence. Cave sediment samples will be tested using X-ray diffraction analysis to determine the clay mineralogy in the sediment samples and analyze the structure of manganese oxides. Whole rock geochemistry will be used to determine the elements in the sample. We expect to find a correlation between geochemical makeup of the sediment samples and the composition of the microbial community within.

Poster 89
Sara Palega, Biology Graduate Student
Faculty Mentor: Andrew Bellemer, Biology
Co-Author(s): Rebeccah Stewart
Title: THE ROLE OF THE RNA-BINDING PROTEIN, PUMILIO, IN THE REGULATION OF NOCICEPTION
Chronic pain affects over 50 million people in the United States annually. Chronic pain arises from neuroplastic changes that alter the sensitivity of pain sensing neurons called nociceptors. Elucidating the molecular regulation mechanisms that lead to greater pain sensitivity will shed light on how to treat chronic pain. An important layer of regulation in neurons is the post-transcriptional regulation of mRNA. The control of which transcripts are translated into proteins, when and where they are translated, and in what quantity can all affect the sensitivity of neurons through affecting their signaling.

RNA-binding proteins are a crucial part in this process due to their ability to bind mRNA transcripts and affect their expression. The RNA-binding protein, Pumilio, is hypothesized to be a post-transcriptional regulator of nociceptor sensitivity. Pumilio RNAi knockdowns in D. melanogaster larval nociceptors leads to mechanical and thermal hypersensitivity, suggesting pum could be limiting baseline nociceptor sensitivity. Pumilio has been shown to repress the translation of the voltage-gated sodium channel, Para, in motor neurons. This sodium ion channel is responsible for depolarization during action potentials, suggesting that the increased sensitivity observed in pum knockdown larvae could be a result of decreased repression of Para translation. This interaction will be researched further by tagging Para transcripts with Green Fluorescent Protein and observing its fluorescence in Drosophila nociceptors. By doing this, the effect of pumilio RNAi knockdown on the expression of Para can be visualized. If the knockdown of Pumilio results in hypersensitivity through the regulation of the ion-channel Para, it is expected that an increase in the expression of Para will be seen when Pumilio is knocked down.

Poster 90

Juanita Valencia Rincon, Biology Undergraduate Student
Faculty Mentor: Chequita Brooks, Biology
Co-Author(s): Chequita Brooks, Suzanna Brauer, Rachel Bleich

Title: MICROBIAL DIVERSITY IN THE APPALACHIAN STATE UNIVERSITY DUCK POND

Due to the increasing pressure on natural ecosystems, developing a greater understanding of microbial diversity in urban ponds plays an important role in sustainable urban development. The majority of research on freshwater ecosystems focuses on larger bodies of water and as a result, urban ponds and their microbial diversity are highly neglected. To explore the microbial diversity in this environment, we collected three water samples and three sediment samples from the Duck Pond, an urban pond, located on the Appalachian State University campus. The water samples were collected directly from the shore, then horizontally across a distance of four feet, and six feet. The water samples did not vary in pH but did vary in temperature and turbidity. Sediment samples were also taken from the same three locations and did not vary in pH but did vary in temperature. The microbial communities from all the samples were then sequenced for analysis using 16S rRNA amplicon sequencing. The same three water samples were also analyzed for trace elements and nitrogen species. These results will be essential for characterization of the microbial communities within the urban pond. Advancing the knowledge of pond ecosystems and the microbial diversity will help increase understanding about the opportunities they provide in sustainable urban development, global cycles, and monitoring public health risks.

Poster 91
Hailey Ward, Biology Graduate Student
Faculty Mentor: Maryam Ahmed, Biology
Co-Author(s): Darren Seals
Title: MELITTIN IN COMBINATION WITH VESICULAR STOMATITIS VIRUS FOR THE TREATMENT OF TRIPLE NEGATIVE BREAST CANCER
Vesicular stomatitis virus (VSV) is currently being investigated as a candidate oncolytic agent due to its ability to target cancer cells and modulate components of the tumor microenvironment. However, not all cancer cells are sensitive to infection and killing by VSV. There is therefore a need to investigate combination approaches to augment the oncolytic activity of VSV. My project aims to test whether melittin, an anticancer bioactive component of honeybee venom, synergizes with VSV for the treatment of triple negative breast cancer. Moreover, we also will test for modulation of M2 macrophages, a main component of the tumor microenvironment. We hypothesize that melittin, in combination with an immunogenic strain of VSV (rM51R-M virus) will decrease the viability of cancer cells, kill M2 macrophages, or transform them to an inflammatory M1 phenotype. Our results show that melittin alone decreases the viability of M1 and M2 macrophages by approximately 50% to 60% by 24 hours. Naïve M0 macrophages were also susceptible to killing by melittin at concentrations above 2.5 g/ml. When M0 macrophages were treated with melittin (above 5g/ml) in combination with rM51R-M virus, we observed a synergistic effect on cell killing. This preliminary data suggests that melittin does not impact the ability of VSV to infect macrophages and future studies will test how this combination approach modulates M2 macrophages as well as breast cancer cells.

Poster 92
Rebecca Foley, Chemistry Undergraduate Student
Faculty Mentor: Christian Wallen, Chemistry and Fermentation Sciences
Co-Author(s): Morgan Hern, Carter Rodgers
Title: EFFECTS OF ALTERED LIGAND STRUCTURE ON THE COORDINATION OF INDUSTRIALLY-RELEVANT PROTIC MOLECULES TO SULFONAMIDATE METAL COMPLEXES WITH SECOND SPHERE HYDROGEN BONDING
Hydrogen sulfide is a common pollutant found in natural gas feedstocks that is a toxic gas and catalyst poison. The state-of-the-art process for removing hydrogen sulfide from “sour” gas, the Claus Process, leaves behind 2-5% of the hydrogen sulfide in the tailgas, necessitating secondary treatment. Existing technologies for this secondary treatment have fundamental limitations. The Wallen group is exploring the use of second-sphere hydrogen bonding to promote selective binding of hydrogen sulfide to late first-row transition metal complexes to inform the design of next-generation Claus tailgas oxidation catalysts. The synthesis of two sulfonamidate ligands, one with a cyclic ether and one with an aryl ether, and their coordination to cobalt(II), nickel(II), copper(II),

and zinc(II) will be presented with crystallographic and spectroscopic characterization. The reactivity of these complexes with hydrogen sulfide, hydrosulfide, hydroxylamine, hydrazine, and hydroxide will also be discussed.

Poster 93
Morgan Hern, Chemistry Undergraduate Student
Faculty Mentor: Christian Wallen, Chemistry and Fermentation Sciences
Co-Author(s): Carter Rodgers, Becky Foley
Title: COORDINATION OF INDUSTRIALLY-RELEVENT PROTIC MOLECULES TO METAL-SULFONAMIDATE COMPLEXES WITH SECOND-SPHERE HYDROGEN BONDING
Hydrogen sulfide is a toxic gas often found in significant concentrations in petroleum feedstocks such as natural gas. The state-of-the-art technology for removing hydrogen sulfide from this "sour" gas is the Claus Process, which converts hydrogen sulfide into elemental sulfur, a form of sulfur that is less toxic and more amenable to safe storage and handling. However, the traditional Claus process only removes 95-97% of the hydrogen sulfide from the sour gas and secondary treatment is required to remove the remaining amount. The major tailgas treatment processes each have fundamental limitations, creating a need for improved catalysts for hydrogen sulfide capture and oxidation. The Wallen research group is focused on the use of second-sphere hydrogen bonding to promote the coordination of hydrogen sulfide to late first-row transition metals to inform the future design of next-generation catalysts used in Claus tailgas processing. The synthesis of an electronically-diverse set of tetradentate asymmetric sulfonamidate-ether ligands and corresponding metal complexes will be presented with spectroscopic and crystallographic characterization. The coordination chemistry and reactivity of these complexes with industrially-relevant small protic molecules such as hydrogen sulfide, hydrazine, and hydroxylamine will also be presented.

Poster 94 Withdrawn

Poster 95
Heide Emmanuel, Graphic Design Undergraduate Student
Faculty Mentor: Bhuwan Thapa, Geography and Planning
Co-Author(s): Emily Suit
Title: PATHWAYS FOR STRENGTHENING CAMPUS SUSTAINABILITY INITIATIVES AT APPALACHIAN STATE UNIVERSITY
Rapid changes in temperature and precipitation events have triggered actions across different sectors over the last several decades. In the last decade, universities and colleges across the nation have developed and implemented sustainability and climate action plans. The primary goal of this research is to compare sustainability and climate efforts with other universities in North Carolina. Appalachian State University (ASU)

has initiated sustainability efforts by promoting carbon neutral commuting, zero waste practices, and renewable energy usage, while other universities such as the University of North Carolina at Chapel Hill have created zero waste landfills, water reclamation programs and have reduced greenhouse gas emissions drastically since 2007 (UNC, 2022). We will perform content analysis of the sustainability plans, and also organize informal meetings with stakeholders, including faculty at the office of sustainability, staffs of Appalachian Climate Action Collaborative, and local experts. Comparing sustainability and climate change efforts with other universities allows for the ideation of strategies, develop recommendations, and thereby strengthens current initiatives at ASU. Some of these recommendations may include, continuing the decrease of greenhouse gas emissions, increasing the number of carbon-neutral commuters, and increasing the effectiveness of recycling as well as waste management.

Poster 96
Abigail Branco, Psychology Undergraduate Student
Faculty Mentor: Shawn Bergman, Psychology
Co-Author(s): Aidan Powell, Robert Gruber, Brenna McNamara, Samantha Plourde
Title: CAN PSYCHOLOGY STUDENTS SOLVE TOP INDUSTRY ISSUES?
Despite the discipline's popularity, psychology graduates remain underemployed (The Ladders, 2019; National Center for Education Statistics, 2019). Our previous research found that during their undergraduate career, psychology students obtain job-ready knowledge, skills, abilities, and other qualifications (KSAO) (Sterling et al., 2021). We aim to prepare students to market themselves by connecting their KSAOs to top workforce issues. We conducted a literature review to attain a big-picture perspective on relevant industry issues. Researchers reviewed articles to create lists of recurring issues. The team met to condense the lists into themes. Later, we found the most specific issue in each theme that undergraduate students are fit to handle with credible resource validation. Our review revealed ten issues we hypothesize students can solve (Table 1). We expect solving these issues will make students marketable. We intend to create a capstone class where students will develop operationalized interventions they can use entering the workforce. Thinking through scenarios will also prepare students to answer situational interview questions. We value finding data-driven solutions; thus, the course will utilize our research and the evidence-based practice framework (CEBMa, 2014). Teaching psychology students they can solve top industry issues and granting them practice opportunities in a class setting will boost their knowledge of workplace practice and confidence in their abilities.

Poster 97 Withdrawn

Poster 98
Olivia Hydzik, Psychology Undergraduate Student
Faculty Mentor: Yalcin Acikgoz, Psychology
Co-Author(s): Ena Hodzic, Samuel Whiteheart, Aspen Wood, Mary Covington, Alexis Jones, Ty Graves, Madison Culver
Title: REMOTE OR IN PERSON WORK: HOW DO PERSONALITY AND QUALIFICATIONS RELATE TO PERFORMANCE?
After the COVID 19 pandemic forced many office workers to work remotely, many employers are now trying to bring their employees back to the office. However, many employees are resisting these calls, with claims that they can be equally, if not more productive while working remotely. Anecdotal evidence suggests that work performance can fluctuate in remote or in-person environments and from person to person. The concern when workers telecommute, is that there will be less monitoring, less innovation, and less communication. However, which the environment generates better performance on average has not been well understood. There are differences in predictors of performance in remote vs. in-person settings is another under-researched area. Accordingly, acknowledging that this is an empirical question, this study will investigate work performance of individuals in remote or in-person work environments and attempt to explain why each person's work performance was inhibited or enhanced. The participants will be shown two different tasks and instructed to perform each task within both environments. The task asks the participant to complete a spelling error check. Participants are asked to complete the task as quickly and as accurately as possible. Once participants complete their tasks, they are asked to do a survey measuring their personality and other potentially relevant constructs to explain the reasons they may perform better when doing remote work instead of in-person, or vice versa.

Poster 99
Layla Koroleva, Applied Data Analytics Graduate Student
Faculty Mentor: Jason Xiong, Computer Information Systems
Co-Author(s): N/A
Title: ANALYSIS OF THE RELATIONSHIP BETWEEN FEMALE EDUCATION AND BUSINESS OWNERSHIP IN NORTH CAROLINA
Understanding demographic trends helps local governments in policy development, aids non-profit organizations in finding areas of the most social impact, and assists for-profit organizations in setting their marketing strategies. NAICS sector 51, Information industry, and NAICS sector 54, Professional, Scientific, and Technical Services industry, are affected greatly by recent innovations in technology. This research offers an assessment of demographic trends in the aforementioned sectors in North Carolina and identifies several important trends and patterns, such as increasing total and small business ownership share by women and Asians. Next, this research presents a

correlation ($r = 0.901$, $p = 0.006$) and regression analysis ($\beta = 0.901$, $t = 4.66$, $p = 0.006$) between the number of degrees in computer and information sciences awarded to women by the University of North Carolina (UNC) System and the business ownership share by women in the aforementioned sectors. The demographic data related to business ownership in North Carolina was obtained from the United States Census Bureau, and demographic data related to the number of degrees awarded was obtained from the UNC System online database. The results of this research provide an understanding of how demographic trends in business ownership are reshaping North Carolina and provide insights about formal education as one of the important predictors of future trends in business ownership.

Poster 100
Shawn Roberts, Exercise Science Graduate Student
Faculty Mentor: Alan Needle, Public Health and Exercise Science
Co-Author(s): Kelsey Holmes, Mabry Watson
Title: STARTLE RESPONSE DURING DYNAMIC MOVEMENT AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION
Individuals who have previously undergone anterior cruciate ligament reconstruction surgery (ACLR) have been shown to have an increased risk of injury when compared to those who have never injured their ACL. Sudden extreme cognitive arousal, such as in the case of a startle, can also cause altered movement patterns that create a greater risk of ACL injury. This study aimed to test whether or not people who have undergone and recovered from ACLR are at a greater risk of reinjury due to the changes in motor planning that occur following startle when compared with healthy individuals. To test this, 30 individuals (15 ACLR, 15 healthy) performed 15 hop-cut tasks from a 30 cm box placed 70 cm from force plates while movement was tracked with reflective markers. During these movements the participants were randomly startled by a projectile fired in front of their head. The joint angles, moments, and muscle activity from the knee joint will be compared across groups. Results are forthcoming. Our hypothesis that individuals will present increased knee joint stiffness and valgus collapse my provide insight into mechanisms of re-injury following ACLR, directing further rehabilitation efforts.

Poster 101
Dara Kodack, Exercise Science Undergraduate Student
Faculty Mentor: Andrew Shanely, Public Health and Exercise Science
Co-Author(s): Noah C. Kaufmann, K. Bryan Taylor, Emily C. Bauer, Favian Morales, Camryn Olsen, N. Travis Triplett, Jeffery M. McBride
Title: EXPLORING THE RELATIONSHIP BETWEEN VISCERAL ADIPOSE TISSUE AND SKELETAL MUSCLE DENSITY

Skeletal muscle (SM) density is a relatively novel assessment that can be measured via pQCT. Decreased SM density has been shown to be associated with an increased risk of disease. Visceral adipose tissue (VAT) is a highly reactive endocrine organ that can be measured via DEXA, a relative common device. If VAT, measured by DEXA, is predictive of SM density, this opens the possibility for a more accessible way to estimate SM density as DEXA machines are more common than pQCT scanners in the medical world. PURPOSE Examine the relationship between VAT and SM density. METHODS 31 healthy volunteers (14f, 17m; 33.4±13.6y, 26.4±7.7% body fat) participated in this preliminary cross-sectional study. Body composition and VAT were measured by DEXA. Intramuscular fat area and SM density were measured by pQCT. Correlations between measures of total percent body fat and VAT mass, intramuscular fat area, and SM density were calculated using Pearson's partial correlation coefficients, while controlling for age and sex. The ASU IRB approved this study (HS-22-8). RESULTS VAT mass and intramuscular fat area were related to percent body fat ($r=.695$, $p<.001$; $r=.792$, $p<.001$, respectively). SM density was inversely related to VAT mass ($r=-.693$, $p<.001$). CONCLUSION These preliminary data confirm previous findings of relationships between percent body fat and VAT, intramuscular fat area, and SM density. These data also demonstrate an inverse relationship between SM density and VAT.

Poster 102

Favian Morales, Exercise Science Undergraduate Student
Faculty Mentor: Tamaro Hudson, Public Health and Exercise Science
Co-Author(s): Collis Brown

Title: STABLY TRANSDUCED ANNEXIN 2 AND SPINK1 INDUCED DIFFERENTIAL PROSTATE CANCER GROWTH

We propose that different genes associated with the progression of prostate cancer (PrCa) can be used to attenuate growth, creating new gene therapy options for prostate cancer. This was based upon preliminary data from our lab which showed that in a case-control study of African American men at different stages of PrCa, annexin 2 (ANX2), a surface phospholipid-binding protein, was significantly suppressed as PrCa disease progressed. Conversely, protein expression of the serine peptidase inhibitor, kazal type 1 (SPINK1/TAT1), a trypsin inhibitor, significantly increased at certain stages of PrCa disease. To test whether altering ANX2 and SPINK1 gene expression would affect PrCa growth and mitochondria viability, we acquired a proprietary lentiviral vector expression construct designed to enhance ANX2 gene expression and silence SPINK1. Using lentiviral vector stocks created from this expression construct, we generated two stable 22Rv1 PrCa cell lines that silenced SPINK1 and reversed the ANX2 expression ratio. Results demonstrate that transduced ANX2 cell line slightly attenuated growth and mitochondrial function whereas the dual transduced ANX2-SPINK1 cell line significantly decreased growth and mitochondria viability. Thus, highlighting the potential to develop therapeutic gene options for advanced prostate cancer.

Poster 103
Alex Worley, Exercise Science Graduate Student
Faculty Mentor: Marco Meucci, Public Health and Exercise Science
Co-Author(s): Kimberly Fasczewski, Andrew Shanely
Title: THE ASSOCIATION BETWEEN THE FUNCTIONAL THRESHOLD POWER AND THE DMAX AND THE GAS EXCHANGE ANAEROBIC THRESHOLD IN TRAINED ENDURANCE CYCLISTS
PURPOSE: To investigate the relationship between the functional threshold power (FTP), and indices of cardiorespiratory fitness such as the anaerobic gas exchange threshold (AnTGE) and the lactate threshold (LT), in endurance trained cyclists. Establishing the association between indices of performance and aerobic capacity will help coaches assess athletic performance and identify physiological factors that limit it with one test. METHODS: We will recruit 25 male and female endurance cyclists with ages ranging from 18 to 35 years old and an already established FTP. Participants will visit the laboratory two times over a 2-week period. During visit one, body composition, anthropometric measurements, and urine specific gravity (USG) will be measured followed by either a 20-minute time trial (20TT) or a cardiopulmonary exercise test (CPET) on a stationary bike. During visit two, anthropometrics and USG will be measured prior to performing the remaining exercise test (20TT or CPET). The exercise tests will be preceded by a standard 15-min warm-up with exercise intensity increases by 25 watts every 3-min until 85% of the participant's FTP is reached. Followed by 5 minutes of active recovery at the first exercise intensity of the warm-up. The CPET will start at the last intensity of the warm-up and will progress by 25 watts every 3 minutes. The 95% of the average power output from 20TT will be used to determine FTP. The AnTGE will be identified using the ventilatory equivalent method and the LT will be determined using the Dmax method. A one-way analysis of variance will be used to identify differences in oxygen consumption, heart rate and power output between FTP and the AnTGE and LT. A Pearson's r correlation will be used to examine the association between the same variables. HYPOTHESIS: A strong association between FTP and the AnTGE and LT will be observed. FTP will occur around 80% of maximal oxygen consumption (VO2max) and the AnTGE and LT around 85% to 90% VO2max.

Poster 104
Ansley Patton, Exercise Science Undergraduate Student
Faculty Mentor: Jared Skinner, Public Health and Exercise Science
Co-Author(s): Natalie Thulien
Title: ASSESSMENT AND MANAGEMENT OF PHYSICAL ACTIVITY OF OLDER ADULTS IN THE HIGH COUNTRY
Introduction: This study evaluated the changes within primary and follow up SIMPAQ health profiles of 8 older adults (65-88 years) in the high country. Previous findings

suggest physical activity levels may indicate fall risk. This retrospective study evaluated the correlation between SIMPAQ health profiles and spatiotemporal variables. Methods: Data was pulled from a primary aging wellness screenings database in order to evaluate changes in subject's step length, velocity, stride length, stride time, stride width, cadence, mean eGVI, step time, stance time, and swing time. The differences in mean values were compared to differences in annual SIMPAQ scores to evaluate the effectiveness of information provided at wellness screenings. Results: Findings suggest a statistically significant ($p<0.05$) positive correlation between mean eGVI and two aspects of the SIMPAQ health profile– sedentary lifestyle ($r=0.34$, $p=0.03$) and exercise/sport ($r=0.42$, $p=0.04$). The study also found several statistically significant positive correlations between spatiotemporal gait variables and SIMPAQ5– chores ($p=0.01$). Discussion: The limited number of statistically significant relationships indicates the database should expand follow up assessments to better understand relationships between spatiotemporal variables and physical activity as determined by the SIMPAQ. Furthermore, participating in physical activity and chores could be emphasized to subjects to reduce fall risk.

Poster 105
Nickolos Monk, Computer Science Undergraduate Student
Faculty Mentor: Noah Williams, Mathematical Sciences
Co-Author(s): N/A
Title: DEFINING TRAJECTORIES FROM RECURSIVE PAIRING BETWEEN ZEROS AND CRITICAL POINTS OF DERIVATIVES OF RANDOM POLYNOMIALS WITH INDEPENDENT ROOTS
We study the geometric properties of the zero sets of random degree-n polynomials (with roots chosen independently at random from the complex plane) and their non-trivial derivatives. Simulations readily reveal root and critical point ``pairing'' that persists under repeated differentiation, giving the appearance of distinguishable ``trajectories.'' We propose an algorithm motivated by a classical proof of the Gauss–Lucas theorem to precisely define a set of ``trajectories,'' and we present a preliminary investigation into their behavior. Our inquiry catches wind from recent results due to Galligo, Steinerberger, O'Rourke, Hoskins, H\"{a}gg, and others.

Poster 106
Bryson Hedrick, Physics Undergraduate Student
Faculty Mentor: Brooke Hester, Physics and Astronomy
Co-Author(s): N/A
Title: AXIAL CALIBRATION OF CUSTOM BUILT AUTOMATED OPTICAL TWEEZERS
Research at the microscopic level requires an ilk of instruments. These include optical tweezers, which allow for the measurement of forces at the picoNewton scale. Prior to

measurements, the optical tweezers position detection system requires a calibration for the specified direction of measurement. By performing axial calibration via position detector voltage measurements at varying axial positions and a Linear Least Squares Regression Line (LSRL), the proportionality constant between voltage and position in Volts per meter is obtained. The measured proportionality constant allows for the determination of the trap stiffness with the cutoff frequency of Brownian motion. Once the trap stiffness is accurately obtained, the system's capabilities allow for the measurement of forces and displacements. In this study, the proportionality constant is 8.87x10^(5) V/m ±1.15x10^(5) To validate the statistical significance of the slope, a P-test was performed. The proportionality constant is within the expected range of 7.72 x10^(5) V/m and 10.02 x10^(5) V/m.

Poster 107

Anna Koulovatos, Physics Undergraduate Student
Faculty Mentor: Brooke Hester, Physics and Astronomy
Co-Author(s): N/A

Title: POWER SPECTRA OF TRAPPED PARTICLES IN OPTICAL TWEEZERS

Optical tweezers are a tool used in studying isolated biological specimens, among other systems. Using optical tweezers, it is possible to trap a bead in a high-intensity laser beam focused through an objective lens, and with the addition of a position detection laser, light detected on a position detector allows for recording the three-dimensional motion of the trapped bead. The position detector is a photodiode made of semiconductor material that allows for simultaneously sensing position in the x, y, and z directions as well as overall light intensity. Light incident onto the semiconductor creates a potential difference on the semiconductor and corresponding voltages are incident on four wires connected to the four edges of the square photodiode. Those voltages are routed to an amplifier circuit that produces the normalized voltages: Vx, Vy, and Vz, where each voltage is proportional to the position of the light intensity distribution on the position detector. Position data is recorded with a LabVIEW software program. A fast Fourier transform is performed on the position data and a power spectrum is plotted. A Lorentzian is fit to the power spectrum and the corner frequency is found. The corner frequency is a measure of the optical tweezers trap strength and is the target measurement in typical optical tweezers experiments. Unwanted signals are commonly found in the signal that is read from the position detector and can come from sound, electronics, mechanical vibrations, and other sources. Once all unwanted signals have been eliminated, an axial (z) calibration can be performed to measure trap stiffness and force. Here we present our work in troubleshooting unwanted signals in our position data.

Afternoon Oral Session 4 - 2:40pm-4:00pm 415 Plemmons Student Union

2:40pm
Emma Albertino, Clinical Psychology, PsyD and Psychology Graduate Student
Faculty Mentor: Denise Martz, Psychology
Co-Author(s): Lisa Curtin, Twila Wingrove
Title: HIGH PREVALENCE OF IN-PERSON AND TECHNOLOGICAL SEXUAL VIOLENCE AMONG WOMEN WITH EATING DISORDERS
Eating disorders and sexual violence (SV) disproportionately affect women. While in person sexual violence (ISV) has been studied, technological sexual violence (TSV) has not. We explored the relationship between eating disorders and SV in women using Prolific (N = 145, 54% White, 55% heterosexual). Most had experienced SV (Total = 91.7%; Only ISV = 11.0%; Only TSV = 6.9%; Both ISV & TSV = 73.8%). A polyvictimization metric (i.e., sum of different types of ISV & TSV) was correlated with the EDE-Q-13 – an eating disorder severity measure. The EDE-Q-13 and Polyvictimization of ISV ($r = 0.293$, $p < .001$) and TSV were related ($r = 0.295$, $p < .001$). Linear regression showed Polyvictimization of ISV ($b = 0.190$, $t = 2.03$, $p = 0.044$) and TSV ($b = 0.194$, $t = 2.07$, $p = 0.040$) were both predictors of eating disorder severity. Moreover, an ANOVA, $F(3, 22.5) = 5.39$, $p = 0.006$, displayed a significant difference (MD = -0.988, $p = 0.014$) between Only TSV mean ($M = 1.61$, $SD = 0.826$) and Both ISV & TSV mean ($M = 2.60$, $SD = 0.981$) for eating disorder severity. This study documents SV prevalence (ISV & TSV) among women with eating disorders including more severity among women with multiple types of SV experiences. Given the rise in technology and increased eating disorders during COVID, this is a timely study with implications for eating disorder prevention and treatment using trauma-informed approaches.

3:00pm
Abby Cope, Public Health Undergraduate Student
Faculty Mentor: Jennifer Schroeder Tyson, Public Health and Exercise Science
Co-Author(s): John Richards
Title: AN ANALYSIS OF A MATERNAL, CHILD, AND FAMILY HEALTH MICROLEARNING PROGRAM FOR PUBLIC HEALTH AND NURSING STUDENTS AT APPALACHIAN STATE UNIVERSITY
As the field of public health is evolving, there is a need for accessible workforce development tools. Microlearning is an evidence-based method to deliver information and provide resources in small segments that build upon each other. The purpose of this study is to analyze the effectiveness of MCFH|Appalchian, a microlearning program, in the knowledge acquisition and ability to increase interest in the field for public health and nursing students at Appalachian State University. With a focus on Maternal, Child,

and Family Health (MCFH) professional development, this project utilizes the MCH Navigator's MCH 20|20 resources and localizes them to rural Appalachia. 53 students were enrolled in the Fall 2022 cohort. Participants took a pre-test, answered 11 weekly questions, and then took a post-test. Students showed increased interest in becoming involved in the field of MCFH, and self-reported that the pace of the course worked well and that they gained applicable knowledge. Students reported takeaways like increased appreciation for the field of MCFH, feeling empowered, and more awareness of disparities. The sample population is public health and nursing undergraduate students at the Beaver College of Health Sciences at Appalachian State University. This is a convenience sample, as participants receive class credit for completing the program. This research will be one of the first studies done on microlearning as a workforce development tool within the field of MCFH.

3:30pm
Daniel Collins, Religious Studies Undergraduate Student
Faculty Mentor: Cuong Mai, Philosophy and Religion
Co-Author(s): N/A
Title: DEATH PREPARATION AND THE IDEAL DEATH COMPARED: JUDAISM AND BUDDHISM
This study examines the view of the ideal death and the preparatory rituals that ensure life after death across two traditions, Judaism (Kabbalistic and Rabbinic) and Mahayana Buddhism (the monastic vs. the lay community). Judaism and Buddhism have a rich history of displaying death as an equal concern to life. In this study, the connection between life and death, specifically how death impacts life and vice-versa, is more deeply explored. The Kabbalistic tradition within Judaism acts similarly to the monastic community in Mahayana Buddhism to make a more significant distinction between the self and others, as contrasted by the laity and Rabbinic Judaism which serves to absolve any distinguishing factors. Through the analysis of early Jewish and Buddhist texts and more nuanced scholars about disease control, death preparation, and ritual within these traditions, this question and more are deeply explored. Additionally, the sociological factors of the two areas (India and early Israel/Palestine) are not lost, and the impact of the East and West, including views on disease control, and community goals, is explored concerning death preparation across these traditions. A concluding statement will also introduce the idea that Rabbinic Judaism in its early form was likely political in motivation with little relation to the original tradition.

4:00pm
Lydia Stonerook, Athletic Training, Graduate Student
Mentor: Jennifer Howard, Rehabilitation Sciences
Co-Authors: Devynn Galloway, Scott Crothers
FROM MILD COUGH TO SEPSIS: A CASE STUDY

A18 year-old collegiate athlete reported to the athletic trainer complaining of nausea/vomiting and a minor cough that began a week prior. The team physician administered ondansetron and acetaminophen. Overnight, he awoke with severe pain and rigidity in his right abdomen. He was taken to the hospital by the athletic trainer and physician for suspected gastroenteritis or appendicitis and presented with a blood pressure (BP) of 90/40mmHg, a temperature of 102°F and a heart rate of 120bpm. A CT scan revealed severe pneumonia in his right lung. A urine antigen test was also positive resulting in a diagnosis of community acquired pneumonia. Six hours post-admission, he went into septic shock and critical illness related renal insufficiency. He was administered vasopressors to increase BP and an intravenous steroid (prednisone) and antibiotics (azithromycin and cefdinir). The patient responded well and was discharged from the hospital 3 days later. The patient was withheld from activity for 1 week. He then was allowed to lift 3 days/week and progressed to running, then full contact practices within 2 weeks post hospital discharge. The patient's BP and oxygen saturation were taken daily with minimum thresholds set at 108/60mmHg and 95%O2. There was no definitive cause of the patient's rapid deterioration following hospital admission. He had no predisposing factors, nor any prior symptoms of disease beyond a mild cough. The patient has been able to return to his prior abilities.

Afternoon Oral session 5 - 2:40pm-3:40pm 417 Plemmons Student Union

2:40pm
Morgan Gaglianese-Woody, Biology Graduate Student
Faculty Mentor: Matt Estep, Biology
Co-Author(s): N/A
Title: THE EFFECTS OF A PAST AUGMENTATION ON THE FITNESS OF THE FEDERALLY ENDANGERED SOUTHERN APPALACHIAN ENDEMIC GEUM RADIATUM MICHX
Geum radiatum Michx., or Spreading Avens, is a rare cliff-dwelling endemic in Rosaceae that is restricted to fifteen fragmented populations above 1500 meters along the North Carolina and Tennessee border. This long-lived perennial has been listed as federally endangered since 1990 and is deemed imperiled (G2) in North Carolina and critically imperiled (G1) in Tennessee. Geum radiatum's small and fragmented range and unique life history renders it vulnerable to extinction within the next several decades; this threat is exacerbated by the effects of anthropogenic climate change and habitat loss. There is therefore a dire need for integrative conservation management strategies that consider genetic factors. This project aims to estimate the fitness effects of a historical augmentation of a G. radiatum metapopulation to determine if a genetic rescue occurred. We first identified hybrids, native parents and augmented parents using genotyping technology. We then quantified performance differences among those genotypes using the demography data provided by the National Park Service and U.S. Forest Service. The results of this study will contribute to our understanding of transplantation as a conservation management strategy for G. radiatum and long-lived perennials alike.

3:00pm
Lauren Rusnak, Biology Undergraduate Student
Faculty Mentor: Megen Culpepper, Chemistry and Fermentation Sciences
Co-Author(s): Sierra Malley
Title: CHARACTERIZATION OF PUTATIVE DMS MONOOXYGENASE FROM OCEANOBACILLUS PIEZOTOLERANS
The goal of this project is to characterize a new form of the enzyme dimethyl sulfide (DMS) monooxygenase. This enzyme plays an essential role in degrading the volatile sulfur compound DMS, which acts as a foraging cue for top predators, coral reef health, and most notably, a nucleation site for the formation of clouds. There is a single report on the isolation and purification of DMS monooxygenase from Hyphomicrobium sulfonivorans. This project aims to characterize additional DMS monooxygenases from alternative species in order to study the divergence among this family of enzymes. DMS monooxygenase requires two subunits for its function; a monooxygenase DmoA subunit where DMS breakdown occurs and a flavin reductase DmoB subunit. A candidate was

identified from the organism Oceanobacillus piezotolerans, a deep soil bacterium found in the Pacific Ocean. Both the dmoA and dmoB genes from this organism were synthesized and transformed into an E. coli host for recombinant protein expression. After screening expression conditions, both subunits were successfully expressed in the soluble lysate. Protein purification and characterization is underway. Characterization includes protein structure determination, cofactor and substrate specificity, and subunit interactions. This work will contribute towards our understanding of how structure dictates chemical mechanism as it relates to climate regulation.

3:20pm
Ben Brewer, Biology Graduate Student
Faculty Mentor: Matt Estep, Biology
Co-Author(s): N/A
Title: ASSESSING THE GENETIC DIVERSITY AND STRUCTURE OF GRAY'S LILY (LILIUM GRAYI)
Lilium grayi S. Watson, Gray's Lily, is a threatened perennial herb endemic to high elevations in the Southern Appalachians of Virginia, North Carolina, and Tennessee. L. grayi faces multiple challenges, including an invasive fungal pathogen, continued habitat loss, potential hybridization with the more common L. canadense and it has many small and seemingly isolated populations. Threatened species that occur in small and isolated populations are more likely to lose genetic diversity over time due to stochastic processes including genetic drift, thus molecular data from those populations is a critical research need. This study used 11 published Lilium microsatellite markers to evaluate the genetic diversity and structure of 2 L. canadense and 24 L. grayi populations, including 6 populations thought to be experiencing introgression from L. canadense. In total 612 individuals were genotyped across the 26 populations, ranging from 3-57 individuals per population with all available individuals sampled in 19 populations. Calculated genetic diversity statistics include an across-population average expected heterozygosity of 0.355, average observed heterozygosity of 0.348, and average number of effective alleles of 1.798. Genetic structure analysis suggests an overall high level of gene flow between populations. These data will be instrumental to Federal and State governments in determining the conservation status for this species and informing future management decisions.

Afternoon Poster Session 2 - 2:40pm-4:00pm Parkway Ballroom
Posters 116-144

Poster 116
Porter Dalton, Sustainable Technology Graduate Student
Faculty Mentor: Jeff Ramsdell, Sustainable Technology and the Built Environment
Co-Author(s): N/A
Title: HOW DO GENERATIONAL AGE GROUPS COMPARE IN HOW THEY VALUE THE DIFFERENT ENVIRONMENTAL IMPACTS OF NEW VEHICLE PRODUCTION?
This study researches the question, "How do generational age groups compare in how they value the different environmental impacts of the production of new vehicles?". This research question has the academic goal of better understanding how generational age group identification affects one's value of the environmental impacts for specifically new vehicle production. To answer this prompt, a ten question - likert scale survey was conducted across the southeast region of the USA. All results were analyzed to calculate mean values for each generational age group as well as put through multiple Mann-Whitney independent sample tests. Through calculating mean value for each generation group and conducting Mann-Whitney U tests, this study was able to notice the trend of as age increases, the value for vehicle production environmental impact decreases. As well as note the significant similarities and differences in values of the environmental impacts between each generation. Results lead to the conclusion that generational age group identification plays a significant role in determining one's value of the environmental impacts of new vehicle production, and further research is necessary to understand why this is true.

Poster 117
Micaela Patterson, Environmental Science Undergraduate Student
Faculty Mentor: Matthew Ogwu, Sustainable Development
Co-Author(s): Pia Senchak
Title: PHOSPHORUS MINING AND BIOAVAILABILITY FOR ENVIRONMENTAL SUSTAINABILITY
Phosphorus (P) is a macronutrients necessary for plant growth and development but only small quantities are often naturally available within cultivation systems. Due to the little quantity of bioavailable P, farmers and gardeners resort to using inorganic fertilizers containing P that are mined from various sources. Some mined P contains high concentrations of uranium, which are expensive to separate and pose significant environmental and human health implications. Moreover, many countries do not have regulations in place to control the environmental and human health effects of P mining. A healthy soil system increases the ability of plants to absorb P. Hence, soil rhizospheres with diverse microorganisms increases P availability and enhances plant capacity to absorb greater quantities of P in lieu of artificial P addition. Plants are only able to uptake around 10-20 % of P from fertilizer. We analyzed ways in which inorganic P can be mobilized, solubilized, and facilitated through different phosphobacteria as well as mechanisms that fungi have developed to convert inorganic P into a bioavailable form,

as well as the mechanisms of how fungi exchange P with plant roots in exchange for necessary carbohydrates. The purpose of this study is to understand the processes and mechanisms occurring within the rhizosphere to enable P acquisition by crops for more sustainable and resilient food and environmental systems.

Poster 118
Travis Taylor, Mathematics Graduate Student
Faculty Mentor: Chris Thaxton, Physics and Astronomy
Co-Author(s): Nick Mencis, Joshua McNeill, Tomas Romero, Brynn Welch
Title: MODELING THE EFFECTS OF OBJECT-INDUCED TURBULENCE ENHANCEMENT ON SEAFLOOR OBJECT SCOUR AND BURIAL
In partnership with the U.S. Naval Research Laboratory Seafloor Science Division (NRL-SSD), Appalachian State's Applied Fluids Laboratory (AppAFL) is developing a model to predict scour and burial of objects on the seafloor - such as unexploded ordnance, instrument platforms, and infrastructure - in support of Naval operations and site management. In this project, our goal is to quantify scour enhancement around a seafloor object due to the object-induced localized turbulent kinetic energy (TKE) using results from the open source computational fluid dynamics OpenFOAM software. We seek to correlate TKE production with gradients in the shear stresses near the object for a given set of far-field forcing parameters, object shape, instantaneous burial depth, and orientation. The magnitude and direction of the stress gradient field, unique to each shape and orientation, can be easily represented as a vector at relatively low resolutions. Further, we expect that scour enhancement can be captured, within acceptable confidence intervals, by dividing the energy spectrum into just a few partitions that are bounded by the onset of turbulent structures, such as horseshoe and shed vortices. Our first goal is to optimize grid sizing in OpenFOAM to balance runtime with an object-scale stress gradient field representative of the smaller scale effects. We would then work to build a look-up table of scour amplification factors for a given object and set of environmental conditions.

Poster 119
Kaitlyn Miller, Psychology Undergraduate Student
Faculty Mentor: Jack Carson, Management
Co-Author(s): Morgan Greene, Mariana Solanilla, Mackenzie Law
Title: VALUE ALIGNMENT IN WORKERS AND ORGANIZATIONAL MESSAGING OF ENVIRONMENTALLY SUSTAINABLE INITIATIVES
Sustainable human resource management is an emerging practice in the future of global business environments. Research into this topic has been accelerated as organizations are moving away from the standard business protocols and onto more sustainable methods. The aim of this study is to assess various communication styles regarding organizational environmental sustainability initiatives. How companies express their

value orientations in everyday employee communications can ultimately impact employee perceptions of value alignment. Based on Social Identity Theory, employees with sustainable values and cultures are more likely to retain and act in line with such sustainable organizational messages. Similar findings are found from research on theories regarding value congruence, which suggest that positive outcomes are yielded when employee and organizational values are similar (Gelle-Jimenez & Aguiling, 2021). We are utilizing the Social-Identity Consciousness Scale to assess individual values and potential relationships between this variable and preferred sustainability messages. (Highhouse et al., 2007). We, specifically, will be looking at the alignment of egoistic, altruistic, and biospheric values with organizational messaging. We expect to find relationships between employees' values and their desired form of organizational messaging. For instance, we hypothesize that egoistic values of the individual will be related to individuals' preference for egoistic organizational sustainability messaging. We also aim to address personality as a potential moderator of this hypothesis. Lastly, we expect that value orientation will impact likelihood to attend informational meetings about sustainable practices such that those who hold altruistic and biospheric values will be more likely to attend.

Poster 120 Withdrawn

Poster 121
Keyona Anthony, Psychology Undergraduate Student
Faculty Mentor: Mary Ballard, Psychology
Co-Author(s): Anastacia Schulhoff
Title: CYBERBULLYING AS RELATED TO SCHOOL TRANSITIONS DURING THE COVID-19 PANDEMIC
This study examines the impact of transitions to and from online schooling during the COVID-19 pandemic on the frequency of in-person bullying and cyberbullying. The approximately 200 undergraduates who will participate in this study will have been in high school during the transition to online learning. We will also examine the impact of bullying on students' mental health. Previous research indicates that in-person and cyberbullying are related to negative outcomes, including depression, anxiety, and fear of loneliness. A 60-item online questionnaire will be used to assess in-person bullying and cyberbullying perpetration and victimization before the transition to online learning, after the transition to online learning, and after the transition back to in-person school. The survey will also assess the negative impacts of bullying on participants' mental health. This research will provide important information about students' bullying behavior and its impact on mental health during these high-stress transitions. We expect to find that students will report increases in cyberbullying and decreases in in-person bullying following the transition to online learning. We also expect that students will report decreases in cyberbullying and increases in in-person

bullying following the transition back to in-person learning and that bullying in general will be related to negative mental health outcomes.

Poster 122
Kelly Davis, Psychology Graduate Student
Faculty Mentor: Lisa Curtin, Psychology
Co-Author(s): Jacqueline Hersh, PhD; John Paul Jameson, PhD
Title: INTENT TO RECEIVE A COVID-19 VACCINATION AMONG COLLEGE STUDENTS: THEORY OF PLANNED BEHAVIOR AND SOCIODEMOGRAPHIC PREDICTORS
The COVID-19 pandemic created health and financial consequences across the world and will likely be managed through vaccination. College campuses have experienced high community spread throughout the pandemic. A sample of college students (N = 228) was recruited from a public southeastern university prior to widespread dissemination of COVID-19 vaccines and completed an online survey. The survey assessed sociodemographic variables (race, geographical location, religiousness, political leaning) and used Theory of Planned Behavior items (attitudes, subjective norms, and perceived behavioral control) to predict intent to receive the COVID-19 vaccine when available. The constructed model for COVID-19 vaccine intent was significant and explained approximately 74% of the variance observed in vaccine intent. Political leaning, attitudes, and perceived norms towards vaccination emerged as the strongest predictors of intent to vaccinate against COVID-19. Consistent with general population surveys, conservative political leaning related to greater vaccine hesitancy, suggesting the need for tailored vaccine messaging from trusted sources. This study was limited by small sample variability, missing data, and a cross sectional design that relied on self-reports and only assessed intent to receive the vaccine rather than behavior. Future studies should continue to assess college students' COVID-19 vaccine-related behavior and vaccine messaging as the pandemic continues to evolve.

Poster 123
Abryanna Vidot, School Psychology Graduate Student
Faculty Mentor: Jamie Yarbrough, Psychology
Co-Author(s): Natalie G. Moyer, Laura A. MacLean, Caroline N. Cummings, Hannah M. King, Tierney C. O'Brien, Sara Hehn, Mlynn Wooden, India M. Horn,
Title: RACIAL DISPROPORTIONALITY IN TEACHER DISCIPLINE REFERRAL
This study is a content analysis of an urban, southeastern middle school's discipline referral data. The deidentified data contained the following categories: race, gender, referral reason, discipline outcome, and whether a referral was minor or major. Qualitative data will be coded using a theme-based approach. A Chi-Square test of independence was used to determine whether or not there is a significant association

between categorical variables such as race and gender. T-tests or ANOVA were used to compare the remaining variables.

Poster 124
Janaka Volpe, Psychology Undergraduate Student
Faculty Mentor: Lisa Emery, Psychology
Co-Author(s): Corinne Nocar, James Auwn, Brenna McNamara, Emilie Murdoch, Helen Vonderhaar, Jonathan Taylor, Maia Harbaugh, Myers Busch, Katie Gundry
Title: ROBBERS, RENTERS, & RECALL: PERSPECTIVE AND STORY MEMORY
Anderson & Pichert, (1978) found that when participants recalled a story from a different perspective than they encoded it, they were able to remember details that had previously been forgotten. Subsequent research, however, has suggested that perspective switching is one of the least effective memory techniques (Davis et al., 2004). We suggest that this discrepancy is because of a methodological limitation of Anderson & Pichert (1978). In the experiment, participants read an identical story from the perspective of either a homebuyer or robber. They then had to recall the story exactly as it was presented, before recalling it from a different perspective. By telling the participants to recall the original story verbatim, perspective-irrelevant information may have been reactivated at the first recall. In our study, undergraduate students read a story from one of three perspectives: burglar, renter, or a control (non-perspective) condition. Afterward, they were asked to recall the story either verbatim (in the control) or from their assigned perspective. Those in the assigned perspective were told to tell the story as if they were conveying the information to either their burglary partner or a friend who would be sharing the rental. Students then took a recognition test containing three types of information: burglar-relevant, renter-relevant, or perspective neutral. If Anderson & Pichert were correct, perspective should influence the recall test, but not the recognition test.

Poster 125
Sarah Hehn, School Psychology Graduate Student
Faculty Mentor: Jamie Yarbrough, Psychology
Co-Author(s): Natalie Moyer, Laura Maclean, Abryanna Vidot, Caroline Cummings, Hannah King, Tierney O'Brien, Sara Hehn, Mlynn Wooden, India Horn
Title: DOES MODE OF INSTRUCTION IMPACT ACADEMIC AND SOCIAL SUCCESS?
The purpose of this study is to determine the social and academic consequences of the coronavirus pandemic in a sample of college students. Specifically, researchers are interested in how instructional modality and living circumstances impacted students' academic motivation, learning outcomes, and feelings of social connectivity during the 2020-2021 academic year. The following research questions were tested:

Are there differences in academic motivation, learning outcomes, and feelings of social connectivity between students that took mostly face-to-face/blended courses, mostly online synchronous courses, or mostly online asynchronous courses?
Are there differences in academic motivation, learning outcomes, and feelings of social connectivity between students that lived on-campus, lived off-campus but close to the university, or lived off-campus away from the university?"

Poster 126
Katelyn Saunders, Psychology Undergraduate Student
Faculty Mentor: Reagan Breitenstein, Psychology
Co-Author(s): Lisa Curtin, PhD
Title: THE IMPACT OF COVID-19 ON DEPRESSION AND ANXIETY WITH SOCIAL SUPPORT AS A PROTECTIVE FACTOR
Undergraduate students have been seen to be at higher risks for depression and anxiety (Acharya et al., 2018; Ghazawy et al., 2020). However, perceived and actual social support have been shown to mitigate negative impacts on psychological health (Haliwa et al., 2020; Cohen & Wills, 1987; Guo et al., 2021). We tested whether COVID-19 impacts were associated with anxiety, stress, and depression symptoms and whether social support played a role as a protective factor. Participants were college students recruited via convenience sample in 2021 (N = 210). Participants reported how much COVID-19 impacted them in multiple areas (e.g., academic, financial, relationships). Participants also completed the Berlin Social Support Scales (Schulz & Schwarzer, 2003) and the Depression, Anxiety and Stress Scale (Lovibond & Lovibond, 1976). We found higher average COVID impact scores were associated with higher anxiety, depression, and stress. Average COVID impact wasn't related to social support (emotional, instrumental, support seeking). Higher social support was associated with lower depression. Associations between average COVID impact and mental health outcomes weren't dependent on types or levels of social support. Perhaps given that the study was conducted in 2021, the social support factor doesn't have the same mitigating effect we might expect compared to at the start of COVID-19. This indicates that the impact of COVID-19 was robust in terms of how it related to mental health.

Poster 127
Bryson Campbell, Exercise Science Undergraduate Student
Faculty Mentor: Jared Skinner, Public Health and Exercise Science
Co-Author(s): Brandon Ellis and Hunter Anderson
Title: THE EFFECT OF COLD WATER IMMERSION ON EXECUTIVE FUNCTIONING
Introduction: Acute cold water immersion (CWI) is common in several industries, which leads to a series of physiological and cognitive changes. Despite the growing body of research behind CWI, it is still unclear if cognitive function is improved or impaired with CWI. This study aimed to observe changes in executive function (EF) following an

acute bout of CWI. Methods: Thirty individuals (22∓6.8) were recruited for this study. Subjects arrived fasted, without caffeine and not having participated in any rigorous activity in the previous 24 hours. Subjects were given a questionnaire to evaluate their acclimation to cold temperatures as well as pre-screening for possible exclusions. Following the questionnaire, subjects were instructed to participate in a pre-CWI executive functioning task using NIH-EXAMINER. Following the completion of the task, subjects then immersed themselves into a 55° cold tub for 10 mins. Upon completion, subjects completed post-CWI testing with the NIH-EXAMINER. Raw Scores were reported for the NIH examiner test and data was analyzed using JMP®, Version 16. Results: There were no significant differences between NIH examiner performance pre and post-CWI. For the NIH Toolbox Flanker Inhibitory Control and Attention Test (Pre:19.6∓.05 vs. post:19.9∓.05, p=0.65) and the List Sorting Working Memory Test was (Pre:29.3∓.17 vs. post:29.9∓.17, p=0.67). Discussion: This study provides preliminary evidence that acute CWI does not negatively affect EF.

Poster 128

Jaden Tuitt, Exercise Science Undergraduate Student
Faculty Mentor: Jared Skinner, Public Health and Exercise Science
Co-Author(s): N/A

Title: EFFECT OF MARTIAL ARTS COMPETITION EXPERIENCE ON INJURY CHARACTERISTICS

Introduction: Sport martial arts athletes sustain various types of injuries and often multiple injuries throughout their career, which impacts the health, performance, and career longevity of the athlete. Understanding injury characteristics for sport martial arts competitors would allow athletes and coaches to make better informed decisions about training and retirement practices. Current efforts to resolve the problem of high injury prevalence in martial arts have focused on understanding the characteristics of martial arts injuries to develop injury prevention regulations, protective equipment, and training protocols. This study aims to measure injury prevalence, type, and severity through survey data to observe differences between competitive and non-competitive martial artists. Methods: Based on the preliminary data, we plan to collect responses from 60 athletes. A qualitative online survey will obtain participant demographics, martial arts style, years of experience, motivation, and injury history. The qualitative responses will include motivation to resume after injury, compete, and engage in martial arts. The data will be collected and organized to assess motivational and injury differences between individual experience levels. Expected Results: Competitive martial artists will exhibit a greater prevalence of injury, greater severity, longer time lost from training, and greater motivation to return to training.

Poster 129

Key Hatch, Environmental Science Undergraduate Student

Faculty Mentor: Sarah Evans, Geological and Environmental Sciences

Co-Author(s): Sarah Godsey, Emma Ferm, Rachel Harris, Brandon Yokeley, Clara Chew, Benjamin Crosby

Title: CONTROL OF VEGETATION MICROCLIMATES ON SHALLOW GROUND TEMPERATURES ABOVE CONTINUOUS PERMAFROST

The Arctic is warming at four times the rate of the global average causing shrub tundra vegetation to spread north. Arctic vegetation influences permafrost stability, as vegetation can increase ground temperatures via snow-trapping and decrease ground temperatures through sun-reflectance. Generally, larger-stature vegetation (>45cm), such as shrubs in the salix and betula genuses, have the greatest effect because microclimates can exist in patches of dense shrub between the ground and vegetation canopies, buffering ground temperatures from the air. This study measured temperatures within vegetation microclimates at a height of 5 to 7 cm above the ground, and in the ground beneath shrubs at 5 cm depth at two hillslopes 23 km apart on the North Slope of Alaska. Preliminary results suggest a maximum summer temperature difference of 8°C between the sites in soil temperatures beneath similar shrubs, indicating that shrub type may not have a direct control on microclimate temperatures. Ongoing research will search for and examine possible predictive parameters.

Poster 130

Jeremy Heidenfelder, Geology Undergraduate Student

Faculty Mentor: Andrew Heckert, Geological and Environmental Sciences

Co-Author(s): N/A

Title: THE MORPHOLOGY OF TANYSTROPHEIDS (REPTILIA ARCHASAUROMORPHA) OF THE UPPER TRIASSIC (REVUELTIAN MID-NORIAN) HOMESTEAD SITE IN EAST CENTRAL NEW MEXICO

Tanystropheids are an extinct clade of Triassic archosauromorph reptiles characterized by elongated vertebrae. Tanystropheids had a wide geographic range and were principally Laurasian but rare within the western United States. We examined specimens from an Upper Triassic locality (Revueltian mid-Norian) called the Homestead site in east-central New Mexico in the Garita Creek Formation, interpreted as an oxbow lake. So far, two femora and nine vertebrae (four cervicals, three caudals and two dorsals) are identified as tanystropheid. There is one complete hyperelongate cervical vertebra which is amphicoelous and has a ratio of centrum length vs. height at the anterior margin of 6.4, which is a synapomorphy of the basal tanystropheids Tanystropheus and Amotasaurus. Two of the broken cervicals are hollow in cross section, which is a character seen in Tanystropheus.The caudal and dorsal vertebrae identified as tanystropheid because they are procoelous, a synapomorphy of the derived tanystropheids Langobardisaurus and Tanytrachelos. Additionally, two caudal vertebrae

have an anterior paramedian ridge similar in morphology to Langobardisaurus and Tanystropheus. Both femora lack a proximodorsal incline in the proximal head of the femur, a character state also shared by Langobardisaurus and Tanytrachelos. This assemblage may contain both amphicoelous and procoelous tanystropheids, the former being distinct from the coeval Hayden Quarry tanystropheid.

Poster 131

Jordan Ulmer, Environmental Science Undergraduate Student
Faculty Mentor: William Armstrong, Geological and Environmental Sciences
Co-Author(s): N/A

Title: ALASKA'S CHANGING PROGLACIAL RIVER SYSTEMS: TRENDS AND POTENTIAL MECHANISMS

Proglacial hydrologic systems transmit high volumes of both water and sediment and are subject to constant change, particularly in the face of anthropogenic climate warming. Changes in the proglacial hydrologic systems could have far-reaching impacts on their ecosystems both locally and downstream, yet the magnitude of system change as well as underlying processes are poorly understood. To better understand how and why these systems undergo change, we analyze 60 proglacial river braidplains in Alaska utilizing Landsat imagery and characterize how these systems have changed over 1984 – 2022. We utilize both manual and automated methods to document changes in water extent and planform channel morphology experienced while the upstream glaciers thin and retreat. These data characterize the average and variability of proglacial river system change across Alaska. We search for physical drivers of surface water change by investigating environmental factors including the rate of thinning and retreat of adjacent glaciers and the elevation profiles of braidplains. This work will serve to improve the understanding of what physical changes are taking place in proglacial river systems, how they are interrelated, and the effects they will have on both local and downstream ecosystems.

Poster 132

Joshua Crouch, Geology Undergraduate Student
Faculty Mentor: Andrew Heckert, Geological and Environmental Sciences
Co-Author(s): Caeden Carter, Luke Rose

Title: PRELIMINARY TAPHONOMY OF A REVUELTIAN (UPPER TRIASSIC: NORIAN) AGE COPROLITE ASSEMBLAGE FROM THE HOMESTEAD SITE OF THE GARITA CREEK FORMATION, EAST-CENTRAL NEW MEXICO, USA

Homestead is a site within the Garita Creek Formation of east-central New Mexico and is of Triassic, specifically Revueltian (Norian) age. A rich collection of thousands of coprolites (fossilized feces) from Homestead was made available for ichnotaxonomic study. These coprolites are paleoecologically important as direct evidence of predator-prey interactions. We examined a subset (n=1973) coprolites, finding that 277

(14%) preserved visible fish scales in either external or cross section views. We divided these into three categories, two of which are possibly diagnostic, those with striations or spirals, and the currently nondiagnostic pellet-like coprolites. Of the scale-bearing coprolites, ~8% bear striations, ~2% spirals, and the rest are nondiagnostic. Although nondiagnostic coprolites are more likely to have visible scales on their exterior (~69%), the diagnostic coprolites are more likely to have visible scales in cross section (~65% of striated, ~75% of spiral), suggesting that scanning (e.g. micro-CT) complete diagnostic coprolites will potentially yield significant fossils and warrant the examination of coprolites from other Triassic sites. Coprolites have their own ichnotaxonomy. Of the diagnostic coprolites, the striated coprolites bear resemblance to the ichnotaxon Alococopros triassicus (potential archosauromorph perpetrator) due to lateral striations that lead to furrowed, rounded edges. The spiral coprolites may pertain to Heteropolacopros.

Poster 133

Anna Bryant, Chemistry Undergraduate Student
Faculty Mentor: Megen Culpepper, Chemistry and Fermentation Sciences
Co-Author(s): N/A

Title: EXPRESSION AND PURIFICATION OF DIMETHYL SULFIDE MONOOXYGENASE FROM ITS NATIVE SOURCE, ARTHROBACTER GLOBIFORMIS

Dimethyl sulfide (DMS) is a compound that is extremely important to the continuance of the sulfur cycle. The products from the oxidation and breakdown of DMS are the initial sites of cloud formation and atmospheric concentrations of DMS have been directly linked to environmental cooling. Breakdown of DMS occurs by the 2-subunit enzyme DMS monooxygenase. This enzyme utilizes a flavin-reducing DmoB subunit coupled to a DMS DmoA monooxygenase subunit. Much is still unknown about how the two subunits interact, native expression, and native cofactors, specifically divalent metals required for activity. DMS monooxygenase is found in a soil bacteria called Arthrobacter globiformis. In this project, A. globiformis is grown, starved in carbon-depleted media, and supplemented with DMS to upregulate its production of DMS monooxygenase. Growth is monitored by cell microscopy. Growth media formulations have been screened, cells harvested, and tested for DMS monooxygenase activity. To date, the highest activity is observed in minimal media supplemented with 1mM DMS. Currently the cultures are being upscaled, a protein purification strategy is underway, as well as metal analysis and enzyme kinetics to determine the natively expressed DMS monooxygenase from A. globiformis optimal cofactor and substrate identity. Results from this work will build upon the research in the field understanding this complex enzyme system and how divergent the enzyme is from different organisms.

Poster 134
Jack McKeon, Chemistry Undergraduate Student
Faculty Mentor: Jefferson Bates, Chemistry and Fermentation Sciences
Co-Author(s): Sybella Work
Title: PREDICTING ARYL CARBENE SINGLET-TRIPLET ENERGY DIFFERENCES BEYOND THE RANDOM PHASE APPROXIMATION
Density functional theory is the workhorse of computational chemistry, however newer methods such as the random phase approximation (RPA) are becoming increasingly important for moving beyond the challenges of traditional density functionals. Applications of RPA have usually centered on closed-shell systems, while not as much is known about RPA's ability to predict structural properties and energy differences for open-shell molecules. In order to evaluate RPA's ability to predict adiabatic spin-state energy differences, we have calculated the singlet-triplet energy gaps for a set of aryl carbenes using both RPA and methods incorporating exchange-corrections to compare with reference results from wavefunction-based methods. The RPA optimized molecular geometries for the singlet and triplet were computed and used to calculate the adiabatic singlet-triplet energy gaps for RPA and two exchange-corrections known as AXK and ACSOSEX. These results yield insight into the general importance of treating the beyond-RPA correlation energy and its implications for predicting chemical properties in molecules with unpaired electrons.

Poster 135
Aydan Gibbs, Physics Undergraduate Student
Faculty Mentor: Brooke Hester, Physics and Astronomy
Co-Author(s): Nate Parillo Claire Brown
Title: FEEDBACK CIRCUIT FOR A TEMPERATURE CONTROLLED MICROSCOPE SAMPLE CHAMBER FOR STUDIES OF HUMAN BIOLOGICAL MICROBES IN AN OPTICAL TWEEZER APPARATUS
Optical tweezers are an instrument used to measure the mechanical properties of individual human cells, among many other applications. In order to study cells in their natural physical state, they must be studied in an environment maintained at body temperature, 37°C. We have developed and implemented a feedback circuit that regulates the temperature of our microscope sample chamber. The transistor-based analog feedback circuit can apply a potential difference to the heating rings attached to the sample chamber while a temperature sensor is used to measure the sample chamber liquid temperature. The circuit turns the heating on when the measured liquid temperature drops below the lower threshold and turns the heating off once the temperature rises above the upper threshold. We have achieved a consistent regulated liquid temperature of 37°C to within a few tenths of a degree. In the future we will place living cells into the temperature regulated sample chamber for testing the temperature regulation functionality during long term optical tweezer experiments.

Poster 136
Ryan Whitfield, Psychology Undergraduate Student
Faculty Mentor: Mark Venable, Biology
Co-Author(s): N/A
Title: IDENTIFICATION OF A NATURAL PHOSPHOLIPASE A2 INHIBITOR FOR USE AS A NOVEL ANTIVENOM
Pit vipers are the largest group of venomous snakes in the United States, with one subgroup alone, eastern diamondback rattlesnakes, being the leading cause of fatal snake bites in North America. Currently, bites from pit vipers can only be treated using crotalidae polyvalent immune fab (brand name CroFab) antigens produced from animals exposed to the venom, a process which is expensive and labor-intensive. Phospholipase A2 is a key enzyme responsible for the venom's damage to tissues. Previous research has shown a lipid extracted from naturally-produced serum is able to inhibit PLA2 during in-vitro assays. Our team has since worked to identify which lipids in the extract are responsible for these effects in hopes of developing a new antivenom that would be more shelf-stable and cheaper to produce. Separate classes of lipids from the serum have been purified and extracted, allowing them to be tested against PLA2 enzymes from various pit vipers' venoms. Currently, efforts are underway to utilize liquid chromatography to purify and fractionate this extract to a degree appropriate for analysis with mass spectrometry. This would, optimally, allow the obtention of a chemical identity for the lipid, from which it could later be synthesized and tested as confirmation of the active compound's structure. It is hoped this inquiry will develop a novel antivenom that can be more widely distributed and thus accessible to underserved areas where CroFab antigens are less available.

Poster 137
Eliza Watson, Biology Graduate Student
Faculty Mentor: Darren Seals, Biology
Co-Author(s): Maryam Ahmed
Title: DEVELOPMENT OF A SIMULATED TUMOR MICROENVIRONMENT TO MONITOR MACROPHAGE-CANCER CELL RESPONSES TO VIROTHERAPIES
Macrophages are a common infiltrate of the tumor microenvironment (TME), and their impact on tumor progression is considered subtype-dependent. M1 macrophages exhibit a classical phenotype involved in host defense and have anti-tumoral properties. However, M2 macrophages are immunosuppressive and coincidentally promote tumor growth, angiogenesis, and metastasis. Oncolytic virotherapies exhibit the dual ability to kill cancer cells while promoting anti-tumor immunity, but their effect on macrophage populations is less clear. Our preliminary data show that a mutant strain (rM51R-M) of oncolytic vesicular stomatitis virus (VSV) kills some M2 macrophages while polarizing others to an M1 phenotype. Here we address whether those results can be recapitulated

in a simulated TME comprised of co-cultured MDA231 breast cancer cells and THP1-derived M1 and M2 macrophages. In preliminary studies, we have established a baseline growth profile for dye-labeled MDA231 cells in the absence of VSV by fluorescent microscopy. Compared to an MDA-MB-231 monoculture, cocultures featuring M1 macrophages significantly reduced cancer cell counts by two-fold over a 36-hour assay period, while cocultures featuring M2 macrophages showed a two-fold increase. Future experiments employing VSV will determine whether these promotive effects of M2 polarized macrophages on breast cancer can be thwarted by the virus, and whether the mechanism is based on macrophage repolarization.

Poster 138
Ava Stoddard, Biology Undergraduate Student
Faculty Mentor: Darren Seals, Biology
Co-Author(s): Hannah Wolf, Megan Polzin, Maryam Ahmed, Darren F. Seals
Title: PODOSOME ACTIVITIES AMONG M1 AND M2 THP-1 MACROPHAGES
Macrophages are a professionally invasive cell type with remarkable plasticity in function, from phagocytosis of pathogens (M1s) to wound healing (M2s). Common to these activities is the podosome, a cytoskeletal structure that enables adhesion to and degradation of matrix proteins. Our published data showed that THP1-derived M2 macrophages have twice as many podosomes as M1 macrophages. This suggests that M2 macrophages are more invasive, but other assays are required to verify that hypothesis. Here, we examined three essential processes of macrophage podosomes: adhesion, motility, and gelatin degradation. Adhesion is the rate of attachment to plastic dishes, and our studies to date suggest a more rapid adherence rate in M2 macrophages 3 hours after replating (2.5-fold faster than M1s). Motility in a wound-healing assay monitors closure of a scratched region of a confluent culture. In one experiment, M2 macrophages closed a wound by 73% in 48 hours; M1s exhibited only a 13% closure. Podosome activity is the amount of gelatin degraded by cells in situ. Despite decreases podosome numbers, slower adhesion, and reduced motility, it was the M1 macrophages that more quickly (1.3-fold higher at 6 hours) and sustainably (2.1-fold higher at 72 hours) degraded gelatin. Future investigations will further dissect these phenotypic differences in macrophage subtypes, for its implications in host defense and tissue repair as well as in other pathological contexts like cancer.

Poster 139
Lindsey Pleasant, Biology Undergraduate Student
Faculty Mentor: Mary Kinkel, Biology
Co-Author(s): Deja Cooper
Title: INTESTINAL MOTILITY GENE EXPRESSION MAPPING IN ZEBRAFISH
This project addresses human intestinal motility disorders that are present in a wide array of the population using zebrafish as a model. Zebrafish are a model organism

because they share many of the same genes with humans. Zebrafish are an ideal model for gut research as they display simple physical characteristics and functions. A larval zebrafish intestinal tract is immature and functions with simplicity. A mature zebrafish gut is characterized by changes in gene expression. Previous research has identified genes expected to play a role in gut motility. The objective of this study is to map expression of these genes by utilizing RT-PCR and other supporting techniques. Experimental samples were obtained from the adult zebrafish through intestine removal and dissection into the four identified functional areas that include the intestinal bulb, loop, small intestine, and colon. RNA was then isolated from the samples from each aforementioned area and developed into cDNA through reverse transcription. Currently, we are determining which genes are expressed in each region of the adult zebrafish intestine through PCR amplification of the isolated cDNA using specific primers. The map of the adult intestinal genes will then assist in understanding and creating further research ventures regarding the earlier stages of intestinal development. Later studies will map other stages of intestinal development to further understand intestinal maturation.

Poster 140

Rosemary Ronca, Biology Graduate Student
Faculty Mentor: Jon Davenport, Biology
Co-Author(s): N/A

Title: ESTIMATING HABITAT INDICATORS OF THE SOUTHERN APPALACHIAN ENDEMIC, PLETHODON WELLERI

Plethodon welleri is a small-bodied salamander species that is endemic to select mountain tops in the Southern Appalachian Mountains and considered threatened across its entire range. Initial descriptions indicated that this species was a high-elevation, spruce-fir specialist only found above 1500m. However, recent observations have documented populations as low as 620m. The goal of this study is to assess environmental parameters for habitat preferences and build a comprehensive dataset on species detection and occurrence. To do this, we conducted surveys across North Carolina and Tennessee. Species surveys were combined with environmental parameters to predict population presence. Preliminary data from the 2021 field season indicates that the top environmental covariates for detecting P. welleri populations was the interaction between ambient temperature and recent rain. Occupancy of P. welleri in 2021 was found to be most heavily influenced by canopy cover in. Interestingly, elevation was not found to influence occupancy of P. welleri across their North Carolina and Tennessee range. This study will provide foundational data for this species and other salamander species in this region. Having access to baseline knowledge for threatened species is necessary for the development of effective conservation strategies and comprehensive management plans.

Poster 141
Grace Kropelin, Biology Graduate Student
Faculty Mentor: Clare Scott-Chialvo, Biology
Co-Author(s): N/A
Title: IS DROSOPHILA GUTTIFERA TRANSITIONING TO A SPECIALIST?
The evolutionary arms race between insects and their plant/fungal hosts has been intensely studied. Hosts that produce highly toxic compounds typically exclude generalist feeders that are predicted to evolve the ability to detoxify closely related chemical compounds. However, some fly species in the immigrans-tripunctata radiation of Drosophila use deadly toxic mushroom species (e.g., the death cap and destroying angel mushrooms) as well as edible species as hosts. While these species are classified as generalists, we hypothesize that Drosophila guttifera is transitioning from a generalist to a specialist feeding/ developmental strategy. To address this question, we reared larvae from two D. guttifera genotypes on diets with and without a single toxin or a mix of toxins extracted from the death-cap mushroom. We also conducted oviposition preference assays in the two lines to determine if females preferred to lay their eggs on toxic mushrooms instead of edible mushrooms or fruits. We then conducted a larval choice assay to note if the larvae prefer the toxic mushrooms instead of edible mushrooms. Lastly, we conducted intraspecific and interspecific competition assays with D. guttifera to determine if competition impacted where a gravid female lays her eggs. Our results provide greater context for the associations between this D. guttifera and its host fungi.

Poster 142
Morgan Gill, Biology Undergraduate Student
Faculty Mentor: Jennifer Geib, Biology
Co-Author(s): Brooke Reutinger , Annkatrin Rose, Annika Fockler, Brooke Walters
Title: SPATIAL AND PHENOLOGICAL VARIATION OF FLOWERING PLANT SPECIES ALONG THE BLUE RIDGE PARKWAY
Flowering phenology is essential in understanding plant-pollinator relationships and pollinator life histories. As many pollinator species have experienced population declines, inventory and monitoring programs have become a research priority. Including a record of co-occurring flowering species and their phenology in these inventories may provide valuable insight into the impact of climate change on pollinator populations. Following a 2019 pollinator inventory of the Blue Ridge Parkway, we performed a flowering plant survey in partnership with the NPS. From May to October 2022, the presence and phenology of flowering plant species at 59 sites were recorded using iNaturalist. Shifts in flowering phenology have been observed in response to climate change; however, these shifts are not uniform across species. Pollinators depend on access to floral resources, and their populations respond to the availability of these resources. We will compare flowering phenology between different sites and plant

genera to evaluate floral resources at the pollinator inventory sites, providing important context to the pollinator inventory data. We will also analyze how environmental factors affect introduced species' distribution along the parkway. Long-term monitoring of both pollinator and plant populations will provide a better understanding of how to protect biodiversity along the Blue Ridge Parkway.

Poster 143
Noah Estrada, Biology Undergraduate Student
Faculty Mentor: Cara Fiore, Biology
Co-Author(s): Brooke Stevens, Nile Crump
Title: THE IDENTIFICATION AND DISTRIBUTION OF FRESHWATER SPONGES IN WESTERN NORTH CAROLINA
Freshwater sponges are distributed worldwide and play an integral role in nutrient cycling and primary production. However, little is understood about their distribution or ecology. In fact, freshwater sponges are some of the least studied faunal groups. Currently, in North America, less than 30 species have been identified. In North Carolina, the distribution of species and associated life-history traits are nearly lacking. The absence of distinct morphological features makes identification challenging. Spicules are skeletal structures of sponges and the primary source for species identification. Each species has unique spicule morphology and arrangement. We have identified several species by dissolving sponge tissue in a base and assessing the spicules through microscopic analysis. Some of the current identifications include Racekiela ryderi and Radiospongilla crateriformis. Species-level taxonomy can be difficult to determine if gemmules, a dormant body of freshwater sponges, are not present. Most taxonomic keys also complicate this process as they are poorly illustrated and do not give information regarding environmental variation. Sponge abundance and dispersal vary year to year, thus more collection sites and further analysis on species distribution is required. Results from this research can provide us with the data necessary to build a regional taxonomic key of freshwater sponges.

Poster 144
Samuel Cooke, Biology Undergraduate Student
Faculty Mentor: Rachel Bleich, Biology
Co-Author(s): Janelle C. Arthur
Title: BIOFILM ANALYSIS OF ADHERENT-INVASIVE E. COLI AND E. FAECALIS CO-CULTURES: AN EXPLORATION OF WATER CHANNELS
Crohn’s Disease is a chronic inflammatory bowel disease that effects the gut epithelium. Crohn’s disease has been shown to correlate with an increase of the pathobionts, adherent-invasive E. coli (AIEC) and Enterococcus faecalis (EF). Previous studies have shown that AIEC can increase inflammation of the gut, and that AIEC and EF abundance are positively correlated in the inflamed gut. When cultured together E. coli

(EC) and EF have been shown to have an increased wrinkled phenotype, indicative of biofilm formation. These wrinkles in the biofilm are thought to reveal underlying water channels that form early in biofilm development from motile bacteria swimming through the polysaccharide matrix. These channels increase the diffusion of water and nutrients and are important in the understanding of the biofilm microenvironment. We hypothesize that the pattern of increased wrinkling in co-culture biofilms is due to the organization between EC and EF in the colony. To investigate this, motility data was collected on EC and EF strains and co-culture biofilms were imaged via scanning electron microscopy (SEM). Motility data showed differing motility across the two media types used and SEM data showed altered organization across the different co-culture combinations. Motility correlated with increased wrinkling, indicating that movement of E. coli within the co-culture colony could help to form the wrinkles.

Presentations by Faculty Mentor Department

Department	Presentations	Posters	Total
Art	0	1	**1**
Biology	6	27	**33**
Chemistry & Fermentation Sciences	1	9	**10**
Computer Information Systems	0	1	**1**
Economics	0	1	**1**
Geography & Planning	1	8	**9**
Geological & Environmental Sciences	1	20	**21**
History	0	1	**1**
Management	0	1	**1**
Mathematical Sciences	0	1	**1**
Nursing	0	1	**1**
Nutrition & Health Care Management	0	4	**4**
Philosophy & Religion	1	0	**1**
Physics & Astronomy	3	7	**10**
Psychology	2	10	**12**
Public Health & Exercise Science	1	16	**17**
Recreation Management & Physical Education	0	1	**1**
Sustainable Development	0	1	**1**
Sustainable Technology and the Built Environment	0	3	**3**
Not listed	0	1	**1**
Total	**16**	**114**	**130**

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