Office of Student Research

APPALACHIAN STATE UNIVERSITY

27th Annual Celebration of Student Research and Creative Endeavors

April 18, 2024

Full Program

Welcome to the ***27th 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 holds particular excitement as we celebrate the increase in research and creative activities that occur on campus. The rising numbers of applications for Office of Student Research Travel and Research grants, as well as Undergraduate Research Assistantships, reflect the campus-wide commitment to involving students in research and creative pursuits. Today, we celebrate the culmination of these efforts with 143 student presentations (52 Graduate Students, 91 Undergraduate Students), showcasing Appalachian's unwavering dedication to student engagement. Faculty members have continued to mentor and involve students in the research and creative process, and the Office of Student Research is proud to play a role in supporting these endeavors.

Our students consistently inspire us, but it's the exceptional dedication of our faculty that truly stands out. Their unwavering support and mentorship are instrumental in enabling us to highlight the remarkable work of our students. To our students, we extend our heartfelt gratitude for generously sharing your hard-earned achievements with the entire campus community. The projects you have undertaken possess the potential to make a meaningful impact, and we commend you for your dedication and contributions.

We are immensely grateful 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 and Innovation, Office of Student Affairs, Cratis D. Williams Graduate School, and University College. Additionally, we extend 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. Christine Hendren - Vice Provost for Research and Innovation. We also express our appreciation to the dedicated staff in the Office of Student Research, including Kathy Weaver Stevens and our Graduate Assistant Briana Robinson.

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-2:00pm, Room 415
Oral Session 4: 2:00pm-3:20pm, 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
Kassidy Everhart, Athletic Training Graduate Student
Faculty Mentor: Alan Needle, Rehabilitation Sciences
Co-Author(s): Howard JS, Skinner JW
Title: PATIENT-REPORTED FUNCTION IN PATIENTS WITH CHRONIC ANKLE INSTABILITY IMPROVES FOLLOWING REHABILITATION REGARDLESS OF TRANSCRANIAL DIRECT CURRENT STIMULATION INTERVENTION.
Patients with chronic ankle instability (CAI) often experience diminished function and health-related quality of life (HRQL) compared to uninjured individuals. This study aimed to compare the effects of motor cortex stimulation, frontal cortex stimulation, and sham stimulation using transcranial direct current stimulation (tDCS) combined with rehabilitative exercise on HRQL in patients with CAI.The study employed a double-masked randomized controlled trial design with 45 individuals with CAI. Participants completed surveys including the Foot and Ankle Ability Measure (FAAM), Disablement in the Physically Active Scale (DPAS), and Global Rating of Change (DPAS) at 2-week intervals, including baseline (week 0), mid-training (week 2), post-training (week 4), and retention (week 6). Participants attended 8 sessions of rehabilitative exercise with tDCS over the prescribed area between baseline and post-training. The 20-minute sessions consisted of various exercises of progressing difficulty. Before exercise, participants received either motor cortex, frontal cortex, or sham anodal tDCS stimulation .Of the 45 recruited participants, 37 completed the study (Frontal: n=11, 23±6 yrs; Motor: n=13, 23±3 yrs; Sham: n=12, 26±6 yrs. There were no significant group-by-time interaction effects or group main effects for any outcome measures. However, significant effects of time were noted for FAAM (activities of daily living: $p=0.002$; sport: $p<0.001$) and DPAS ($p<0.001$). The GRoC indicated improvements, ranging from "a tiny bit better" at mid-training to "somewhat better" at retention.The study demonstrated small-to-moderate improvements in patient-reported outcome measures following the 4-week intervention, regardless of tDCS stimulation type. Previous evidence suggests that tDCS interventions can improve disablement, but this may depend on the specific exercise selection.

PC 2
Jordynn Hellinger, Athletic Training Graduate Student
Faculty Mentor: Jennifer Howard, Rehabilitation Sciences
Co-Author(s): Lydia G. Stonerook, Ashley N. Marshall
Title: PARTLY CLOUDY: FORECASTING PUBLIC EVIDENCE OF MENTAL HEALTH BEST PRACTICES IN THE SUN BELT CONFERENCE

The NCAA created a checklist for mental health best practices that identified four key areas related to student-athlete mental wellness. It is unclear how clearly these best practices have been applied across NCAA athletic departments and institutions. The purpose of this study was to evaluate the frequency of publicly available evidence of fulfillment of the best practices within the Sun Belt Athletic Conference. Two reviewers searched public websites to identify evidence of best practice application based on the checklist. Athletic department websites were reviewed first, and if the item could not be located, institutional websites were reviewed. A third reviewer confirmed evidence or lack thereof. Key findings include: all institutions report access to "licensed practitioners who are qualified to provide mental health services"' with 11/14 institutions reporting access via athletics and 3/14 reporting institutional access; only 7/14 had noticeable emergency action plans, with no specific one for mental health emergencies; 6/14 showed evidence of screening for mental health disorders during the pre-participation exam, but no processes related to referral of at-risk student-athletes identified through screening were identified. A lack of publicly available evidence of fulfillment of best practices does not stop these practices from still occurring, the lack of transparency in both practice and advocacy for mental well-being is counter to current recommendations.

PC 3

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

Title: EFFECTS OF WARMING ON FOUR MOSS SPECIES FROM THE SOUTHERN APPALACHIAN MOUNTAINS

The year 2023 was the hottest year on record and nearly all years in the 21st century have been warmer than those in the preceding century. Many high elevation organisms in the Southern Appalachian Mountains (SAM) are glacial relics and warming could result in their extirpation, or extinction if they are endemics. Most at risk could be lichens and bryophytes, who depend primarily on atmospheric moisture for their water and nutrient inputs, since warming would enhance evaporation rates and drying, raise respiration rates, and alter competitive relationships among species, all of which could lead to declines. There have been no studies of how SAM mosses might respond to warming, so we undertook an experiment to grow four species outdoors in containers with native soils, for ~1 year, with half warmed by ~3-4 degrees C using IR lamps and the other half unheated. We used two species common to open habitats (Polytrichum juniperinum and Ceratodon purpureus) and two from forest understories (Thuidium delicatulum and Hypnum imponens). Understory species were grown at reduced light beneath shade cloths and all mosses received water only from natural rain events. All four mosses survived warming, but P. juniperinum and C. purpureus showed lower Fv/Fm in the warming treatment while T. delicatulum and H. imponens did not show a

significant difference between ambient and warming treatments. There was no treatment effect on total chlorophyll content and chl a:b ratio among all four of the species. Results from our short-term study indicate that SAM mosses have the capability of tolerating moderate warming, but that their long-term survival may depend on feedback effects resulting from altered competitive interactions that can only be determined by performing such studies in the field under natural conditions.

PC 4

Finley Collins, Sustainable Technology Graduate Student
Faculty Mentor: James Houser, Sustainable Technology and the Built Environment
Co-Author(s): N/A

Title: A COMPARATIVE ANALYSIS OF TECHNOLOGY AND POLICY OF HIGH-VALUE PV RECYCLING: THE UNITED STATES VERSUS THE EUROPEAN UNION

The global energy sector is amid a solar photovoltaic (PV) boom. PV technologies are crucial for a clean energy future; however, in 2021, PV panels were the fastest growing stream of electronic waste (E-waste). There is limited infrastructure and policy to manage End-of-Life (EoL) PV panels, and experts report that there will be an accumulated mass of 60 million to 80 million tons of EoL PV panels by 2050. This study analyzed high-value recycling of crystalline silicon (c-Si) panels because they make up 95% of the global market. High-value PV recycling processes were selected for their higher rates of material recovery than other methods, via removal of the ethylene vinyl acetate layer (EVA), otherwise known as delamination. Three facilities in the European Union (EU) and two facilities within the United States (US) were selected for comparison: Veolia of France; Tialpi Srl of Italy; FLAXRES GmbH of Germany; We Recycle Solar of Arizona; and SOLARCYCLE of Texas. Facilities were compared by handling capacity, delamination methods, and rates of recovery. PV EoL legislation was analyzed within the US, the EU, and selected states. This study found that only the EU has specific legislation addressing the PV panel lifecycle. The gap in nationwide recycling rates for the EU and the US is wide, at just 10% in the US compared to 80% in the EU, but the facilities within the US are comparable to those in the EU in terms of handling capacity and rates of recovery. However, the price difference to perform high-value PV recycling in the two nations is significant. In the US, the price range is $15 to $45 USD per panel, with SOLARCYCLE, Inc. charging $18 USD per panel and We Recycle Solar, Inc, charging $20 USD. The EU, on the other hand, has prices down to around $0.70 USD. This study was unable to confirm why the price gap between the EU and the US is so wide but hypothesized that it is due to the lack of supporting policy and economic incentives within the US.

PC 5

Caroline Fehlman, Geography Graduate Student

Faculty Mentor: Maggie Sugg, Geography and Planning

Co-Author(s): Jennifer Tyson, Shishir Shakya

Title: MAPPING MATERNAL HEALTH CARE ACCESS DISPARITIES: A FINE-SCALE GEOSPATIAL ANALYSIS IN NORTH CAROLINA

Maternal mortality and morbidity rates continue to rise despite advances in maternal health care and the success of simple interventions like prenatal care. Rises in maternal mortality and morbidity are occurring parallel to decreasing maternal healthcare accessibility as hospitals discontinue their OB services and provider shortages escalate in rural and underserved communities. In this study, we examine the accessibility of maternal health care by providing the first fine-scale geospatial analysis of maternal health care at the census tract level in North Carolina. We use the National Provider Identifier (NPI) database to obtain geocoded coordinates of all maternal health care providers (e.g., OBGYN, Midwives, Family Practitioners, and Doulas). Geocoded coordinates of providers are linked with contextual information of rurality, poverty, structural racism, and income segregation to identify which communities have minimum maternal health care access. Results suggest a strong divide in maternal healthcare access, with rural communities with high-income segregation experiencing the least amount of service. Our work is transformative as it provides the first sub-county analysis of maternal health care access for the state of North Carolina, with direct implications for public health policy and future research examining how access to maternal health care impacts maternal and fetal health.

PC 6

Justin Hites, Geography Graduate Student

Faculty Mentor: Bhuwan Thapa, Geography and Planning

Co-Author(s): Will Bennett, Drew Wilson

Title: SPATIOTEMPORAL ANALYSIS OF TREE WINDBREAKS AND CROP LOSS FROM WIND EVENTS IN KANSAS AND NEBRASKA, USA

Extreme weather attributed to climate change is a growing threat worldwide that has already impacted vital industries such as agriculture. In the US, wind-related damages cost around 1.2 billion dollars in crop insurance payments between 2015 to 2020, of which around half was paid for the damage claims in the Midwest region. Previous studies have found that strategically planted trees, often called windbreaks, played a crucial role in protecting cropland from weather hazards. However, there is limited understanding of their relationship at a large scale. This study investigates the spatiotemporal relationship between tree cover percentages derived from remote sensing data and crop damage records between 2014 and 2021 at the county level in Kansas and Nebraska, USA. The preliminary analysis reveals the inverse relationship between tree density on the farm and wind-related crop loss with spatial variability. The

study helps us provide valuable insights into agricultural management, environmental resilience, and risk mitigation strategies, contributing to both scientific understanding and practical applications in sustainable farming practices and disaster preparedness.

PC 7

Kristen Lysne, Geography Graduate Student

Faculty Mentor: Maggie Sugg, Geography and Planning
Co-Author(s): N/A
Title: A SPATIAL ANALYTIC APPROACH TO MATERNAL HEALTH AND BIRTH OUTCOMES FOLLOWING HURRICANE FLORENCE (2018).

The United States has been ranked the highest among developed nations for maternal morbidity, yet the literature surrounding severe maternal health in the context of natural disasters is still emerging. Projections suggest that hurricane intensity will continue to surge as global temperatures rise, and experts warn that they pose one of the most significant threats to global public health in the 21st century. This study is the first to apply a spatial approach to maternal health and birth outcomes following hurricane exposure in North Carolina. We used spatial clustering analysis of hospitalizations for Severe Maternal Morbidity (SMM) using the Bernoulli Kulldorff SatScan statistic from 2017-2019 in North Carolina. Logistic regression was used to identify individual and contextual factors associated with high-risk clusters in relation to Hurricane Florence (2018). All 28 FEMA disaster-declared counties had significant spatial clustering, and individual factors (age) and contextual factors (income, urbanity) were associated with high-risk clusters. When compared to pre-hurricane exposure, more Black individuals and fewer White individuals visited the hospital for SMM-related concerns. Our results indicate the importance of a spatial analytic approach for maternal health outcomes following climate disasters to better identify high-burden populations for post-disaster relief and response.

PC 8

Jose Picado, Exercise Science Graduate Student

Faculty Mentor: Alan Needle, Public Health and Exercise Science
Co-Author(s): Jennifer Howard, Jared Skinner
Title: TRANSCRANIAL DIRECT CURRENT STIMULATION WITH REHABILITATIVE EXERCISES DOES NOT MODIFY NEURAL EXCITABILITY IN PATIENTS WITH CHRONIC ANKLE INSTABILITY

Neuroplasticity within the central nervous system has been observed in individuals experiencing chronic ankle instability (CAI), ultimately requiring rehabilitation intervention techniques that improve neural function. Therefore, we aimed to determine if transcranial direct current stimulation (tDCS) over the brain's motor or frontal cortex could improve neural excitability when combined with rehabilitative exercises. This intervention study tested 45 volunteers with CAI who were randomly allocated to groups

that received anodal tDCS over the motor or frontal cortex, or a sham current over 8 sessions. Participants were tested and assessed for reflexive excitability using the Hoffmann reflex (H-reflex) and cortical excitability using the resting motor threshold (RMT) from transcranial magnetic stimulation (TMS) at baseline (week-0), mid-training (week-2), post-training (week-4), and retention (week-6). For 4-weeks, participants reported twice per week for rehabilitative exercise consisting of obstacle course walking, dynamic balance, and lateral agility while receiving allocated treatment. The study was completed by 37 individuals (Frontal: n=11, Motor: n=14, Sham: n=12). No significant group-by-time effects for Hmax:Mmax ($F[6,99]=0.792$, $p=0.578$), RMT ($F[6,63]=0.291$, $p=0.939$), or maximum motor evoked potential (MEPmax, $F[6,48]=0.320$, $p=0.870$) were observed. Similarly, no effects of time were noted for Hmax:Mmax ($F[3,99]=1.134$, $p=0.339$), RMT ($F[3,63]=1.823$, $p=0.152$), or MEPmax ($F[3,48]=1.588$, $p=0.204$). Our results suggest that neither rehabilitative exercise, nor the inclusion of tDCS generated significant differences in neural excitability in patients with CAI. Combined with previous evidence, it appears that effects of tDCS on neural excitability are best achieved with strength training over more general rehabilitative exercises.

PC 9

Andrey Sanko, Exercise Science Graduate Student
Faculty Mentor: Kimberly Faszcewski, Public Health and Exercise Science
Co-Author(s): Meg Hopkins

Title: WALKING A MILE FOR AWARENESS: EXAMINING MOTIVATION FOR CHARITY-BASED PHYSICAL ACTIVITY PROGRAMMING

Despite the known benefits of physical activity (PA), less than half of the US population meets the American College of Sports Medicine's PA recommendations. Previous research has demonstrated that adherence to PA is improved when tied to a disease-based fundraising charity event by increasing motivation and creating an emotional tie to the cause. Unlike disease-based charities that raise money to fund scientific research on a disease, cause-based charities raise funds/awareness around a social or environmental issue that is meaningful to a specific group of people. The goal of this project was to explore motivation for participation in a PA cause-based charity to see if emotional connections drive participation. Data were collected during an in-person one-mile walking event to raise awareness of domestic violence. Forty-four participants (female, n = 30; male, n = 14) completed the survey. There was a correlation between motivation to participate and perceived benefit from the money raised ($r = .649$, $p<.001$) and raising awareness of domestic violence was the most important reason for participation (N = 23, 52.3%). Results demonstrate that cause-based charity events are an effective strategy to promote PA by eliciting emotional connections to the cause, particularly in those individuals with a personal connection to

the cause. Future research should focus on exploring the use of all types of charity events to increase motivation through connections to a meaningful cause.

PC10

Stella Cybulski, Public Administration Graduate Student
Faculty Mentor: Brooke Towner, Recreation Management and Physical Education
Co-Author(s): Dr. Joy James

Title: ENGAGEMENT, HAPPINESS, AND BUGS: BUILDING CONNECTIONS BETWEEN PHYSICAL ACTIVITY AND SCIENCE LESSONS

Spending time outside and being physically active have positively impacted children's physical and mental health. Instilling active habits at a young age improves the likelihood that they will remain active over their lifetime. In addition to promoting physical and mental health, spending time in nature and engaging in physical activity has been shown to have brain health benefits for children, improving cognition and academic performance. This study examined students' perceived enjoyment based on three different types of science lessons (inactive indoors, active indoors, and active outdoors). Thirty-two first graders at a public lab school in North Carolina participated in three two-week data collection periods, where the teachers implemented the different types of science lessons. Students and teachers completed reflection surveys assessing their enjoyment and feelings about the lesson. Survey questions were modified from the PACES scale, and the final question asked the students to draw their favorite moments of the science lesson. Three primary themes emerged from the students' reflective drawings: engagement, joy, and friendship. Additionally, teachers felt adding active moments was a simple, low-cost way to improve students' happiness and PA during the school day. Exploring innovative strategies and encouraging teachers to use movement/PA in outdoor environments has the potential to lay a foundation for promoting the well-being and quality of life of our children in elementary schools.

PC 11

Chris Lucero, Geography Undergraduate Student
Faculty Mentor: Maggie Sugg, Geography and Planning
Co-Author(s): Dr. Maggie Sugg, Sophie Ryan

Title: MAPPING THE EPIDEMIC OF ISOLATION: SPATIAL DISPARITIES IN LONELINESS AMONG US ADOLESCENTS AND YOUNG ADULTS (2016-2022)

In 2021, the US Surgeon General issued a national advisory citing an epidemic of isolation and loneliness. Even before the onset of the COVID-19 pandemic, approximately half of people in the US reported experiencing measurable levels of loneliness. Despite localized and select cross-sectional studies highlighting even higher increases in isolation/loneliness during the COVID-19 pandemic, the research is still lacking, particularly for youth and adolescents. This work examines patterns of isolation and loneliness across the United States from 2016 to 2022. Our study uses a unique

dataset, Crisis Text Line, that provides complete spatiotemporal coverage of isolation/loneliness in the US among individuals aged 10 to 24. Crisis Text Line has been demonstrated in the literature as an ideal proxy for mental health compared to more traditional health datasets. We conducted a geospatial analysis using Kuldroff's Space-Time SatScan to identify statistically significant clustering of elevated isolation-related conversations in adolescents and young adults. Statistical significance of spatiotemporal clusters was determined using Monte Carlo simulations (n=1000). Results demonstrate local relative risk as high as 1.47 in high-risk populations in Southern, Midwest, and Atlantic states, indicating areas where the actual case count is 147% of the expected cases (p-value < 0.01). Nationally, isolation peaked from May to July 2020. To the author's knowledge, our work is the first to examine spatial disparities in isolation among adolescents and young adults, providing much-needed knowledge where future public health interventions are immediately needed.

PC 12

Ben Pluska, Sustainable Development Undergraduate Student
Faculty Mentor: Rebecca Witter, Sustainable Development
Co-Author(s): n/a

Title: ECOLOGY BY A DIFFERENT SOUND: REVERBERATIONS OF INJUSTICE IN THE RURAL SOUTH

Since 1973, the "Green for Life" (GFL) Environmental Holdings Facility has grown in the predominantly Black community of Snow Hill in Sampson County, North Carolina (USA). Today, the 1,315-acre landfill is the largest in the state and the second-highest emitter of methane in the nation. Around 300 trucks transport 4,320 pounds of waste from 73 counties to the landfill daily. The NC Department of Environmental Quality and Sampson County Board of Commissioners have reassured residents that liners, covers, and a leachate collection system contains the garbage, PFAS, and vinyl chloride emitted from the landfill. Yet residents still see, smell, feel, and hear environmental harm. The constant influx of garbage pollutes the soil, water, and air and generates an intrusive industrial soundscape that continually disturbs residents' sleep and disrupts their quality of life. After years of struggle against the landfill's development, new permits to diversify the operation threaten to dismantle residents' dignity. Public hearings observed and listening sessions conducted in 2023 emphasized residents' concerns about ongoing environmental injustices and prompted a student-led, community-engaged acoustic monitoring project. In this poster and/or talk we share the preliminary results of that project aimed at monitoring the location, frequency, and magnitude of garbage truck noises. Our results trouble GFL's claims of containment and demonstrate the promise of sensory knowledge in a context where existing regulatory paradigms evade responsibility for residents' mental, physical, socio-economic, and cultural well-being. By engaging with ethnographic and sensory data, permitting

agencies can move beyond mitigating exposure towards empathetic and responsive environmental policy.

PC 13
Kathleen Plesh, Geology Undergraduate Student
Faculty Mentor: Andrew Heckert, Geological and Environmental Sciences
Co-Author(s): Josef Stiegler
Title: FILETS OF FISH: SEGMENTING COMPUTERIZED TOMOGRAPHY (CT) SCANS TO MORPHOLOGICALLY DESCRIBE RAY-FINNED FISH (ACTINOPTERYGII) FROM THE SNYDER QUARRY IN THE LATE TRIASSIC CHINLE FORMATION IN NORTHERN NEW MEXICO
The Snyder quarry, located in the Late Triassic Chinle Formation of northern New Mexico, is known primarily for its abundant larger vertebrates, but does yield a diverse microvertebrate fossil assemblage, especially of osteichthyans (bony fish). However, this diversity is not mirrored by the macrovertebrate fossil record, with the microvertebrate assemblage specifically containing more osteichthyan fossils and lineages not present in the macrovertebrate assemblage. The osteichthyan microvertebrate fossils collected thus far are primarily scales, bone and toothplate fragments, and, rarely, complete teeth. The lineages represented include a diversity of Actinopterygii (ray-finned fish), principally semionotids, redfieldiids, and palaeoniscoids, as well as some indeterminate sarcopterygians, probably coelacanths. In contrast, the only osteichthyan that was represented in the macrovertebrate assemblage was an incomplete articulated skeleton of a semionotid. In the summer of 2023, three articulated actinopterygian fossil fish skeletons were collected from the Snyder quarry. Computed tomography (CT) scans of these specimens were taken and later used to create 3D models of the fish skeletons that could be analyzed by digitally separating out (segmenting) the individual skull bones of each of the skeletons. The goals of this ongoing project are to analyze each of these skull bones individually and compare their morphological characteristics to the other known actinopterygian lineages present in the macro- and microvertebrate assemblages of the Snyder quarry. Not only will this provide more taxonomic information on the Snyder quarry assemblage, but it will also offer paleontologists a rare glimpse into the internal anatomy of Triassic fish fossils by by being able to view the bones' morphology in three dimensions rather than the typical two dimensions offered by analyzing them in situ.

PC 14
Molly Donahue, Psychology Undergraduate Student
Faculty Mentor: Amy Galloway, Psychology
Co-Author(s): Camden Hutchinson, Taylor Martin
Title: EXPLORING THE INFLUENCE OF CAREGIVER PRAISE ON INFANT FEEDING BEHAVIOR: A WINDOW INTO DEVELOPING EATING PATTERNS

The relationship between infant eating patterns and social cues during mealtimes might be an important component in developing intuitive eating behavior. Praise is a social reward used to encourage the recurrence of a desired behavior. When used during an infant's meal time, the caregiver gives approval of a child's eating (Orrell-Valente et al., 2017). Previous studies have shown a significant positive correlation between praise and more healthy food eaten off a child's plate, indicating that this caregiver's verbal feedback might influence the diet quality. While verbal reinforcement is not typically deemed overly controlling, there may be unintended consequences if it encourages a child to continue to eat beyond fullness (Arredondo et al., 2006). The current experiment aimed to understand the relationship between infant control over their feeding behavior and praise given to the child by their mother. We expected to see a positive correlation between caregiver use of verbal praise and the level of infant self-feeding. We recruited and video-recorded infant-caregiver feeding interactions (n = 14) during one mealtime in the home. Experimenters coded the video data for the use of caregiver verbal praise and the level of infant-led eating and parent-led eating. Remarkably, results showed that parent verbal praise was positively correlated with higher levels of parent-led eating, $r(14) = 0.78$, $p = <0.001$, as opposed to infant-led eating. These findings suggest that when parents bring food to the infant's mouth, they are more likely to use praise as feedback. While this might encourage healthy feeding, it is possible there may be unintended consequences if it overrides an infant's physical satiety cues. Further research is warranted to find evidence of social cues' substantial impact on a child's eating behavior from infancy to adulthood.

PC 15

Ian Berry, Geography Undergraduate Student
Faculty Mentor: Dennis Guignet, Economics
Co-Author(s): Dr. Maggie Sugg

Title: UNDERSTANDING THE INTERSECTION OF NEIGHBORHOOD FACTORS AND PROXIMITY TO CHEMICAL FACILITIES: IMPLICATIONS FOR POLICY AND EQUITY

Communities near industrial facilities face the risk of chemical accidents, which can cause acute and long-term financial and health effects. Such accidents can result in fires, explosions, and releases of toxic chemicals into the air. Little is known about the underlying contextual and neighborhood factors of locations across the US and which populations are most at risk for accidents. This study aims to understand the underlying populations close to industrial and chemical facilities to determine which locations and sub-populations are most susceptible to these accidents. Using data from the US Environmental Protection Agency's (EPA) Risk Management Plan (RMP) program, which monitors over 17,000 facilities within the United States, we study neighborhoods within a 10km range of an RMP facility, and in particular within this same distance of an RMP facility where a severe chemical accident occurred (i.e., accidents that resulted in

offsite impacts, including explosions, damage to surrounding properties, injuries and fatalities to surrounding populations, and/or orders to evacuate or shelter-in-place). We also include crucial contextual neighborhood factors from the American Community Survey to construct spatial measures of income segregation, structural racism, and poverty. To examine spatial overlap and clustering we used methods including local bivariate analysis and Getis-Ord Gi. Our preliminary results show a direct association between poverty, structural racism, and RMP facility locations across the US. Based on these findings, policymakers should prioritize equitable land use policies to reduce risks and enhance the well-being of residents living near industrial facilities.

PC 16

Matthew Mair, Economics Undergraduate Student
Faculty Mentor: John Whitehead, Economics
Co-Author(s): Tatyana Ruseva, Greg Howard

Title: FACTORS THAT IMPACT FARMER WILLINGNESS TO PARTICIPATE IN CONSERVATION PROGRAMS IN THE TAR-PAMLICO WATERSHED OF NORTH CAROLINA

Payment for ecosystem services (PES) programs provide financial incentives to farmers who voluntarily adopt conservation practices. The decision to participate in a PES program is primarily influenced by the attributes of the contract offered and the characteristics of the decision-maker. We surveyed 197 farmers in the Tar-Pamlico watershed, presenting them with demographic questions and a choice experiment. Farmers were asked to choose between two hypothetical PES contracts or a status-quo option of neither program. For our experiment, the contract attributes include limits on nitrogen application, cover crop requirements, and payment per acre. Decision-maker variables include the farmer's age, education, and threat appraisal (i.e., their perceived level of concern regarding nutrient loss on their farm). Performing a conditional logit regression model, we analyze the effect of each contract attribute and decision-maker variable on the willingness of a farmer to participate in a PES program. Consistent with previous literature, we observe a highly significant positive relationship between payment and participation. As expected, we find a negative effect for strict nitrogen limits. We also observe a significant positive relationship between threat appraisal and participation. By understanding these factors, we can better inform policy decisions for how PES programs are implemented and targeted.

PC 17

Elizabeth Moeller, Sociology Undergraduate Student
Faculty Mentor: Ellen Lamont, Sociology
Co-Author(s): Dr. Johnnie Lotesta, second reader

Title: ""NOT EXCITED TO BE A TEACHER"": HOW DO TEACHERS RESPOND TO AND NAVIGATE POLICIES GOVERNING THE EXPRESSION OF GENDER IDENTITY AND SEXUALITY IN SCHOOLS, AND HOW DOES IT IMPACT THEM?

In recent years, state legislators have enacted policies that further exclude members of marginalized gender and sexual groups from mainstream institutions in the United States. Although laws have targeted a range of social contexts, schools have been a particular focus. As a result, teachers find themselves in rapidly changing policy environments that place them at the forefront of the ongoing culture war over gender expression and sexual orientation in schools. As street-level bureaucrats, teachers are expected to act within the bounds set by the state, school, or community. That said, they may also exercise discretion based on their personal beliefs and goals. These tensions can ultimately impact both their work and, potentially, their well-being. Using in-depth interviews with 10 public high school teachers from two states with sharply contrasting policies – California and Texas – I explore how teachers navigate policies governing the expression of gender identity and sexuality in schools and how it impacts them.

As I show, LGBTQ+ policies in California and Texas inform how teachers engage with students, administrators, and parents. In California, teachers are empowered to openly support LGBTQ students through policies they can leverage for protection even when they encounter less than supportive administrators or parents. However, they still face pressures to engage with LGBTQ issues in particular, progressive ways and were taken to task when they did not. In Texas, on the other hand, teachers had to find covert ways to subvert broader policies and support LGBTQ students, and could not rely on parents and administrators to protect these efforts. As a result, teachers in both locations felt constrained by the political context and lack of perceived support. While they ultimately were able to find constructive ways to support LGBTQ students, navigating competing demands created strain as they worked to create positive environments for their students.

PC 18

Mabry Watson, Exercise Science Undergraduate Student
Faculty Mentor: Alan Needle, Public Health and Exercise Science
Co-Author(s): Howard JS, Skinner JW

Title: TRANSCRANIAL DIRECT CURRENT STIMULATION OVER THE MOTOR OR FRONTAL CORTEX DOES NOT IMPROVE DUAL TASK REACTION TIMES OR COGNITIVE PERFORMANCE IN INDIVIDUALS WITH CHRONIC ANKLE INSTABILITY

Patients with chronic ankle instability (CAI) have difficulty with dual-task execution tied to changes in their motor (M1) and dorsolateral prefrontal cortices (DLPFC). We aimed to determine if transcranial direct current stimulation (tDCS) combined with rehabilitative exercises could improve dual-task ability in patients with CAI. Forty-five individuals participated in a double-masked randomized controlled trial. Participants

tested at baseline, mid-training, post-training, and retention, surrounding a 4-week ankle rehabilitation intervention. Intervention involved participants performing 8 rehabilitation sessions, receiving anodal tDCS at 1.5mA for 18 minutes over M1 or DLPFC, or Sham stimulation lasting 1 minute. Outcome measures were performance on a choice reaction hopping test, recording reaction time, while simultaneously performing a 3-back memory test on a light placed in front of subjects, recording percent correct responses. Thirty-seven individuals completed the trial (DLPFC: n=11, 23±6 yrs, M1: n=13, 23±3 yrs, Sham: n=12. 26±6 yrs). Two-way ANOVA revealed reaction time was not significantly different across groups or times ($p>0.05$). Reaction times were faster on lateral hops than medial hops ($F[1,32]=5.329$, $p=0.017$). No significant group-by-time or group difference was observed for correct letters ($p>0.05$); however, there was a significant effect of time ($F[3,99]=10.4$, $p<0.001$) with accuracy improving from baseline to all time points ($p\leq0.005$), and from mid-training to post-training and retention ($p\leq0.008$). Dual-task reaction times and cognitive performance improved over the course of rehabilitation, but were not impacted by tDCS. Improvements were noted on the cognitive task, suggesting either a learning effect across groups, improved cognitive performance, or increased focus on the cognitive task. Potential future research utilizing mental imagery, a cognitive task, paired with stimulation may yield improved outcomes.

PC 19

Kiara Neilsen, Biology Undergraduate Student
Faculty Mentor: Rachel Bleich, Biology
Co-Author(s): Ally Lawing

Title: INTERACTIONS OF BACTERIA IN AEROBIC CONDITIONS AFTER CALORIC RESTRICTION IN ESTABLISHED RAT MODEL

Diet and nutrition are essential in regulating an individual's health and well-being. Recent developments have linked the human gut microbiome composition to multiple ailments or bodily regulations, such as inflammation, nutrient absorption, and energy use. Together, alterations to the gut environment due to caloric restriction, such as eating disorders like Anorexia nervosa, war or famine, or intense dieting, may be linked to long-term health consequences. Anorexia nervosa and other eating disorders are common in the United States and internationally, with 1.2% of the U.S. population developing anorexia nervosa in a lifetime (American Addiction Centers 2022). Rats may be used as model organisms to study the microbiome by collecting fecal samples at different time points during an ad libitum or food-restricted diet. In this project, microorganisms from the fecal sample of a calorically restricted rat (40% of normal diet) were isolated, characterized by colony morphology, and grown in co-culture to examine potential interactions between the seven isolated bacterial strains. Incubation was completed aerobically to examine aerobes and facultative anaerobes in the gut of the calorically restricted rat. Isolates were plated in close proximity and as 1:1 strain

mixtures (measured via optical density). Wrinkling was observed in two pairs of 1:1 mixed isolates and one pair of closely-plated isolates. Colony wrinkling in co-culture indicates potential biofilm formation between these isolates. Additionally, two closely-plated pairs were observed to produce a material which one strain used to surround the other, indicating competition in co-culture. The isolated microorganisms will be identified using 16S sequencing. Studying the interactions between isolated strains from this fecal sample in oxic conditions may further our understanding of nutrient restriction and its influence on the human gut microbiome.

PC 20

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

Title: STABILIZATION OF ALCOHOL DEHYDROGENASE IN SOLUTION BY A NOVEL TARDIGRADE PROTEIN

Tardigrades are microorganisms known for their ability to withstand a variety of stressors, including desiccation. Tardigrade desiccation survival requires upregulation of intrinsically disordered cytosolic abundant heat soluble (CAHS) proteins, including CAHS D. Recombinant CAHS D can also protect enzymes outside of tardigrades. Specifically, lactate dehydrogenase and lipoprotein lipase are sensitive to inactivation by desiccation and lyophilization but retain activity under these conditions in the presence of CAHS D. We are interested in testing whether CAHS D can stabilize enzymes in aqueous solution. This would be beneficial to therapeutics that are delivered in liquid form, such as insulin. Recombinant CAHS D was purified from E. coli using metal chelate affinity chromatography. Alcohol dehydrogenase from Saccharomyces cerevisiae was mixed with increasing concentrations of CAHS D in aqueous solution to determine the optimal ratio of ADH to CAHS D by weight. Once the optimal concentration of CAHS D was determined, the activity of ADH was tested at 60 °C for 80 minutes alone, in the presence of CAHS D, or in the presence of bovine serum albumin (BSA). ADH retained greater activity in the presence of CAHS D than alone or with BSA. At room temperature, ADH maintained activity over a period of four days in the presence of CAHS D. These experimental results suggest that CAHS D can not only act as a stabilizer for enzymes in aqueous solution, but performs better than BSA in this role.

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

Poster 21
Maria Iveth Carballo Funes, Biology Undergraduate Student
Faculty Mentor: Andrew Bellemer, Biology
Co-Author(s): N/A
Title: INVESTIGATING MOLECULAR MECHANISMS OF THERAPEUTIC TREATMENTS FOR EPILEPSY IN DROSOPHILA MELANOGASTER
Epilepsy is a common neurological disorder, characterized by recurrent episodes of abnormal electrical nervous system activity, otherwise known as seizures. These electrical activity disturbances may result in muscle spasms, convulsions, and loss of consciousness. Drosophila melanogaster (the fruit fly), was chosen as the model organism for studying epilepsy in this project due to their shared homology with humans. The specific seizure-prone fly lines that will be investigated are the parabss1 and east fly lines. Parabss1 is a fly line with a gain-of-function mutation in its voltage-gated sodium channel gene. Eas is a fly line with a frame-shift mutation in the ethanolamine kinase gene. Mechanically induced seizures in both fly lines mimic features of human seizures. Previous studies and literature concluded that parabss1 and eas flies exhibited a reduction in the proportion of seizing flies when fed Arachidonic Acid and Anandamide. The primary aim of this project is to better understand how Arachidonic Acid exerts its anticonvulsant effects. Lipoxygenases (LOXs), Cytochrome P450 and Cyclooxygenases (COX) are enzymes that metabolize Arachidonic Acid. We test drugs that block the enzyme activities (with Arachidonic Acid) to conclude whether they block or improve the seizure-protective effects. Additionally, previous experiments suggested that fish oil reduced seizure severity when tested on parabss1 flies. This directed our studies to also test fatty acids such as linoleic acid. The mechanisms behind reduced seizure severity will continue to be investigated in order to better understand epilepsy and propose cost-effective therapeutic treatments."

Poster 22
Katrina Fortier, Biology Graduate Student
Faculty Mentor: Cara Fiore, Biology
Co-Author(s): Alicia Reigel2, Amy Apprill3, Cole Easson4, (2) Appalachian State University, Boone, United States, (3) Woods Hole Oceanographic Institution, Marine Chemistry & Geochemistry, Woods Hole, United States, (4) Middle Tennessee State University, Murfreesboro, United States
Title: THE HIDDEN INFLUENCE OF SPONGES ON CORAL REEF HEALTH: A STUDY ON DOM AND BACTERIOPLANKTON COMMUNITIES
Bacterioplankton communities on coral reefs are diverse and crucial for nutrient cycling and ecosystem health. Their composition can shift due to environmental conditions,

including the percent cover of corals and algae. These organisms release unique exudates that support microbial growth. While the impact of coral and algal exudates have been investigated, there are no published studies of how sponges, a prevalent filter feeding organism on reefs, influence bacterioplankton composition. We investigated this question by creating four mediums: coral exudate water, sponge exhalant water, sponge exhalant water plus coral exudates, and ambient seawater. Coral reef bacterioplankton were added and incubated in the dark for 48 hours. Nutrients and the bacterioplankton community composition and abundance were assessed at the start and end of the experiment. Preliminary results indicate a greater increase in cell densities with sponge exudates, alone or with coral exudates, compared to the coral treatment. All treatments increased cell densities but decreased taxonomic diversity, suggesting these treatments favored the growth of certain microbes. Cyanobacteria, prominent autotrophs in seawater, decreased in all treatments but remained present after 48 hrs, and Gammaproteobacteria increased across all treatments. Further work will identify specific taxa that were ecologically relevant in each treatment, revealing associations between sponge and coral exudates and reef bacteria. Our study suggests that sponges and corals distinctly impact bacterioplankton communities and their combined exudates may enhance reef bacteria diversity and productivity. This highlights the unique role of sponge metabolism in nutrient profiles and picoplankton dynamics, and improves our understanding of the ecological function of sponges and corals in reef microbial ecology.

Poster 23

Sarah Mann, Biology Undergraduate Student
Faculty Mentor: Rachel Bleich, Biology
Co-Author(s): Ally Lawing, Dom Diprospero

Title: E. COLI & E. FAECALIS BIOFILM FORMATION AND RELATIVE CONTRIBUTION TO GUT INFLAMMATION OBSERVED IN IBD.

The gut microbiome plays a critical role in maintaining gastrointestinal health, along with maintenance of the autoimmune system. Individuals diagnosed with inflammatory bowel diseases (IBD), such as Crohn's disease (CD) and ulcerative colitis (UC) experience issues with chronic inflammation, which can eventually lead to more serious implications such as gastrointestinal fistulas and/or stricture, as well as blockages and potentially an increased risk of cancer. The variety and imbalance of gut bacteria is linked to inflammatory bowel diseases. Analysis of two bacteria, Escherichia coli (E. coli) and Enterococcus faecalis (E. faecalis), and their combined effect on inflammation within the gastrointestinal tract via increased biofilm formation was conducted to determine its significance within individuals experiencing inflammatory bowel diseases. E. coli and E. faecalis are commonly found in the gastrointestinal tract and are known to be symbionts, and therefore not detrimental to the gut microbiome/gut health, but are more abundant in people with IBD.The focus of this study is on the pathobiont, biofilm forming adherent-invasive Escherichia coli (AIEC). AIEC strains are known to have the

ability to adhere and invade gastrointestinal epithelial cells. AIEC, in correlation with other gut microbiota, such as E. faecalis are predicted to form larger, more complex biofilms that could contribute significantly to the increased inflammation and bacterial invasion presented in individuals diagnosed with IBD.

Poster 24
Bailey Sauls, Biology Graduate Student
Faculty Mentor: Jon Davenport, Biology
Co-Author(s): Dr. Benjamin Fitzpatrick
Title: DETERMINING DIETARY NICHE OVERLAP OF TWO WOODLAND SALAMANDERS USING STABLE ISOTOPES IN GREAT SMOKY MOUNTAINS NATIONAL PARK.
Plethodon salamanders have been identified as ideal model organisms for ecological and evolutionary research. These amphibians are typically abundant where found and play vital roles in their ecosystems. Southern Zigzag salamanders, Plethodon ventralis, and Southern Redback salamanders, Plethodon serratus, are two small-bodied woodland salamanders that potentially overlap in the Great Smoky Mountains National Park and the surrounding area. These two species are ecologically similar but research is lacking to explain how they coexist. Resource partitioning is often thought to contribute to species coexistence. Sympatric and allopatric populations of the two salamander species will be studied to determine if niche overlap exists in isotopic diet. Tail tissues approximately 5mm in length were collected and processed for stable isotope analysis since previous work showed ample information can be gathered from these tissues rather than sacrificing the animal. Sympatric and allopatric populations were sampled to determine isotopic diet of individuals from eighteen sites. Based on preliminary results, it appears there is overlap in the dietary niche space of P. ventralis and P. serratus. Environmental parameters may play a bigger role in the coexistence of the two woodland salamanders in question. This research will expand our understanding on what factors may enable coexistence of ecologically similar species.

Poster 25
Lindsey Stack, Biology Undergraduate Student
Faculty Mentor: Eduardo de Campos, Chemistry and Fermentation Sciences
Co-Author(s): NA
Title: A PILOT STUDY OF THE ANALYSIS OF DESIGNER BENZODIAZEPINES IN SYNTHETIC ORAL FLUID AND URINE USING LATERAL FLOW IMMUNOASSAY TESTS
Designer benzodiazepines (DBZDs), a class of newly emerging psychoactive drugs, are causing concern among experts as they are increasingly found in seized materials and biological specimens. Unlike traditional benzodiazepines, DBZDs have not been approved for medical use in the United States. The chemical structure of DBZDs is

similar to known benzodiazepines, posing challenges for forensic scientists to detect these compounds using common testing methods. In this research, two types of immunoassay test strips were evaluated for their ability to detect three specific DBZDs (bromazolam, etizolam, and flubromazepam) in synthetic urine and oral fluid. Synthetic urine and oral fluid samples were spiked with reference material solutions in methanol and tested using two commercially available immunoassay test strips. A potential cross-reactivity was observed for only one of the target analytes, suggesting that these immunoassays could be used as a tool to screen this compound in aqueous samples. However, the current study has some limitations: experiments were performed with synthetic fluids (not authentic biological samples), did not target any metabolites, and used a test strip not developed for oral fluid analysis, which requires further studies and validation.

Poster 26

Seleen Al Horani, Chemistry Undergraduate Student
Faculty Mentor: Petia Bobadova, Chemistry and Fermentation Sciences
Co-Author(s): Masa Al Horani

Title: COMPUTATIONAL MODELING OF A SERIES OF UNSYMMETRIC BIS(BF2) BODIPYS: BOPYPYS

4,4-Difluoro-4-bora-3a,4a-diaza-s-indacene fluorophores (known as BODIPYs) have found exciting applications ranging from medical imaging, biosensing, and photodynamic therapy to photovoltaic, and optoelectronics. BODIPYs have excellent photophysical properties, including sharp absorption and emission bands in the visible spectral region, high fluorescence quantum yields, and high molar extinction coefficients. One of the main advantages of BODIPYs is that they can be functionalized at all peripheral carbon atoms and at the boron center, enabling the fine tuning of their chemical and photophysical properties for a particular application. Recently, a series of substituted unsymmetrical bis(BF2) fluorophores (BOPYPY) were synthesized and their regioselectivity and photophysical properties were investigated both experimentally and computationally. Our study focused on the computational modeling of the ground and excited states of the series. We examined the effect of the substituents on the molecular properties of the series of compounds and were able to explain the observed regioselectivity. We were also able to propose a hypothesis to explain the lower fluorescence ability of BOPYPYs compared to previously synthesized compounds, BOPPYs. The results of this study were submitted for publication in Inorganic Chemistry, a peer-reviewed journal of the American Chemical Society with current impact factor of 4.6. Our research was selected for an oral presentation during the Women Make COMP Symposium organized by the Division of Computers in Chemistry of the American Chemical Society as part of the ACS Spring National Meeting in March 2024.

Poster 27

Dehlia Lang, Chemistry Undergraduate Student

Faculty Mentor: Eduardo de Campos, Chemistry and Fermentation Sciences

Co-Author(s): n/a

Title: DEVELOPMENT AND VALIDATION OF A GC-MS/MS METHOD FOR THE ANALYSIS OF DELTA-8-THC IN COMMERCIAL OIL SAMPLES

Delta-8-tetrahydrocannabinol (delta-8-THC) is a psychoactive compound found in lower levels in the cannabis plant, and it can also be synthesized from cannabidiol. Products containing delta-8-THC are not approved by the FDA and they may contain dangerously high concentrations of delta-8-THC and/other cannabinoids, debris from unsanitary production, or dangerous solvents and contaminants. Therefore, analytical methods for the detection and quantification of this compound in such products is needed. In the literature, to the best of our knowledge, no methods using gas chromatography-triple quadrupole mass spectrometry (GC-MS/MS) have been developed. The goal of this research is to develop and validate a GC-MS/MS method for the analysis of delta-8-THC in commercially available oils. Analyses were performed using a Thermo Trace GC Ultra coupled with a Thermo TSQ Quantum XLS MS. Full scan, selected ion monitoring, product scan, and selected reaction monitoring (SRM) experiments were initially performed. The selected transitions for delta-8-THC were m/z 386 → 330 and m/z 386 → 303. After performing an optimization study, the selected conditions for derivatization consisted of a temperature of 70°C, incubation for 20 minutes using a mixture of 50 µL of ethyl acetate and 50µL of BSTFA with 1% TCMS. Future experiments will be performed to complete the method validation.

Poster 28

Jack McKeon, Chemistry Undergraduate Student

Faculty Mentor: Jefferson Bates, Chemistry and Fermentation Sciences

Co-Author(s): Gary Guillet

Title: ELECTRONIC STRUCTURE STUDIES OF A TRI-FERROUS EXTENDED METAL ATOM CHAIN COMPLEX

Extended metal atom chain (EMAC) complexes have been synthesized using late first-row transition metals to produce a wide array of compounds. Recently, a novel tri-ferrous complex has been synthesized that does not utilize the usual 2,2'-dipyridylamine (dpa) ligand framework, which essentially always results in a tetragonal coordination environment and general formula M3(dpa)4X2, where X is an anion. Instead, the tri-ferrous complex utilizes a pyridine-based ligand (L) system resulting in the formation of trigonal complexes with general formula Fe3L3. Semi-local and random phase approximation (RPA) density functional theory calculations were utilized to explore this novel Fe3L3 complex in order to compare and contrast with the traditional dpa-based EMACs. Due to the absence of anionic, axial ligands, the sigma non-bonding orbitals formed from the metal d orbitals are lower in energy than in the

dpa complexes, and compete with the pi bonding orbitals for occupation in the Fe3L3 complex. By studying a model complex, Fe3L'3, a series of Jahn-Teller distortions are predicted ending in a C2 structure that closely matches the reported crystal structure for all of the methods utilized in this study. 2D potential energy surfaces were also calculated for a range of fixed Fe-Fe bond lengths to understand the preference for symmetric or asymmetric tri-ferrous units.

Poster 29
Kat Provost, Chemistry Undergraduate Student
Faculty Mentor: Micheal Reddish, Chemistry and Fermentation Sciences
Co-Author(s): N/A
Title: DEVELOPMENT OF AN OPTIMIZED PROTOCOL FOR THE EXPRESSION AND PURIFICATION OF RECOMBINANT HUMAN ADRENODOXIN IN ESCHERICHIA COLI
The enzyme cytochrome (CYP) P450 27A1 catalyzes the metabolism of vitamin D and cholesterol derivatives, which contributes to sterol homeostasis and cancer signaling. To better understand the functions of this enzyme, it is pertinent to understand how it interacts with its redox partner, adrenodoxin (Adx). Adx is an iron-sulfate ferredoxin protein that delivers electrons to cytochrome P450 enzymes. Adx may support CYP P450 reactions beyond the delivery of electrons. Understanding Adx and optimizing its production is essential to the complementary characterization of P450 27A1. The purpose of this study is to determine the most effective methods of expression and purification of adrenodoxin. Optimization of Adx production began with utilizing western blotting to determine the earliest point in the purification process that Adx could be detected. The results suggested that adrenodoxin could be detected as early as the bacteria lysis step. The ability to test sonication samples proved to be more time-efficient when working to optimize cell lines. Three cell lines, E. coli C41, C43, and Tuner (DE3), were normalized to E. coli BL21 to determine which was the more productive cell line in the production of Adx. The results indicated that cell lines do lead to an increase in Adx production, with C41 being the most efficient cell line for production.

Poster 30
George Hotelling, Environmental Science Undergraduate Student
Faculty Mentor: Shea Tuberty, Biology
Co-Author(s): Robert Swarthout, Nick Scrocco, Lilly Stieby, Hunter Comeford, Maggie Pipkins, Lucca Scoggins
Title: EXPLORING PHOSPHORUS FLUX DYNAMICS IN THE HEADWATERS OF THE SOUTH FORK NEW RIVER
In the headwaters of the South Fork New River, members of the AppAqua research cluster at App State are conducting a study to quantify the flux of total phosphorus (TP)

using advanced monitoring techniques. Our primary objective is to address the question: How much phosphorus is present in the high country waterways, and can this value be determined without resorting to intensive monitoring efforts? Our methods include data and sample collection by in situ data sondes, ISCO stormwater autosamplers, grab samples, and analysis for TP by laboratory digests, and ICP-OES. By examining TP flux trends in conjunction with high water events, we have identified a distinct relationships that potentially enables interpolations based on TP concentration trends and hydrographs. This work is important because phosphorus sustainability is emerging as a critical topic, given its extensive use, nonrenewable nature, and potential to pollute waterways when present in excess. Work to better understand TP transports can aid in understanding the causes of eutrophication events and harmful algal blooms (HABs), two potential results of nutrient pollution, and it can help identify where best management practices (BMPs) should be discussed. The Science and Technology for Phosphorus Sustainability Center (STEPS), a convergence science center funded by the National Science Foundation, has spearheaded this initiative. By engaging in interdisciplinary and stakeholder collaboration, we, within STEPS, strive to contribute valuable insights to inform strategies for sustainable phosphorus management. Our work addresses concerns related to improving use efficiency and promoting the overall health of aquatic ecosystems in the New River.

Poster 31

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

Title: ASSESSING TRENDS IN THE FLUVIAL GEOMORPHOLOGY OF ALASKA'S PROGLACIAL RIVER SYSTEMS

Proglacial hydrologic systems, comprised of lakes and rivers downstream from glaciers, transmit high volumes of both water and sediment and are subject to constant change. Changes to river planform and fluvial geomorphology within a proglacial system may have far-reaching impacts on ecosystems both locally and downstream, including alterations to stream flow rate, vegetation growth, and sediment transport. However, both the magnitude of system changes and the mechanisms driving change are poorly understood. To better understand the changes and trends in the fluvial geomorphology of proglacial river systems, we analyze 30 proglacial river braidplains in Alaska utilizing satellite and aerial imagery and characterize how systems have changed over 1984-2022. We use manually derived measurements of multiple braidplain characteristics, including active channel width, braid width, and braiding index to document changes in water extent and planform channel morphology occurring within a system while upstream glaciers thin and retreat. We first use satellite and aerial imagery to manually delineate salient braidplain characteristics at different times across the study period. We then investigate changes in these characteristics by comparing current

and historic observations within each braidplain. These data are then used to characterize the average and variability of proglacial river system change across Alaska. We search for trends and mechanisms of system change and seek to understand the variability in hydrologic change across systems by investigating environmental factors including the role of proglacial lakes in regulating system change and the relationships between various system characteristics. This work will serve to contribute to the understanding of the nature of changing fluvial geomorphology of proglacial river systems, potential mechanisms driving system change, and the effects these changes may have on both local and downstream ecosystems.

Poster 32
AG Berry, Geology Undergraduate Student
Faculty Mentor: Steve Hageman, Geological and Environmental Sciences
Co-Author(s): N/A
Title: EXPLORING THE RELATIONSHIPS BETWEEN SHORT-TERM CHANGES IN DIATOMS (MICROSCOPIC ALGAE) AND COAL ASH CONTAMINATION WITHIN HYCO LAKE, NORTH CAROLINA
Coal combustion residuals (CCRs), including coal ash, regularly contain hazardous heavy metals. These residuals have contaminated local bodies of water near coal-fired plants. One such body of water is Hyco Lake, near the Roxboro Plant in Semora, North Carolina. The lake also contains diatoms, or single-celled algae with silica skeletons. These diatoms are preserved in the sediment record and can be useful environmental indicators. Diatoms are a natural sink of atmospheric CO_2. The goal of this project is to determine the distribution of diatoms throughout the sediment record (five decades of annual resolution) and if any connections can be drawn to the coal ash within Hyco Lake, and other natural environmental variation. Multiple sediment cores were collected by colleagues from Appalachian State University in the Dept. of Geological and Environmental Sciences. Sediment samples were analyzed for coal ash using a Leica DMLP polarizing microscope (Fox, this session) and for diatoms using a Scanning Electron Microscope. Three common and eight rare morphologies were identified within the samples. The abundance of morphologies was plotted against time. The results show that patterns are present in the diatom record within and among the sediment cores. Two significant dates with diatom peaks include 1969 and 1992. These patterns will provide insights and understanding as to how the coal ash is impacting the base level of the food chain in this lake ecosystem over time.

Poster 33
Colby Bierwirth, Geology Undergraduate Student
Faculty Mentor: Cole Edwards, Geological and Environmental Sciences
Co-Author(s): N/A

Title: LOCATION MATTERS, OR DOES IT? TESTING THE VARIABILITY OF CARBON ISOTOPIC VALUES FROM SIMILAR AND DIFFERENT CARBONATE LITHOLOGIES: IMPLICATIONS FOR PALEOENVIRONMENTAL RECONSTRUCTIONS

Stable carbon (13C) isotopes measured from bulk carbonate rocks are used to reconstruct changes to the isotopic value of the oceans, as well as provide insight into changes in the atmospheric composition and ocean anoxia. However, recent work on modern carbonate systems has challenged these kinds of interpretations, suggesting that intra-rock variability of different grains can explain observed isotopic changes. To test this hypothesis, we resampled a section previously studied to test whether multiple sampled spots from a rock sample vary more than analytical uncertainty, and whether a reported isotopic excursion could be explained by measuring one lithology vs. another. These Ordovician carbonates were sampled from the Ibex area, western Utah, where previous work shows a >2‰ positive excursion is preserved in this section. Newly collected samples (n=62) at <1m sampling resolution contain facies that range from lime mudstone to packstone. Preliminary data measured using the IsoPrime Isotope Ratio Mass Spectrometer coupled to an IsoFLOW device at Appalachian State University recreate published data well. Furthermore, these data indicate that samples from the same lithology of the same hand sample have a 13C range of 0.04‰ (n=2, and within error of each other), whereas samples with different lithologies can have 13C values that can differ as much as 0.23‰. This difference is statistically significant and suggests that either alteration has affected some coarse- vs. fine-grained lithologies, but not nearly large enough to explain a >2‰ excursion as previously reported. This suggests that this 13C excursion does record changes in seawater and has implications for making paleoenvironmental estimates of deep time using this method. Future work will complete the high-resolution sampling throughout this interval, focusing on more thoroughly sampling individual facies to be able to statistically show how robust and variable is this reported 13C excursion.

Poster 34

Luke Rose, Geology Undergraduate Student
Faculty Mentor: Andrew Heckert, Geological and Environmental Sciences
Co-Author(s): John Hancox

Title: TAXONOMIC SIGNIFICANCE OF LUNGFISH (SARCOPTERYGII:DIPNOI) TOOTH PLATES IN THE LOWER TRIASSIC (OLENEKIAN) BURGERSDORP FORMATION OF DRIEFONTEIN, SOUTH AFRICA

Despite their extensive fossil record since the Devonian, the taxonomic diversity of dipnoans (lungfish) is not well constrained above the Permian-Triassic boundary (PTB). This is due to reduced ossification of the skeletons in post-Paleozoic dipnoans, resulting in a near-total lack of cranial material from Mesozoic deposits. The Lower Triassic (Olenekian) Driefontein locality of the Karoo Basin, South Africa, in the lowest

Cynognathus Assemblage Zone of the Burgersdorp Fm, yields dozens of tooth plates assigned to the genus Ptychoceratodus, but that appear to represent greater diversity. Thus, Driefontein is a prime site for studying lungfish recovery post-PTB. Lungfish possess a readily diagnostic dentition, consisting of ridged tooth plates, which are typically the only part of the animal that is preserved in Triassic taxa. Taxonomic assignments of these plates are based on the number, size, and shape of the ridges and intervening furrows, though it is limited by allometry and other ontogenetic/positional variation. Here I report the length and width (in mm) of 63 lungfish tooth plates as well as measurements for three ridge angles (C1BCP, C2BCP, C3BCP) defined by five anchor points. These measurements were used in principal component and linear discriminant analyses (PCA & LDA) to quantify the morphological variation in these plates and test our taxonomic hypotheses. We report three tooth plate morphotypes from Driefontein: the previously assigned Ptychoceratodus, a much larger Arganodus-like morph, and a Gnathorhiza-like morph. All three genera coexisted in the Olenekian of Russia and are also found at Olenekian localities in Poland. However, Arganodus is absent from Sub-Saharan Africa and Gnathorhiza is absent from Africa entirely. The occurrence of Arganodus and Gnathorhiza-like morphs at Driefontein greatly expands their geographic range, providing more evidence for the rapid recovery and re-radiation of ceratodontiform lungfish after the Permian extinction.

Poster 35

Brenna McNamara, Psychology Undergraduate Student
Faculty Mentor: Shawn Bergman, Psychology
Co-Author(s): Logan Briggs, Oliver Sullivan, Samantha Plourde, Madhu Sukumar, Penelope Williams

Title: LET'S GET TO WORK: ASSESSING PSYCH MAJORS' CAREER READINESS"

Introduction: Psychology undergraduates gain various work competencies from their curriculum but are still affected by underemployment. Students are often encouraged to obtain a master's degree for a better career outlook. Appalachian State University aims to prevent students from facing this issue after graduating by implementing a new graduate assistant position in the Psychology Advising Center to support students' career development. In preparation for this, a Needs Assessment was conducted to gauge students' perceptions of their career readiness. Methods: Data came from 243 senior psychology majors at Appalachian State. Members of the research team attended upper-level psychology class sessions with permission from faculty to read a script outlining the purpose of the study and encourage students to take the survey, a self-administered online questionnaire. Results: Results showed that a vast majority of participants agree their curriculum prepared them for their career, there are specific resources participants value in the career center, and many students plan to either get a job after graduation, work while attending grad school, or work before attending grad school. These findings support the initiative to launch the new position in the

Psychology Advising Center and provide detailed information on how to maximize the effectiveness of that role.

Poster 36
Mariana Solanilla, Psychology Undergraduate Student
Faculty Mentor: Dr. Timothy Ludwig, Psychology
Co-Author(s): Jacob Leslie, Taylor Brynds, Firzana Syazania, Nicholas Rupert, Drew Sipe, Dr. Shawn Bergman
Title: DART-ING TOWARDS SUCCESS: UNVEILING THE POWER OF THE DATA ANALYTICS READINESS TOOL (DART)
Safety research has yet to harness the power of data analytics to evaluate the impact of management systems. The DART is a self-assessment given to SMEs within organizations that scores descriptive, diagnostic, predictive, and prescriptive analytic capabilities. Results from a petroleum company revealed adequate preparedness to perform diagnostic analyses whereas descriptive and prescriptive analytic readiness were minimal. Company data was analyzed confirming these results, demonstrating the DART can accurately audit an organization's analytic capacity.

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

Poster 40
Lauren Gray, Biology Graduate Student
Faculty Mentor: Matt Estep, Biology
Co-Author(s): N/A
Title: A GENETIC DIVERSITY ASSESSMENT OF ALLIUM TRICOCCUM POPULATIONS WITH GREAT SMOKY MOUNTAINS NATIONAL PARK USING NEXT GENERATION SNP DISCOVERY
Our world today faces an unprecedented loss of biodiversity, and understanding the extent to which species lose genetic diversity is imperative for conservation efforts. Reduced genetic diversity causes species to be less resilient to stochastic change and more susceptible to extirpation and possibly extinction. This is especially problematic for species that have small population sizes or have modes of reproduction that do not facilitate gene flow. Allium tricoccum is a highly sought-after edible plant and is culturally significant to Native Americans, specifically the Eastern Band of Cherokee. Allium tricoccum has been widely used in traditional medicine to cure colds and earache. Due to its delicate, mild onion flavor and aroma, along with its high vitamin content, foraging for this plant has become increasingly popular. Botanists have become concerned that some populations may be eradicated due to irresponsible harvesting. This study will use SNP genetic markers obtained via Next-Generation sequencing technique, MIG-seq to assess the genetic diversity of A. tricoccum populations throughout Great Smoky Mountains National Park. The results from this study can serve as a proxy for population health within Great Smoky Mountains National Park and can help guide management decisions. This study will generate data needed to conserve populations and will play a role in the long-term monitoring of A. tricoccum by providing a base assessment for future research and the potential implementation of future management strategies. It will highlight genetic methods for obtaining population-level information that can be used in future studies analyzing seemingly abundant clonal populations, as well as provide data that can legitimize the Eastern Band of Cherokee's sustainable harvest of this significant plant.

Poster 41
Kate Loughran, Biology Graduate Student
Faculty Mentor: Matt Estep, Biology
Co-Author(s): N/A
Title: SECRETS OF THE SWAMP: UNCOVERING THE GENETIC DIVERSITY OF A FEDERALLY THREATENED WETLAND SPECIES, SWAMP PINK (HELONIAS BULLATA)

Helonias bullata L. (swamp pink) is a monotypic plant genus belonging to the Melanthiaceae family. Helonias is listed as federally threatened plant species and is a long-lived perennial evergreen herb that occurs in wetlands and bog subtypes in the eastern United States. While these habitats are already increasingly rare, development and urbanization has fractured and extirpated many Helonias occurrences, leading to a mosaic of small, isolated populations throughout its range. Due to the limited number of individuals within many of these populations, Helonias faces the perilous threat of genetic diversity loss which can lead to population instability and collapse. This research focuses on developing an in-depth genetic diversity analysis of the extant Helonias populations in North Carolina, as well as identifying the occurrence of genetic drift within smaller populations. Currently, there is very limited genetic data available for Helonias; only two sites in North Carolina have previously been assessed. Leaf samples from 14 Element Occurrences across the state were collected and DNA extracted using an advanced CTAB approach. MIG-seq, a next-generation sequencing method, will be used for Helonias library construction, followed by sequencing and single nucleotide polymorphism (SNP) identification within the genome of each individual sampled. In total, 300 individuals will be genotyped using multiplexed inter-simple sequence repeat (ISSR) genotyping by sequencing. This data will be used to calculate genetic diversity for each population, observed through allelic richness and heterozygosity. This critical genetic analysis will identify populations within North Carolina containing high genetic diversity as well as at-risk populations experiencing genetic drift. This data will, in turn, help inform future management decisions such as genetic rescue implementation and habitat conservation.

Poster 42

Sydney Svoboda, Biology Undergraduate Student
Faculty Mentor: Matt Estep, Biology
Co-Author(s): N/A

Title: DEVELOPMENT OF MICROSATELLITE MARKERS FOR HUPERZIA LUCIDULA THE SHINY FIRMOSS

Huperzia lucidula belongs to the ancient and complex plant family Lycopodiaceae. This family is poorly understood due to significant evolutionary gaps and hybridization amongst genera. Hybridization is especially prevalent within the genus Huperzia which includes 10-15 species in North America. Huperzia lucidula is a hardy species of terrestrial firmoss found throughout North Central and North Eastern America. H. lucidula is known to hybridize with sympatric species such as the rare H. appressa. Understanding genetic variation within species and populations of H. lucidula and H. appressa allows for further investigation of this complex genus. This research aims at constructing microsatellite markers for this species complex. To begin, three populations of H. lucidula were collected from the Tater Hill Plant Conservation Preserve and are being utilized to assay potential microsatellite markers. Development

of these markers will allow us to evaluate species and their populations as well as investigate potential hybridization within the genus.

Poster 43
Francois Desautels, Biology Graduate Student
Faculty Mentor: Andrew Bellemer, Biology
Co-Author(s): Dr. Megen Culpepper (second PI)
Title: ANTICONVULSANT PROPERTIES OF LONG POLYUNSATURATED FATTY ACIDS IN DROSOPHILA MELANOGASTER SEIZURE MODEL
Epilepsy affects approximately 50 million people worldwide, yet no medication completely alleviates the symptoms of epilepsy and 88% of people who take antiepileptic medication (AEDs) experience aversive side effects. This project aims to investigate how long polyunsaturated fatty acids (PUFAs) reduce seizure behaviors in Drosophila melanogaster (fruit fly) seizure models to provide insight into how long PUFAs affect neuronal excitability. Multiple fatty acids and long PUFA enzymatic inhibitors will be administered to seizure-sensitive flies to determine if they influence their seizure behavior. Our preliminary data supports the hypothesis that arachidonic acid (AA) reduces seizure behavior for parabss1 flies (a seizure-sensitive mutant fly line). Preliminary data also suggest that metyrapone (a cytochrome P450 inhibitor) increases seizure severity for parabss1 flies. RNA-sequencing will be done to provide insight into potential genes related to long PUFA treatment of epilepsy by telling what genes are up and down regulated in response to what we determine to be the most interesting pro/anticonvulsant (intensifying/reducing sudden involuntary muscle contractions) treatments. Additionally, long PUFA metabolizing enzymes will be specifically knocked down in the neurons of parabss1 flies to determine if they influence their seizure phenotype. One long PUFA metabolizing enzyme, a cyclooxygenase-like (COX) enzyme known as PXT in D. melanogaster is of particular focus because of its previously established connection to other biological processes (D. melanogaster follicle development, canner, and inflammation). We will characterize the enzymatic activity of PXT and thereby, potentially explain interesting pro/anticonvulsant effects observed from drug administration to parabss1 flies.

Poster 44
Sara Palega, Biology Graduate Student
Faculty Mentor: Andrew Bellemer, Biology
Co-Author(s): N/A
Title: THE ROLE OF RNA-BINDING PROTEIN, PUMILIO, IN THE REGULATION OF NOCICEPTION
Chronic pain affects over 50 million adults in the United States annually. Chronic pain arises from neuroplastic changes in pain sensing neurons, called nociceptors. These neuroplastic changes are accompanied by changes in gene expression that can result in

better signaling efficiency of these neurons, leading to hypersensitivity. An important layer of regulation in nociceptors 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 altering their signaling. RNA-binding proteins are a crucial part in this process due to their ability to bind mRNA transcripts and affect their expression (de la Peña., 2018). The RNA-binding protein, Pumilio, is hypothesized to be a post-transcriptional regulator of 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, making it necessary for nociceptive signaling. This suggests that Pumilio limits the excitability of pain-sensing neurons through repressing the translation of para. Further research into the RNA-binding protein, Pumilio, its involvement with the ion-channel, Para, and how it affects nociceptive behavior will further the understanding of mechanisms affecting pain hypersensitivity.

Poster 45

Maggie Pipkin, Biology Graduate Student
Faculty Mentor: Shea Tuberty, Biology
Co-Author(s): Dr. Carol Babyak, Dr. Rebecca Witter, Dr. Courtney Woods, Sherri White-Williamson, Danielle Koonce, Dr. Virginia T. Guidry, Dr. Joyce K. Hargrove, Kennedy Holt, Christian Felipe

Title: ASSESSING CUMULATIVE ENVIRONMENTAL HARMS ON SURFACE AND DRINKING WATER QUALITY IN SAMPSON COUNTY, NC

Sampson County is a rural area located in southeastern North Carolina. Residing in this county are communities with lower income Black and Brown populations, and the Native American/American Indian Coharie Tribe. Sampson County contains the largest landfill in the state, a wood pellet production facility, and a chemical manufacturing facility. With Sampson County being the second highest pork producer in the nation, this area contains a significant amount of concentrated animal feeding operations (CAFOs) for both hog and poultry. These cumulative environmental harms have brought up environmental justice concerns as nearly fifty percent of Sampson County residents rely on private drinking wells which risk becoming contaminated with nutrients, heavy metals, E. coli and other toxins and microbes from these operations after flooding events and poor waste management practices. This study uses a combination of water chemistry analysis including ion chromatography, inductively coupled plasma-optical emission spectroscopy, E. coli testing, and macroinvertebrate biomonitoring to analyze the water quality of residents' drinking water, and five surface water sites in Sampson County. This project is an ongoing 3-year partnership between Appalachian State University, The Environmental Justice Community Action Network, University of North Carolina Chapel Hill, and the Open Heaven Community Center. Our objectives for this

project are to (1) analyze surface and ground water samples and macroinvertebrates to determine any potential health impacts of residents' water supply, (2) spreading awareness of environmental justice in this area, (3) notifying residents of potential health impacts that can occur from their water supply and provide residents the evidence to defend their claims that cumulative environmental harms are poisoning their water supply, and (4) providing residents whose drinking water exceeds NCDHHS' guidelines with mitigation treatment options and maintenance to have safe access to drinking water.

Poster 46
Ethan Furr, Biology Undergraduate Student
Faculty Mentor: Jon Davenport, Biology
Co-Author(s): Carson Scott
Title: Stream Salamander (genus Desmognathus) Distributions Along Southern Appalachian Headwater Streams
Previous work with stream salamanders has indicated that species will assemble by size along a gradient from the stream. The largest species is often directly in the stream, with each smaller species being pushed farther away from the stream. The exact mechanism for this pattern has been hypothesized as competition or predation, with studies providing support for both hypotheses. All of the previously published data has come from 2 sites (Coweeta Hydrological Lab and the North Carolina side of the Smoky Mountains). We examined if this pattern of size distribution was consistent across additional stream sites in the southern Appalachians. We hypothesized that larger individuals, even when a larger species was present, would mainly be found in streams and smaller species would be furthest from streams. We found that 2 largest species (shovel-nosed and blackbelly salamanders) were almost exclusively found in the streams. The intermediate sized species (seal) was mostly within the splash zones of the streams. The smallest species (mountain dusky and seepage salamanders) were found the furthest from streams. Our additional 3 streams support the general hypothesis that larger species are found mostly in streams and smaller species are more terrestrial. One interesting finding from our work was the co-occurrence of the 2 largest species in smaller streams. This suggests that competition may not be strong among those 2 species or that streams with both harbor more resources.

Poster 47
Lindsey Pleasant, Biology Undergraduate Student
Faculty Mentor: Mary Kinkel, Biology
Co-Author(s): N/A
Title: INTESTINAL MOTILITY GENE EXPRESSION MAPPING IN ZEBRAFISH
Human intestinal motility disorders are present in a wide array of the population. To study these disorders, zebrafish are an effective model organism as 70% of genes are

conserved with humans. Zebrafish are also an ideal model for gut research as they display simple anatomy and functions. In humans and zebrafish, intestinal gene expression changes as the gut matures. 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. To obtain samples, adult zebrafish intestines were dissected into four functional areas including the intestinal bulb, loop, small intestine, and colon. RNA was then isolated from those tissues and reverse transcribed to cDNA. 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 for candidate genes. The efficacy of the primers is being tested on genomic DNA derived from a zebrafish fin clip. Once the primers have been proven to amplify the genes of interest, the tissue-specific cDNA samples will be amplified. The resulting map of intestinal gene expression will be the first such map and it will allow us to gain a deeper understanding of gut motility. Future studies will map earlier stages of intestinal development to further understand intestinal maturation.

Poster 48

Carson Scott, Biology Undergraduate Student
Faculty Mentor: Jon Davenport, Biology
Co-Author(s): Ethan Furr

Title: STREAM SALAMANDER (GENUS DESMOGNATHUS DISTRIBUTIONS ALONG SOUTHERN APPALACHIAN HEADWATER STREAMS

Previous work with stream salamanders has indicated that species will assemble by size along a gradient from the stream. The largest species is often directly in the stream, with each smaller species being pushed farther away from the stream. The exact mechanism for this pattern has been hypothesized as competition or predation, with studies providing support for both hypotheses. All of the previously published data has come from 2 sites (Coweeta Hydrological Lab and the North Carolina side of the Smoky Mountains). We examined if this pattern of size distribution was consistent across additional stream sites in the southern Appalachians. We hypothesized that larger individuals, even when a larger species was present, would mainly be found in streams and smaller species would be furthest from streams. We found that 2 largest species (shovel-nosed and blackbelly salamanders) were almost exclusively found in the streams. The intermediate sized species (seal) was mostly within the splash zones of the streams. The smallest species (mountain dusky and seepage salamanders) were found the furthest from streams. Our additional 3 streams support the general hypothesis that larger species are found mostly in streams and smaller species are more terrestrial. One interesting finding from our work was the co-occurrence of the 2 largest species in smaller streams. This suggests that competition may not be strong among those 2 species or that streams with both harbor more resources.

Poster 49

Harper Bennett, Chemistry Undergraduate Student

Faculty Mentor: Brooke Christian, Chemistry and Fermentation Sciences

Co-Author(s): Erick Francisco, Brooke Christian

Title: PURIFICATION AND CHARACTERIZATION OF NOVEL ALCOHOL DEHYDROGENASE FROM COMMENSALIBACTER INTESTINI

Alcohol dehydrogenases are oxidoreductase enzymes that catalyze the oxidation of alcohols and ketones and the reduction of NAD+ or NADP+. Commensalibacter intestini is a bacterial species isolated from the gut of fruit flies. ADH from C. intestini was analyzed using Expasy ProtParam to have an isoelectric point of 5.99, a molecular weight of 39,951.03 g/mol, and an extinction coefficient of 8940 M-1cm-1. A sequence analysis using Clustal Omega indicates that C. intestini ADH shares the highest percent identity with known Fe-dependent ADH enzymes compared to Zn-dependent ADH enzymes. Recombinant ADH was purified using immobilized metal affinity chromatography (IMAC) using fast protein liquid chromatography (FPLC). Activity assays of C.intestini ADH revealed that this enzyme shows a strong preference for ethanol and n-propanol over longer chain and branched alcohols using NAD+ as a cofactor. Relative activity of the ADH using NAD+ as a cofactor was higher than activity observed using NADP+. The optimal pH range for the enzyme was determined to be 8.5-9.0. Michaelis-Menten kinetics analysis using ethanol and n-propanol were performed to determine the Km and Vmax of the enzyme.

Poster 50

Audrey Gay, Chemistry Undergraduate Student

Faculty Mentor: Jennifer Cecile, Chemistry and Fermentation Sciences

Co-Author(s): Dr. Amanda Howell

Title: OPENING GATES IN INTRODUCTORY CHEMISTRY WITH SUPPORT COURSE INTERVENTION

Underrepresented, first-generation, and transfer students exhibit more D, F, or W grades in the first semester introductory chemistry course, and studies have shown this gateway course is a barrier in success for these student groups. In Fall 2021, Appalachian State University began offering a co-requisite support course designed to reduce student challenges and increase underrepresented student success in the first semester of introductory chemistry. The course offers support with both chemistry material and success skill through activities involving schedule building, guest speakers, and content reflections. Data collected over three semesters shows the %DFW rates of students enrolled in the support course (33.8%) are similar to all students in the first-semester general chemistry course at the same time (34.5%). The %DFW rates are lower than the historical rates for students in underrepresented groups, which indicates the support course may increase student success. Additional data examines the student perspective to understand how the support course prompts student growth. Student

surveys from the Fall 2023 semester gauge student confidence levels, knowledge of campus resources, and the likelihood of using provided office hours and tutoring. Current survey data shows mixed feelings of comfort with chemistry material (almost 47.1% comfortable). On average, the students demonstrated 72% confidence in their ability to succeed in their introductory chemistry course. Students will continue to contribute how their confidence, material comprehension, and knowledge of resources has changed throughout the semester with similar surveys and interviews. Collective data will serve as methods for future support course design and/or improvement in additional chemistry courses.

Poster 51
Elliana Proctor, Chemistry Undergraduate Student
Faculty Mentor: Micheal Reddish, Chemistry and Fermentation Sciences
Co-Author(s): N/A
Title: INVESTIGATING DEHYDROERGOSTEROL AND NBD-CHOLESTEROL AS ACCESSIBLE SUBSTRATE MIMICS FOR CYTOCHROME P450 27A1
Cytochrome P450 27A1 (CYP27A1) is a monooxygenase mitochondrial enzyme that is involved in human cholesterol metabolism and vitamin D metabolism. The reaction between cytochrome P450 27A1 and cholesterol is important in understanding overall cholesterol homeostasis, and the reaction product can also signal for cancer growth. The major product of the reaction between cytochrome P450 27A1 and cholesterol is 27-hydroxycholesterol (27HC). 27-hydroxycholesterol can bind to estrogen receptors in women and promote the development and growth of breast cancer. The reaction between P450 27A1 and cholesterol is difficult to study as cholesterol has no inherent chromophores (parts of molecules that make them easier to detect by conventional methods). This research project uses a kinetics based approach to monitor the reaction between P450 27A1 and cholesterol analogs containing chromophores. To quantify reaction progression and product formation, high-performance liquid chromatography is utilized. Variants of cholesterol such as dehydroergosterol, (DHE) and 5-cholesten-3ß-ol 6-[(7-nitro-2-1,3-benzoxadiazol-4-yl)amino]caproate, (NBD-6 cholesterol) are being explored as stand ins for cholesterol while studying the reactivity of P450 27A1 due to them containing a chromophore. If the reaction between P450 27A1 and cholesterol analogs can be effectively studied, it will enable faster and more thorough analysis of the enzyme's mechanism and potentially one day lead to new therapies targeting cholesterol production and cancer growth.

Poster 52
Kendyl Allen, Exercise Science Undergraduate Student
Faculty Mentor: Jared Skinner, Public Health and Exercise Science
Co-Author(s): Matthew Mitarotondo, Kelsie Bryant, Hannah Collins

Title: ACTION OBSERVATION FOR THE IMPROVEMENT OF FREEZING OF GAIT IN PARKINSON'S DISEASE
Introduction: Parkinson's Disease (PD) is a progressive neurodegenerative disorder characterized by difficulty in executing movement, tremor, postural instability, and freezing of gait (FoG). Past literature has suggested action observation (AO) is a promising aid in the reduction of symptoms related to PD, including FoG. AO is a method of treatment involving the observation and mental rehearsal of motor function before the execution of the action. This analysis examined past studies involving the use of action observation and populations with Parkinson's disease to determine if it contributes to the reduction of FoG. Methods: Databases such as Cochrane Library, Google Scholar, and PubMed were used to search for relevant articles between 2000 to 2023 including keywords “Parkinson's disease”, “action observation”, “motor imagery”, and “freezing of gait”. The inclusion criteria encompassed randomized controlled trials and systematic reviews focusing on the effects of AO on FoG in PD patients. Data extraction involved collection of study design, participant characteristics, intervention details, outcome measures related to FoG, and any relevant statistical data. The primary outcome of interest was the reduction in FoG episodes following AO interventions. Secondary outcomes may include improvements in episode severity and duration. Preliminary Results: A total of 8 of the 45 articles collected met the inclusion criteria were included in the meta-analysis. Pooled results reveal that AO has a positive impact on episode severity, duration, and frequency as measured by the Fog-Q ($P < 0.05$). Discussion: 80% of included studies have determined a correlation between the use of AO and the reduction of secondary outcome, or a combination of two or more of these outcomes. Conclusion: This meta analysis utilized evidence from multiple studies investigating the impact of AO on FoG in persons with PD. Suggesting that AO training is a promising therapy to reduce the symptoms of FoG.

Poster 53
Natalie Thulien, Exercise Science Graduate Student
Faculty Mentor: Jared Skinner, Public Health and Exercise Science
Co-Author(s): N/A
Title: SLEEP ARCHITECTURE AND NOCTURNAL BLOOD PRESSURE IN FIRST RESPONDER SPOUSES
Introduction: First responders occupations (Firefighter, EMT) have been shown to lead to a poorer sleep quality and nocturnal blood pressure (NBP). These irregular work schedules not only affect the first responders, but the spouses who share the same bed. The disrupted sleep patterns and overall nocturnal health of the spouses is minimally researched. Nocturnal health is essential to discovering health crises such as cardiovascular risk as it reveals the patterns that occur during rest and recovery. This study aims to identify how sleep and NBP parameters are impacted by sleep deprivation due to night shifts of first responders in their spouses. Methods: A randomized,

controlled trial will be conducted, involving an experimental group of ten healthy First Responder Spouses (FRS), ages 22-65. Participants will record four nights of sleep architecture via polysomnography (sleep monitor) and nocturnal blood pressure measurements via ambulatory blood pressure monitor (Oscar2 ABPM). A one-way rmAnova statistical analysis will be used to determine differences in sleep values with a Bonferroni correction if we found a significant difference with significance set at $p<0.05$. Expected results: Preliminary data and previous research has shown FRS experience a clinically significant difference in Autonomic Activations, Wake After Sleep Onset (WASO) ($p=0.01$), and systolic blood pressure levels ($p <0.05$). Conclusion: Expected results suggest that FRS experience a poorer quality of sleep and decreased nocturnal blood pressure. A major gap in research has become apparent with first responders and sleep deprivation, posing a need for more studies. Inefficient sleep can result in an increased risk of hypertension, sleep disorders, and cardiovascular diseases.

Poster 54

Ansley Patton, Exercise Science Undergraduate Student
Faculty Mentor: Dr. Jared Skinner, Public Health and Exercise Science
Co-Author(s): Natalien Thulien, Dr. Scott Collier

Title: ACUTE EFFECTS OF EXERCISE ON AUTONOMIC FUNCTION IN PARKINSON'S DISEASE

Resistance training (RT) is a subject of interest in the context of autonomic (ANS) dysfunction. ANS dysfunction in Parkinson's disease (PD) is a significant non-motor symptom that affects the quality of life. While RT has demonstrated positive ANS benefits for older adults (OA), the effects of RT in persons with PD remain uncertain. PURPOSE: Investigate the acute effects of moderate-intensity RT on cardiac output (CO) and sleep efficiency in persons with PD. METHODS: This study employed a cross-sectional design consisting of two groups; PD (10) and OA (10). Baseline CO and sleep efficiency were measured before and after training. The training consisted of 3 sets of 10 reps at 65% of their 10 repetition maximum. Physical activity and Parkinsonian symptoms were evaluated via self-reporting. Data were analyzed using one-way repeated measures ANOVA tests. RESULTS: At baseline there were no differences in CO between groups, however post testing revealed CO deteriorated in the PD group (-1.8 ± 1.8, $p<0.05$) and increased in the OA (0.63 ± 0.96, $p<0.01$) compared to baseline. Awakenings ≥ 30 seconds increased in PD (2.4 ± 1.5, $p<0.05$) compared to baseline. CONCLUSION: Moderate-intensity RT may negatively impact ANS function in persons with PD. Larger sample sizes are warranted to comprehensively understand the acute effects of RT on ANS function in PD. Additionally, future research should delve into the implications of our findings on the broader spectrum of PD symptoms.

Poster 55

Breanna Gibson, Exercise Science Undergraduate Student
Faculty Mentor: Jared Skinner, Public Health and Exercise Science
Co-Author(s): Olivia Chapman, Jared Skinner

Title: EFFECTS OF RESISTANCE TRAINING ON FATIGUE LEVELS THROUGHOUT THE MENSTRUAL CYCLE

Introduction: The menstrual cycle (MC) is a complex process involving hormonal fluctuations that can influence fatigue. This includes mechanisms such as changes in mental health and moods, cognition levels, and overall muscular and exercise performance. Studies observing the impact of the MC on exercise-induced fatigue are minimal. Therefore, we aim to investigate how fatigue levels differ before and after resistance training (RT), and throughout the MC phases. Methods: Female collegiate students ages 18-24 will be studied at the first onset of menses. The initial baseline assessment includes questionnaires on physical activity, sleep, mental health, and moods. These are followed by 1RM RT testing of six different machine-based exercises where fatigue/RPE will be measured. The questionnaires will be given before and after the sessions to observe acute changes. The subjects will be tested once a week for the next four consecutive weeks, aligning with the phases of the MC. RT sessions will be performed at 60%-80% of their 1RM on the same six exercises. Expected Results: We anticipate that fatigue levels will increase after RT sessions and persist longer in the menstrual and luteal phases compared to the follicular phase. Furthermore, a decline in self-reported measures such as cognition, sleep, and moods through the questionnaires is expected during the luteal phase rather than during the follicular phase. Discussion: The goal of this study is to observe the acute effects of fatigue following RT on women during each phase of their MC. This aims to educate women on how their MC impacts exercise so that they can accommodate their needs accordingly. Future endeavors include professionals tailoring exercise prescriptions towards specific phases of the MC.

Poster 56

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

Title: THE BENEFITS OF A DYNAMIC WARMUP FOR THE EQUESTRIAN ATHLETE DURING COLD TEMPERATURES

Introduction: Horseback riding is associated with an elevated risk of acute injuries, which can lead to hospitalization. In the Intercollegiate Horse Show Association, athletes are often required to compete at their best in cold temperatures riding unfamiliar horses without engaging in proper warm-up. This can result in impaired performance owing to decreased blood flow to the lower extremities. This study aims to investigate if incorporating a dynamic warm-up (DWU) after cold exposure (CE) can improve performance. Methods: A randomized controlled trial will be conducted in two

groups: an experimental and a control group. Twenty-two individuals will be required to meet the statistical power of this study. The experimental group will perform a DWU after 20 mins in an environmental chamber at 10°C. The control group will watch a 20-minute non-stimulating video. Reaction time (RT), vertical jump (VJ) height, and performance anxiety questionnaires will be measured before and after the DWU. Expected Results: We expect that the DWU group will demonstrate quicker RT and improvements in VJ performance than the control group. Furthermore, after qualitative analysis, we expect a decrease in perceived performance anxiety in the experimental group. Discussion: This study suggests that incorporating a DWU after CE can facilitate greater preparation and lower extremity power, enabling equestrians to be better prepared for their ride and potentially reduce their risks for injury.

Poster 57
Katie Asbill, Exercise Science Undergraduate Student
Faculty Mentor: Kimberly Fasczewski, Public Health and Exercise Science
Co-Author(s): Andrey Sanko, Chris Wing
Title: GETTING PEOPLE MOVING: THE DEVELOPMENT OF A PHYSICAL ACTIVITY PROGRAM FOR INDIVIDUALS WITH PARKINSON'S DISEASE
Despite the known benefits of physical activity (PA) for individuals with chronic neurological conditions such as Parkinson's disease (PD), adherence to recommended PA guidelines remains low. Due to physical (gait, balance, tremors) and psychological (depression, apathy) limitations, developing exercise programming is challenging in this population. Research with a similar population, individuals living with multiple sclerosis (MS), suggests that motivation to engage in PA may be sustained for longer periods when it is tied to charity fundraising. Therefore, this project aimed to develop similar programming for individuals with PD. Specifically, the program was a revision of the MS program and was designed to increase physical activity participation among people with (PD) by providing a virtual 12-week PA training program tailored specifically to the needs of those living with PD. The goal of the program is for participants to complete a 5k walking fundraising event while raising money for a PD charity of their choosing. The program development was conducted as part of an undergraduate research assistantship, and the next step is implementing the program. The program will be implemented with two regional PD support groups with the goal of developing motivation for sustained PA in these individuals by incentivizing them through an associated 5K PD charity fundraiser. Long-term, if successful, this program may be a blueprint for other populations struggling with motivation to participate in PA.

Poster 58
Emmaline Denton, Exercise Science Undergraduate Student
Faculty Mentor: Rebecca Battista, Public Health and Exercise Science
Co-Author(s): N/A

Title: ADOLESCENTS' PERCEPTION OF PARENTAL SUPPORT FOR ENGAGEMENT IN PHYSICAL ACTIVITY

Parents play an important role in the lives of adolescents, particularly in relation to physical activity (PA). Yet, the way adolescents perceive this support can influence levels of participation in PA. PURPOSE: To understand adolescents' perception of parental support in regards to PA participation. METHODS: Participants (N=1072) included adolescents aged 12-17 years and their parents from a national survey, the Family Life, Activity, Sun, Health and Eating Study (FLASHE). Adolescents answered six survey questions using a 5 point Likert Scale related to their agreement with what their parents say and do when it comes to PA. RESULTS: Adolescents were between ages 12-17 years and of normal body size (BMI boys: 22.71±4.71.4 kg; BMI girls: 22.02±4.8kg). Frequencies indicated adolescents "somewhat agreed" that parents: "have to make sure I get enough PA" (30%); "take me places where I can be PA" (40%); "make me exercise or go out and play" (27%); and "try to be PA when I am around"(31%). However, 43% of adolescents reported they "disagree" that decisions are made together regarding PA and 48% "agreed" that it was okay for rules to be made by parents about the amount of PA. CONCLUSION: Overall, adolescents mostly feel supported by their parents in terms of engagement in PA. However, when it comes to making the rules, adolescents appear to be content with not being involved in deciding the amount of PA they should engage in as parents seem to be fulfilling this role for them. Thus, parents are a key factor in adolescents achieving the appropriate amount of PA.

Poster 59

Seth Overton, Public Health Undergraduate Student

Faculty Mentor: Christopher Seitz, Public Health and Exercise Science

Co-Author(s): N/A

Title: AN EXPLORATORY STUDY OF THE TYPES OF ASSIGNMENTS THAT PROFESSORS USE TO TEACH UNDERGRADUATE EPIDEMIOLOGY

INTRODUCTION: Although there is a general consensus in how epidemiology should be taught at the graduate level, it is unknown how professors approach instruction of the course at the undergraduate level. As such, the purpose of this study was to explore how professors teach epidemiology at the undergraduate level through assignments. METHODS: Through email, each epidemiology professor from all 28 accredited standalone undergraduate programs in public health were asked to send the researchers the assignments they use to teach undergraduate epidemiology (other than quizzes or exams). The assignments were then categorized by individual or group assignments and the types of assignments. RESULTS: A total of 6 professors (response rate = 21%) participated in the study. The number of assignments per professor ranged from 1 to 14 (mean = 6), with a total of 36 assignments included in the study. Most assignments were given to individual students (81%), instead of groups (19%). Most (69%) assignments were worksheets. Of the worksheets, students were instructed to locate and use

government secondary data (60%), apply course definitions and concepts (24%), and make epidemiological calculations (16%). Other assignments included: critiques of peer-reviewed articles' methodologies (16%), presentations of government data (6%), creation of a data analysis report (3%), completion of a CDC epidemiology role-playing game (3%), and creation of a press release to communicate research findings to general public (3%).CONCLUSIONS: With the exception of using government sources of data, the assignments were lacking an emphasis on practical skills that epidemiologists use (e.g., making calculations, critiquing methodologies, creating press releases). In addition, given the nature of teamwork in the public health field, the assignments were primarily focused on individual work, which may not provide students with the soft skills that are required for future public health professionals.

Poster 60

Anna Carroll, Business Administration Undergraduate Student
Faculty Mentor: Dennis Guignet, Economics
Co-Author(s): n/a

Title: How much is too much? Student housing in Boone, NC

A combination of inflation, heavy influx of students, and building constraints has caused the cost of rent to steadily increase in Boone, NC over the past few years. While students have been shown to bring commodities and bolster local economies, large student populations can also gentrify towns, leaving housing to be unaffordable to locals and pigeonholing local economies to one sector. The effects of student populations have been looked at through the lens of local residents, but few studies have shown how rising rent costs can impact students. This study looks to find out if rising rent costs will push students out of Boone, how students tradeoff different housing features when rent is increased, and what the average marginal willingness to pay of students is when given the option of moving farther away or leaving App State. I collected primary data using a survey that asks students about their current living situation and how they would respond to increases in rent and other housing tradeoffs. Preliminary results find that if rent is increased, some students will leave App State all together, but most prefer to move slightly farther from campus before doing so. Students are so sensitive to prices that increases of $100 will make about 45% of students consider moving a mile or two farther away from campus. With the average respondents only willing to pay an increase of $103.69 in rent before considering moving farther away, this issue should be taken seriously.

Poster 61

Hermès Henry, Computer Science Undergraduate Student
Faculty Mentor: Mark Hills, Computer Science
Co-Author(s): N/A

Title: EXPLORING MENTAL STATES: USING EEG TECHNOLOGY TO ANALYZE THE BRAIN

This project aims to explore the human brain via electroencephalography (EEG) and Brain-Computer Interfaces (BCI). Being an exploratory study, it will demonstrate the use of a BCI to collect EEG data with the goal of exploring how this budding technology allows scientists to learn more about the human brain and how we can manipulate and visualize this data. As a first step to exploring how this technology helps us learn about the brain, we will investigate how a person's mental state (relaxed, concentrating on difficult tasks, mindlessly working on repetitive tasks, etc) affects the flow of electricity in their brain and what patterns can be detected, either unique to one mental state, or common across multiple states. Data will be collected using the OpenBCI Ultracortex Mark IV EEG headset and analyzed with the OpenBCI BrainFlow library.

Poster 62

William Pearson, Geography Graduate Student

Faculty Mentor: Buwan Thapa, Geography and Planning

Co-Author(s): Patrick Freeman

Title: SPATIOTEMPORAL ANALYSIS OF WIND-RELATED CROP LOSS IN THE MIDWEST, USA

The US loses around 1.2 billion in wind-related crop damages annually. Understanding differences in the causes of crop loss is important to increase productivity in agricultural systems. Trees planted on and around farms, also called windbreaks, provide key ecosystem services such as erosion reduction, soil health improvement, and wind protection. While there have been some studies about types of natural disasters and crop insurance payments, limited studies have focused on wind-related crop loss. The main objective of this study is to conduct a spatiotemporal analysis of wind-related crop damages in Kansas and Nebraska, USA. Using county-level Cause of Loss data from USA from 2011 to 2023, this study explores the linear and non-linear trends and spatial hotspots of wind-related damages for different crops. The Mann-Kendall Test is performed to assess the trend of crop loss. Zonal statistics will show a greater understanding of the reasoning behind crop loss at a smaller scale. The implications and subsequent analysis will answer the questions of when and where we are seeing the greatest crop loss and to which crops have the greatest loss, along with what factors affect these trends.

Poster 63

Ashley Mallare, Public Health Undergraduate Student

Faculty Mentor: Maggie Sugg, Geography and Planning

Co-Author(s): Ian Berry, Emma Getz, Arden McKee

Title: ECO-ANXIETY AMONG YOUTH IN RESPONSE TO THE CLIMATE CRISIS: A THEMATIC ANALYSIS

Ecological grief, climate anxiety, and climate worry have emerged as novel terms to describe psychological and emotional response to the uncertain future of our planet in the face of the climate crisis. Despite widespread acknowledgement that these conditions greatly impact youth populations, few studies have examined them among a nationally representative sample and outside of a cross-sectionally survey format. The aim of this study is to explore crisis text conversations related to climate-related distress among U.S. youth from 2016 to 2023. Crisis text conversations are obtained from Crisis Text Line, the largest digital SMS intervention used by youth in the U.S. A thematic analysis determined the frequency of climate change exposures, crisis health outcomes, climate worry outcomes, and special topics (e.g. politics) as well as scales to determine climate change sentiment and mental health severity. Results highlight the severity of eco-anxiety among specific sub-populations, particularly when discussed within the context of politics. Suicide-related outcomes (e.g. thoughts of suicide) and self harm often co-occured with eco-anxiety outcomes, highlighting the severity of these conditions. Psychological interventions are immediately needed to address eco-anxiety and climate concerns, particularly during election years.

Poster 64
Sarah Widderich, Political Science Graduate Student
Faculty Mentor: Bhuwan Thapa, Geography and Planning
Co-Author(s): N/A
Title: ACCESSIBLE BUILDABLE SPACE: CASE STUDY IN BOONE AND WATAUGA COUNTY
This project is being developed to address chronic housing shortages in mountain towns of Appalachia because of increased housing demand, limited growing space, tourist economy, and potential climate refugees. The overarching goal of this project is to develop a methodology to estimate building areas for the Town of Boone and Watauga County, NC. The buildable area analysis will provide us with information on how many new houses could be built in the study area under current regulatory requirements. The algorithm will account for a) environmental and topographic limitations (floodplains, slope, public lands), b) zoning regulations (zoning codes, building restrictions), c) existing infrastructure and services, and d) cost of infrastructure development in new service areas (e.g., power line accessibility). The Geographic Information System will be deployed to assess the potential new housing stock development opportunity in and around the town.

Poster 65
Emma Ferm, Environmental Science Undergraduate Student
Faculty Mentor: Sarah Evans, Geological and Environmental Sciences
Co-Author(s): Sarah E. Godsey, Clara Chew, Key Hatch, Brandon Yokeley, Rachel Harris, Noah Caldwell, Benjamin Crosby, and Aaron Mohammed

Title: QUANTIFYING VARIATIONS IN SOIL MOISTURE ACROSS ARCTIC HILLSLOPES UNDERLAIN BY CONTINUOUS PERMAFROST

On the North Slope of Alaska, water is concentrated above permafrost or perennially frozen ground in features called water tracks. Water tracks are seasonally saturated small streams that can rapidly collapse to form thermoerosional gullies, changing stream flow and soil moisture. Differences in soil moisture dynamics between water tracks, gullies, and the surrounding hillslopes affect carbon emissions because carbon in thawing permafrost is released approximately three times more readily when soils are unsaturated than saturated. Therefore, understanding soil moisture heterogeneity within Arctic hillslopes is crucial to quantifying soil carbon emissions. In this study, we measure in situ soil moisture content and derive Normalized Difference Water Index (NDWI) from 3-m resolution Planet imagery for two hillslopes containing water tracks and thermoerosional gullies on the North Slope of Alaska from 2017-2023. Preliminary results suggest significant annual soil moisture variations, where water tracks and thermoerosional gullies have the largest range in soil moisture values. During the growing season, the hillslopes experienced a decrease in NDWI following snowmelt and increases in air temperature. These findings suggest that it is important to consider the occurrence of hydrologic features such as water tracks and gullies when quantifying soil moisture patterns across warming Arctic hillslopes.

Poster 66

Rachel Harris, Environmental Science Undergraduate Student

Faculty Mentor: Sarah Evans, Geological and Environmental Sciences

Co-Author(s): Dr. Scott Marshall, Dr. Sarah Godsey, Dr. Andrew Parsekian, Emma Ferm, Key Hatch, Noah Caldwell, Brandon Yokeley, Dr. Clara Chew, Dr. Benjamin Crosby

Title: USING GROUND-PENETRATING RADAR TO INVESTIGATE THE CONTROL OF GROUND ICE ON CONTINUOUS PERMAFROST HILLSLOPE HYDROLOGY

The presence of ground ice in Arctic regions underlain by continuous permafrost can influence hydrologic processes leading to the collapse and release of carbon into the atmosphere. While we know that ground ice exists within Arctic hillslopes, its role as a driving force in the development of track-gully complexes (TGCs), seasonally saturated hydrologic pathways that concentrate water within a watershed, has yet to be examined. We present a case study on the influence of ground ice in the formation of TGCs on the North Slope of Alaska. We utilize Ground-Penetrating Radar (GPR) surveys, soil cores, and forward modeling to examine if TGCs develop preferentially above ground ice. Over 31 standard offset GPR surveys collected in June 2022 and 2023 exhibit vertical columns of strong reflectors at depth coinciding over the gullying features, potentially indicating the presence of ice wedges or massive ice deposits. Forward modeling of subsurface geometries indicates that similar vertical columns of strong reflectors can be produced by subsurface ice wedge geometry. Soil coring corroborates the GPR and

modeling results; clear ice lenses with a thickness of 2-3 cm were observed at a depth of 26 cm and overall pore ice content increased with depth to a maximum coring depth of 73 cm. Together, these findings suggest that ground ice plays a critical role in the presence of seasonally saturated hydrologic pathways along continuous permafrost hillslopes across the warming Arctic.

Poster 67
Joshua Crouch, Geology Undergraduate Student
Faculty Mentor: Andrew Heckert, Geological and Environmental Sciences
Co-Author(s): N/A
Title: COPROLITE ICHNOTAXA FROM THE REVUELTIAN (UPPER TRIASSIC: NORIAN) AGE HOMESTEAD SITE, GARITA CREEK FORMATION, EAST-CENTRAL NEW MEXICO
The Homestead site is a microvertebrate assemblage within the Garita Creek Formation of east-central New Mexico and represents an aquatic Late Triassic oxbow lake environment. Thousands of coprolites (fossilized feces) from Homestead have been made available for ichnotaxonomic study. These coprolites are significant as direct indicators of ecology and diversity of taxa. I examined a subsample (n = 369) coprolites, finding that 40% (150) preserve visible fossil inclusions, 4% (15) preserve mineral inclusions, and 56% (204) preserve no visible inclusions. I qualitatively divided the coprolites into four broad categories--nondiagnostic, striated, spiraled, and cylindrical. Of these categories, striated, spiral, and cylindrical coprolites bear traits diagnostic of known ichnotaxa such as Alacocopros, Heterapolacopros, Bibliocoprus, Eucoprus, and others. Of the scale-bearing coprolites, 1% (2) are nondiagnostic, 9% (13) are striated, 40% (60) are spiral, and 50% (75) are cylindrical. The majority of fossil inclusions are seen from an exterior view, suggesting that scanning these coprolites may not be a worthwhile endeavor for most, though there are exceptions. Results may change with the analysis of more specimens. Coprolites are known ecological indicators, bearing distinct ichnotaxonomic morphologies alongside diagnostic fossils of consumed taxa. Together, these generate a picture of predator-prey dynamics. Among coprolites with diagnostic morphologies, striated coprolites pertain to Alococopros, representing archosauromorph and amphibian taxa. Spiral coprolites are indicative of taxa with a spiral valve, such as sarcopterygians (coelacanths and lungfish) and sharks. Of the available body fossils, only coelacanths are sufficiently large enough to have perpetrated the majority of spiral coprolites at Homestead. Cylindrical coprolites are indicative of certain actinopterygians without spiral valves, but specific examples are not known.

Poster 68
Renee Dunn, Geology Undergraduate Student
Faculty Mentor: Andrew Heckert, Geological and Environmental Sciences
Co-Author(s): N/A

Title: SUPER CHARGER HEAVEN: A FRESHWATER MICROVERTEBRATE ASSEMBLAGE FROM THE UPPER CRETACEOUS WILLIAMS FORK FORMATION OF NORTHWESTERN COLORADO

Super Charger Heaven (SCH) is a freshwater microvertebrate site in northwestern Colorado in the lower half of the Williams Fork Formation (WFF). This formation, and thus the site is part of the Mesaverde Group and is of Late Cretaceous, late Campanian to early Maastrichtrian (Edmontonian) age. Original surface collecting at an adjoining site, ReBecca's Hollow (RH), allowed for the discovery of SCH and its collection of microfossils. Sediment was collected from SCH and brought back to our paleontological lab to be screenwashed, soaking the sediment in agitated water for 24 hours to facilitate breakdown. We can confirm that SCH was a freshwater environment based on the freshwater and terrestrial animals that have been identified. The assemblage thus far includes osteichthyans (bony fish), crocodiles, turtles, lizards, and dinosaurs. Osteichthyans are represented by lepisosteid (gar) scales, teeth, and vertebra fragments, an amiid vertebra and multiple unidentifiable fish skull bone fragments. Gar scales are the most common microfossil found at SCH with a current sample size of 969 scales. Crocodiles are the second most common organism next to fish, from the number of teeth, osteoderms, vertebra, and claw fragments that have been identified. Coprolites (fossil feces) are another common find at SCH with a total sample size of 435. Other reptile microfossils from SCH are trionychid turtle shells, lizard jaw fragments, and dinosaur tooth fragments. The latter consists of one indeterminate ornithischian tooth fragment, one ceratopsian tooth, a possible hadrosaur tooth, and a possible tyrannosaur tooth fragment. Due to the large amount of fragmentation with these microfossils the identification process can be quite challenging. This can only be improved by continuing to pick through the remaining amount of concentrate to find as many microfossils as possible to increase our knowledge of how best to identify these extinct organisms.

Poster 69

Alec Quinn, Geology Undergraduate Student

Faculty Mentor: Andrew Heckert, Geological and Environmental Sciences

Co-Author(s): N/A

Title: ANALYZING RECONSTRUCTIONS OF THE GIANT FOSSIL SHARK OTODUS MEGALODON, AND PROPOSING A NEW PROCESS BEHIND ""MEGALODON"" EXHIBIT DESIGN.

Reconstructions of Otodus megalodon, the extinct mega shark, are frequently displayed in museums around the world. Investigating these reconstructions reveals that they are almost always based on either disarticulated O. megalodon tooth sets or else the jaws of related species such as Carcharodon carcharias, the Great White shark. Therefore, these displays cannot be confidently declared as accurate representations of O. megalodon. This causes inaccurate information to be unintentionally fed to the public. New studies and advances in technology have helped modernize some of these displays.

I developed ways to emphasize what is known (and unknown) about O. megalodon, and how this can be shown in museum reconstructions. This included creating public outreach displays that can be easily replicated. One display includes replicas of tooth whorls showing the growth and correct orientation of functional and replacement teeth. I also compared molding and casting to 3D printing to generate replica teeth for outreach. A body size estimation display uses casts of various sizes of A1 and A2 (most frontal) O. megalodon teeth with matching notecards showing a solved published body size estimation equation. I used comparisons of modern tooth whorls of O. megalodon and C. carcharias to generate a 3D model of an upper left and right O. megalodon tooth whorl for museum and teaching use. These new forms of outreach display are to inform the public on the current view of the O. megalodon and the science behind it. Finally, I proposed and tested a new thought process behind exhibit design using O. megalodon as an example of how exhibits can show how science is constantly changing and advancing."

Poster 70
Ricky Carland, Geology Undergraduate Student
Faculty Mentor: Sarah Carmichael, Geological and Environmental Sciences
Co-Author(s): Diana Boyer
Title: HUNTING FOR THE HANGENBERG CRISIS USING A MULTIPROXY APPROACH IN THE GREAT BASIN OF WESTERN UTAH
One of the largest extinction events during the Phanerozoic occurred at the Devonian - Carboniferous (D-C) boundary, correlated with a worldwide ocean anoxia event known as the Hangenberg Crisis. The climate during this time was characterized by instability and fluctuating sea levels, due to glaciation in southern Laurussia and western Gondwana. This sudden climate shift is a possible explanation for the Hangenberg Crisis, which is typically preserved in the rock record as an extensive organic-rich black shale overlain by a regressive sandstone unit. However, not all localities that contain a continuous D-C boundary succession exhibit the Hangenberg Crisis in this characteristic lithologic sequence. During the Devonian, western Utah was a massive carbonate shelf off the western coast of Laurussia. The Great Basin Region of western Utah contains sediments that span the D-C boundary, with limestones of the Guilmette Formation and silty carbonates of the Pilot Shale. Samples from the Shade Tree section were analyzed using scanning electron microscopy with energy-dispersive X-ray microanalysis (SEM-EDS) in addition to whole-rock geochemistry (major, trace, and REEs). SEM-EDS analysis showed an abundance of large pyrite framboids with samples that are consistent with the biostratigraphic location of the D-C boundary. Further SEM-EDS analysis of pyrite framboids indicates samples near the proposed D-C boundary are consistent with anoxic environments, even though they are not visible in the field as black shales. Whole rock geochemical data of units with framboids showed significant spikes in Al-normalized trace elements V, As, Co, Sb, Mo, U, Zn, and Ni, also consistent

with marine anoxia. It is likely that the Hangenberg Crisis can be identified in the Great Basin region of western Utah in a different lithology than an organic-rich black shale, indicating that anoxia was widespread throughout the Laurussian paleocontinent at this time.

Poster 71
Caitlin Kinnamon, Geology Undergraduate Student
Faculty Mentor: Ellen Cowan, Geological and Environmental Sciences
Co-Author(s): Tucker Terrell, Caitlin McCarthy, Keith C. Seramur, Scott T. Marshall
Title: USING GEOPHYSICAL METHODS TO FIND HISTORIC FORT DEFIANCE
Fort Defiance is a historic site in Lenoir, North Carolina offering tours to local school groups and visitors from around the world. The site includes the plantation house and outbuildings constructed by Revolutionary War General William Lenoir between 1788-1792. Lenoir, a statesman and a scholar, named his home Fort Defiance after the pioneer fort built before the American Revolution, which was used to protect settlers during the Cherokee War in 1776. Today, there is no trace of the fort although it is reported to have stood nearby. Geophysical methods we used included ground penetrating radar (GPR), gradiometer, and electrical resistivity to detect underground anomalies that could indicate where the fort once was. The geophysical surveys were compared with other frontier forts in the southeastern United States to identify the footprint of Fort Defiance. A GPR survey with a 350 mHZ hyperstacking antenna covered 0.85 acres at 1 ft transect spacing. Gradiometer data was collected with a GEM Systems GSM-19W Overhauser gradiometer. Electrical resistivity tomography was collected with a 28-electrode AGI Supersting with 1.64 ft electrode spacing.
GPR data showed a nearly 2 ft wide and 3 ft deep trench, similar to the trench that held the 10 ft tall palisade built by the Moravians at Bethabara (near Winston-Salem) in 1756. Soil borings along the linear anomaly collected quartz river rocks that may have been added to stabilize the log posts within the trench. Most forts are built with bastions that extend beyond the palisade wall to provide a line of sight for defense. Data indicated the presence of blockhouses at Fort Defiance, structures that extended above the palisade as a lookout across the valley. Electrical resistivity demonstrated that these blockhouses were constructed on foundations excavated into the subsurface. Plow scars mask much of the magnetic data collected; however, a subtle magnetic anomaly parallels the GPR anomaly along the interpreted palisade wall."

Poster 72
Gerald Tripp, Geology Undergraduate Student
Faculty Mentor: Levine Jamie, Geological and Environmental Sciences
Co-Author(s): Gabriele Casale, and Arthur J. Merschat

Title: EMPLACEMENT CONDITIONS OF THE BLUE RIDGE THRUST SHEET: COMPARISON OF QUARTZ MICROSTRUCTURAL DATA FROM THE CATFACE AND IRON MOUNTAIN FAULTS, NC-VA-TN.

The Mountain City Window (MCW) in the western leading edge of the Blue Ridge Thrust Sheet (BRTS) exposes deformation fabrics attributed to the Alleghanian age emplacement of the BRTS approximately 340 million years ago. Notably, the BTRS displays contrasting deformation conditions between western and eastern bounding faults of the MCW, providing an opportunity to observe the brittle-ductile transition along this major tectonic feature. The Catface fault, which bounds the east side of the MCW, contains ductile deformation fabrics estimated to have developed at temperatures above 300 °C. In contrast, less than two kilometers away the Iron Mountain fault, which bounds the west side of the MCW, contains only brittle deformation fabrics. We analyzed samples using a petrographic microscope to characterize ductile and brittle microstructures, dynamic recrystallization, and fluid-related features. We also used Electron Backscatter Diffraction (EBSD) to constrain deformation conditions and preferred orientations in quartz grains. Quartz grains in the Catface fault samples display scalloped and blurry edges with small, irregular grain shapes, and some polygonal grains with a strong preferred orientation, which are associated with deformation via bulging recrystallization and subgrain rotation respectively. Samples from the Catface fault have pole figures with distinct patterns that display some combination of basal, rhomb, and/or prism <a> slip, indicative of deformation temperatures between 300-450 °C. Iron Mountain fault samples, in contrast, show some quartz grains with undulatory extinction, but more widespread fractures and veining, and all samples notably lack bulging recrystallization and other features associated with greenschist facies deformation conditions. Interestingly, EBSD c-axis pole figures from Iron Mountain fault samples, which contain only brittle deformation fabrics, display a weakly developed, but distinct, foliation-parallel central girdle not associated with any common slip system in quartz.

Poster 73

Maria Harbaugh, Psychology Undergraduate Student
Faculty Mentor: Katie Wolsiefer, Psychology
Co-Author(s): N/A

Title: COMPARING THE EFFECTIVENESS OF COMPLETING A GROUP VS. INDIVIDUAL IAT AS AN IMPLICIT BIAS INTERVENTION.

The Implicit Association Test (IAT) is a well-established measure often used to detect subjects' implicit attitudes towards groups (Greenwald et al., 1998). Recently, social psychologists have experimented with using the IAT as a bias reduction intervention (Hahn et al., 2013; Howell & Ratliff, 2017; Vorauer, 2012), however few studies have considered using the IAT in a group demonstration (Stone et al., 2020). Our study aims to compare the effectiveness of an individual vs. group-based IAT demonstration.

Participants were randomly assigned to complete an IAT demonstration either in a group or individually, or they were briefly lectured about implicit bias (control). All participants were then provided measures of defensiveness, internal and external motivation to control prejudice, acknowledgement of bias, negative self-directed affect, and lay theories of bias. We hypothesize that people who completed the group demonstration (compared to individual demonstration or control) will show lower levels of defensiveness and higher levels of internal and external motivation to control prejudice, acknowledgement of their own bias, negative self-directed affect and increased perceptions that biases can be changed. Data collection will be ongoing at the time of presentation. Preliminary results and implications will be discussed.

Poster 74
India Horn, School Psychology Graduate Student
Faculty Mentor: Jamie Yarbrough, Psychology
Co-Author(s): Sara Hehn, Mlynn Wooden, Nicole Iturbide, and Anhminh Nguyen
Title: SHADES OF DISCIPLINE: EXPLORING RACIAL DYNAMICS IN DISCIPLINARY REFERRALS
Disciplinary referral and assessment procedures are not equal for all races and ethnicities which, as a result, identifies certain targeted groups for further disciplinary actions. This study investigated the relationship between teacher race, student race, and the likelihood of disciplinary referrals. There was not a significant relationship between teacher race and ODRs or administrator race and severity of punishment, however, the referrals of black teachers were twice as likely to end with suspensions as compared to white teachers. It was also found that male students were 1.75x more likely to be suspended than female students. These findings illustrate the need for future research to continue investigating these inequities and shape our practices.

Poster 75
Gracie Streeval, School Psychology Graduate Student
Faculty Mentor: Jamie Yarbrough, Psychology
Co-Author(s): India Horn, Emily Reigard, Sara Hehn, Mlynn Wooden, Nicole Iturbide, Hannah Schulze & Anhminh Nguyen
Title: THE BRAVE NEW WORLD OF AI AND ACADEMIC INTEGRITY
As artificial intelligence becomes more available to students, educators are faced with the unique challenge of preserving academic integrity. ChatGPT is a new artificial intelligence technology that provides quick responses to complex and specific questions. ChatGPT is just one example of an AI software that can produce papers and other assignments in just seconds. Avila-Chauvet and Mejía (2023) conducted a study that compared student essays and ChatGPT essays on the following criteria: quality, authorship, and distinguishing feature questions. They found that both students and professors were unable to distinguish between the two types of essays and they tended

to give higher scores to the ChatCPT-generated essays. A study by Ariyaratne et al. (2023) compared the accuracy and quality of several ChatGPT-generated academic articles with those written by human authors. Four out of five ChatGPT articles contained information and citations that were incorrect. While ChatGPT was able to generate coherent research articles, all of the articles reviewed were factually inaccurate and had fictitious references. ChatGPT-generated essays with false information may also appear authentic to the untrained reader. As AI-language models become more sophisticated and accessible, educators are struggling with how to adapt their teaching and grading methods to account for these new technologies. Teachers may respond to ChatGPT by assigning tasks that require students to produce handwritten work. They may change online writing assignments to include tasks that require critical thinking and analytical skills. Some teachers may even allow students to use ChatGPT if they cite it properly. However, other teachers may have a zero-tolerance policy for ChatGPT use, and many view the use of this platform for educational purposes as a form of plagiarism. This is because it pulls its information from data taken from various sources, however, these sources are not cited in the ChatGPT response.

Poster 76

Key Hatch, Environmental Science Undergraduate Student
Faculty Mentor: Sarah Evans, Geological and Environmental Sciences
Co-Author(s): Sarah Godsey, Clara Chew, William Armstrong, Emma Ferm, Rachel Harris, Brandon Yokeley, Noah Caldwell, Benjamin Crosby, and Aaron Mohammed

Title: EMPLOYING SPECTRAL SIGNATURES IN VEGETATION TO DIFFERENTIATE HYDROLOGIC FEATURES ABOVE CONTINUOUS PERMAFROST

The Arctic is warming four times faster than the rest of the planet causing shrubs to creep northward above perennially frozen ground known as permafrost. The hydrology of Arctic regions with permafrost is controlled by water tracks (WT) and thermoerosional gullies (TG), seasonally saturated hydrologic features and channels. Compared to the surrounding hillslope, WTs and TGs are characterized by thicker snowpacks, increased runoff, and different types of vegetation than the surrounding hillslope. Discerning WTs from TGs via remote sensing can be difficult because these features are small (~ 10 m wide) and require high-resolution imagery, but are critical to map as they comprise a large portion of the effective drainage network in the Arctic. This study investigates the viability of using spectral data, including band ratios such as the Normalized Difference Vegetation Index (NDVI) derived from Planet 3-m resolution imagery to differentiate WTs and TGs from the adjacent hillslope for study sites on the North Slope of Alaska. Preliminary findings indicated that from 2017 to 2023, maximum summer NDVI values at our site of interest increased from 0.75 at the TG, 0.74 at the WT, and 0.70 in the surrounding hillslope to 0.81 in the TG, 0.80 in the WT, and 0.78 in the surrounding hillslope, with hillslope values always being lower than

values from the WT and TG. The ability to classify these hydrologic features remotely will help to understand water flow in the Arctic.

Afternoon Poster Session 1 - 1:00-2:30pm Parkway Ballroom
Posters 80-109

Poster 80
Samantha Oleschuk, Art and Visual Culture Undergraduate Student
Faculty Mentor: Jody Servon, Art
Co-Author(s): N/A
Title: SHARING THE CREATIVE AGING IMPACT STORY: NAVIGATING BARRIERS, PURSUING SUSTAINABILITY, AND DREAMING INTO THE FUTURE
The United States population is rapidly aging; by 2034, the number of adults older than 65 will be greater than the number of children under 18. With negative narratives on aging preserved by persistent ageism, older age is often accompanied by social isolation and diminished well-being. Creative aging programs are an excellent solution. These research-driven arts-based programs engage older adults–often those living with dementia–and their care partners in interactive experiences with the arts to inspire creativity and joy; promote vital social connections; support physical, cognitive, emotional, and social well-being; and preserve agency and dignity.
An increasing number of museums, cultural institutions, and organizations are voicing interest in and developing creative aging programs for this underserved demographic but, as evidenced in conversational interviews with creative aging professionals for this research, the field encounters barriers of funding, capacity, transportation, and visibility that inhibit program sustainability, let alone expansion to meet demand. This research investigates these barriers and discusses interviewees' dreams for the field to analytically contemplate creative aging's sustainability and potential for increased impact as policy-making for "age-friendly" longevity-focused communities gains greater support. By raising questions and theorizing about how dreams of new funding streams, communication networks, a national teaching artist certification, and the integration of arts on prescription into healthcare could be pursued, the goal is to increase creative aging's visibility and turn negative, fearful narratives of aging into positive aging stories of purpose and vitality. To do so, this research guided the creation of a storytelling resource for creative aging professionals to share the impact story of this critical programming and advocate for increased support within and outside the arts and culture sector.

Poster 81
Jesse St John, Exercise Science Undergraduate Student
Faculty Mentor: Christian Wallen, Chemistry and Fermentation Sciences
Co-Author(s): N/A
Title: EXPLORING LIGAND FRAMEWORKS FOR FUTURE CATALYSTS IN HYDROGEN SULFIDE CAPTURE IN NATURAL GAS PURIFICATION

Capture of toxic hydrogen sulfide from natural gas sources is vital for reducing toxic greenhouse gases containing sulfur. The Claus process is used to remove the vast majority of hydrogen sulfide from "sour gas," a natural gas precursor, but the remaining hydrogen sulfide must be removed from the tailgas via secondary treatment. Existing processes have fundamental limitations due to other gaseous compounds found in sour gas. The Wallen research group prepares novel complexes of earth-abundant metals and ligand platforms that incorporate second-sphere hydrogen bonding and investigates their reactivity with hydrogen sulfide in order to better understand the role of hydrogen-bonding in hydrogen sulfide capture and inform the design of future catalysts for natural gas purification. The synthesis and purification of a flexible electron-rich sulfonamidate ligand and coordination of this ligand with inexpensive transition metals will be presented along with spectroscopic characterization of novel compounds. The reactivity of metal compounds with small protic ligands similar to hydrogen sulfide will also be discussed.

Poster 82
Katie Baker, Chemistry Undergraduate Student
Faculty Mentor: Christian Wallen, Chemistry and Fermentation Sciences
Co-Author(s): N/A
Title: SYNTHESIS OF ELECTRON-RICH METAL-ORGANIC COMPLEXES FOR HYDROGEN SULFIDE CAPTURE
Hydrogen sulfide exists naturally in "sour" gas, which is the main precursor to natural gas. Due to hydrogen sulfide being highly toxic and acidic, large-scale industrial processes for removing hydrogen sulfide from sour gas are necessary. The state-of-the-art treatment is the Claus process, which converts the majority of the hydrogen sulfide to yellow sulfur, which is nontoxic and safe to handle. However, the Claus process leaves a small percentage of hydrogen sulfide in the tailgas, which necessitates a secondary treatment. Existing secondary treatment processes each have fundamental limitations and weaknesses. Consequently, there is a need for next-generation catalysts to improve our ability to efficiently remove small amounts of hydrogen sulfide from Claus tailgas. The Wallen group is focused on synthesizing metal complexes with intramolecular hydrogen bonding that supports reactivity with hydrogen sulfide. The synthesis of a new family of electron-rich sulfonamidate ligands and complexes bearing inexpensive transition metals will be presented with characterization and purification data. The reactivity of these complexes with protic small ligands will be discussed.

Poster 83
Jack Chaisson, Physics Undergraduate Student
Faculty Mentor: Brooke Hester, Physics and Astronomy
Co-Author(s): N/A

Title: ENGINEERING A SURFACE-ENHANCED RAMAN SPECTROSCOPY SETUP"
Presented here is the work associated with engineering a surface-enhanced Raman Spectroscopy setup, which is used for molecular analysis by observing the interactions of light with the chemical bonds of a material. Engineering a surface-enhanced Raman spectrometer allows researchers to identify and characterize the properties of materials or molecules and analyze the excitation of these materials from a laser. This configuration employs a layer of metal nanoparticles that enhance the Raman scattering signals to a degree that makes them detectable on a USB spectrometer, eliminating the need for a nitrogen cooled spectrometer. Theory, process and applications of engineering a custom surface-enhanced Raman spectrometer are explored.

Poster 84
Zophia Dulaney, Physics Undergraduate Student
Faculty Mentor: Adam McKay, Physics and Astronomy
Co-Author(s): N/A
Title: MEASURING THE VOLATILE COMPOSITION OF C/2013 US10 (CATALINA) WITH NARROWBAND PHOTOMETRY AT A VARIETY OF HELIOCENTRIC DISTANCES
Discovered in October of 2013 by the Catalina Sky Survey, C/2013 US10 is a comet originating from the Oort cloud, a spherical 'shell' of objects surrounding our solar system consisting of leftovers from the formation of the planets. The apparition of C/2013 US10, nicknamed 'Catalina', presented an important opportunity for studying the molecular composition of comets. Similarly to how paleontologists use fossils to study the history of our planet, comets allow astronomers to predict and analyze the conditions of our solar system during its formation. This research takes observations of Catalina from January to April of 2016 using selected image filters to calculate production rates of OH, C2, and CN within the coma. These particular molecules trace water and organic molecules, both of which are necessary for the origin of life as we know it. The resulting production rates and mixing ratios of these molecules will be analyzed as the comet moved away from the Sun and compared to those found by other astronomers both for C/2013 US10 and comets similar to it. The goal is to make accurate predictions of what molecules were present in the early stages of our solar system's formation and the conditions which led to the existence of life on Earth.

Poster 85
Joseph Heckenlaible, Physics Undergraduate Student
Faculty Mentor: Brooke Hester, Physics and Astronomy
Co-Author(s): N/A
Title: QUANTIFYING THE THERMAL EFFECTS OF OPTICALLY TRAPPED, METALLIC NANOSHELLS

In optical trapping experiments, metallic nanoshells can heat strongly due to the excitation of surface plasmons when exposed to light. Understanding this heating effect is important for gaining an overall understanding of the physics of the plasmon-optical trapping interaction and for experimental design optimization. To measure the temperature of a single metallic nanoshell in an optical trap, we compare the high-frequency power spectra of trapped nanoshells at various laser powers with two optical trap wavelengths and validate our results by comparing trap stiffness determined through power spectral analysis with that derived from the equipartition theorem and using Boltzmann statistics. The improvement of the identification of the temperature in the process is the goal of this project.

Poster 86
Chloe Thompson, Physics Undergraduate Student
Faculty Mentor: Brooke Hester, Physics and Astronomy
Co-Author(s): N/A
Title: ENHANCING FOCAL PLANE PRECISION IN OPTICAL TWEEZERS THROUGH TUNABLE LENS INTEGRATION
Optical tweezers trap and manipulate microscopic particles and are commonly integrated into an optical microscope for viewing the trapped object. Particles of various geometries exhibit distinct trapping heights within the focus of a laser, requiring focal plane adjustments in the microscope. The custom-built optical tweezers system utilizes position detection software that requires the trapped object to be in the focus of the position detection and trap lasers. Without a tunable lens, the process must be done by manually adjusting a lens on a track. This is a delicate process and can cause the particle to come out of the trap. Using a tunable lens as the tube lens on an optical tweezers microscope system streamlines the process of adjusting the plane of focus. We use a stand-alone tunable lens microscope to take images of slides located in varying positions from the focus of the microscope. We present here an analysis of images acquired with the tunable lens microscope.

Poster 87
Savannah Watson, Physics Undergraduate Student
Faculty Mentor: Brooke Hester, Physics and Astronomy
Co-Author(s): N/A
Title: BUILDING AN OPTICAL TWEEZER
Optical tweezers use highly focused lasers to trap and manipulate microscopic particles which in turn can be used to measure molecular forces and particle motion. Utilizing Optical Tweezers enhances the ability to record precise data and test the properties of trapped particles. To create the apparatus we use two lasers of 790 nm and 535 nm wavelengths, beam expanders formed by lenses with varying focal lengths, motorized mirrors to steer the laser beams, a microscope, and a position detection sensor. The

laser beams are aligned through the microscope objective, particles being analyzed, and the condenser before being directed toward the camera through the use of mirrors and dielectrics. The result of this project is to engineer a fully functional optical tweezer apparatus of two different lasers that can be used for the manipulation of sub-microscopic particles.

Poster 88
Grace Alvanos, Biology Undergraduate Student
Faculty Mentor: Brooke Hester, Physics and Astronomy
Co-Author(s): N/A
Title: DETERMINATION OF ELASTIC MODULUS OF CELLS WITH OPTICAL TWEEZERS
The elastic modulus of a cell is used to describe its resistance to elastic deformation. The elastic modulus contributes to the cell's ability to react to external stimuli, and can provide information about the cell's health. The elastic modulus of a cell is dependent on the elasticity of its cytoskeleton–a structure composed of actin filaments, intermediate filaments, and microtubules. The measurement of the elastic modulus of cells–using the indentation method–can be performed using optical tweezers. Optical tweezers have the ability to trap particles and the displacement of these particles can be measured via a position sensing detector. The indentation method raises a cell on the microscope slide coverslip to push on and therefore axially displace a trapped microsphere from its equilibrium position. This force causes the bead to indent the cell. The displacement of the microsphere is measured and is used to find the force exerted onto the bead as well as the depth of the indentation–the elastic modulus is determined from these values using the Hertz Model.

Poster 89
Sarah Barnard, Biology Undergraduate Student
Faculty Mentor: Cara Fiore, Biology
Co-Author(s): Preston Charles
Title: Characterizing Microbial Interactions of Freshwater Sponges in Western North Carolina
Freshwater sponges, sessile organisms that benefit their ecosystems through nutrient cycling and water filtration, contain diverse communities of bacteria and microbes (single celled organisms) that comprise the sponge's microbiome. This microbiome contains a vast array of microbial symbionts that can be advantageous to the survival of the sponge. Forms of symbiosis include waste removal, nutrient exchange, vitamin biosynthesis, and chemical defense. Freshwater sponges are understudied compared to their marine counterparts, but contain equal amounts of microbial diversity. To characterize the microbiome of freshwater sponges, we used 16s rRNA gene sequencing for taxonomic identification and metagenomic sequencing for genomic information

within the microbes. We sequenced samples of the freshwater sponge, Racekiela ryderi, from two locations within the same river, Middle Fork New River (MF) and Middle Fork Greenway (MFG), and compared its microbial composition to water and sediment. This comparison from both locations allowed us to visualize if the microbial symbionts are species-specific or based on location. We expect to find correlations of symbiosis from both sequencing methods. Based on 16S data, preliminary results indicate that the sponges found in each location have a different microbial composition. Variations stem from differences in abundance of symbionts in sponges from the two sites rather than large differences in taxonomy. MF sponges have a high presence of bacteria from the Parablastomonas genus, while sponges from MFG have a high presence of bacteria from the Novosphingobium genus. There are bigger differences between the microbial communities of the sediment, water, and sponge samples than there are between the sponge samples from the two sites. These preliminary data provide important insights into the composition and specificity of sponge microbiomes. Future work will characterize potential functional roles of these symbiotic microbes.

Poster 90
Dominik Bettini, Biology Graduate Student
Faculty Mentor: Shea Tuberty, Biology
Co-Author(s): N/A
Title: MONITORING THE RECOVERY OF THE PIGEON RIVER FOLLOWING THE PERMANENT CLOSURE OF THE PACTIV EVERGREEN PAPER MILL IN CANTON, NORTH CAROLINA
Regarding riverine pulp and paper mills, research on the recovery of stream ecosystems after the cessation of upstream paper production is scarce. As the developed world moves away from single-use paper products, more research is needed to determine the rate of recovery for affected ecosystems. For over a century, the Pigeon River in Haywood County, North Carolina received a large quantity and variety of chemical effluent from the Pactiv Evergreen Paper Mill. Despite overall improvement of the river's health due to the cessation of dioxin discharge in the 1990's, biomonitoring conducted by the NCDEQ and Duke Energy has demonstrated that pollutants continued to impair the macroinvertebrate biota prior to the mill's closure in May 2023. Using benthic macroinvertebrates as bioindicators, this research aims to determine if upstream and downstream sites support similar macroinvertebrate assemblages >7 months post-shutdown, the rate of recovery for the benthic community, and the abundance of pollution-sensitive taxa. Additionally, a YSI Quattro multimeter was used and water and sediment samples were taken at each sampling site and analyzed using Inductively Coupled Plasma Optical Emission Spectroscopy and Ion Chromatography to provide more context as to what physicochemical properties are significantly different between upstream and downstream sites. Aquatic macroinvertebrate samples collected by the NC DEQ Biomonitoring lab 3 months post-shutdown demonstrated an initial

colonization of 6 new taxa. Additionally, water quality monitoring by Duke Energy and the NC DEQ indicate drastic reductions in conductivity, turbitidy and water color. Continued quarterly sampling is planned for another 1.5yrs.

Poster 91
Elizabeth Blake, Biology Undergraduate Student
Faculty Mentor: Ashley Adams, Biology
Co-Author(s): Rylee Strassner, Ian Cox
Title: A STUDY ON LEAF LITTER ACCUMULATION AND LEAF LITTER DECOMPOSITION RATES IN CONIFEROUS-DOMINANT AND DECIDUOUS FORESTS
Leaf litter decomposition plays an important role in the ecosystem carbon storage. Yet, there is a lack of research on the early stages of leaf litter decomposition. Our study focuses on the first six months of leaf litter decomposition in both coniferous-dominated and deciduous-dominated forests. Comparisons will be made between leaf litter accumulation, leaf litter decomposition stages, and the effects of nitrogen enrichment on decomposition rates. The study is being conducted on Appalachian State's Gilley Research Site where both forest types can be found. In each forest type, we are measuring leaf litter depth and mass. To evaluate decomposition rates, we constructed leaf litter bags; bags placed in coniferous-dominated plots are composed of coniferous leaf litter, and bags placed in the deciduous-dominant forest are composed of deciduous leaf litter. Leaf litter bags will be collected at various time intervals across the six months to assess mass loss due to decomposition. We expect to find higher rates of leaf litter accumulation and lower rates of decomposition in the coniferous-dominant forest. Our preliminary data show that leaf litter depth is greater in the coniferous dominant forest, where the coniferous dominant forest has an average litter depth of 4.9cm compared to 2.9cm.

Poster 92
Tarona Commodore, Biology Undergraduate Student
Faculty Mentor: Rachel Bleich, Biology
Co-Author(s): Ally Lawing
Title: IMPACT OF ESCHERICHIA COLI AND ENTEROCOCCUS FAECALIS ON BIOFILM PRODUCED IN CO-CULTURE
Crohn's disease is an inflammatory bowel disease (IBD) that causes the immune system to deteriorate healthy tissues, resulting in inflammation and swelling of the digestive tract. This inflammation has been correlated to the makeup of the gut microbiota. Crohn’s disease patients are found to have more of an abundance of Escherichia coli and Enterococcus faecalis in their gut microbiomes. These microbes are able to use the altered environment produced by inflammation to overgrow in the gut. This gives them a fitness advantage and enhances virulence. Preliminary results have shown that when

these two microbes are placed into a co-culture, they produce a wrinkling morphology indicative of biofilm formation. Biofilms are surface-attached microbial communities in a protective matrix. We hypothesize this colony morphology correlates with a phenotype that, in vivo, could allow the inflammation of the gut to be prolonged. In this experiment, four Crohn's-associated Escherichia coli isolates have been co-cultured with a novel Enterococcus faecalis Crohn's-diseased gut isolate. This co-culture assay was used to observe co-culture phenotypes in comparison to individual monocultures. The co-culture assay was used to further examine how the active growth state of Escherichia coli and Enterococcus faecalis affects the wrinkling morphology in relation to biofilm formation. We hypothesized that if either microbe was heat killed before being plated in the co-culture assay, no additional wrinkling would be produced. Thus, the wrinkling morphology is dependent on active growth and not presence of cells alone. Understanding how the growth of co-cultured Escherichia coli and Enterococcus faecalis affects biofilm formation is vital for understanding the interactions of Crohn's disease-linked strains in the gut.

Poster 93
Elyssa Ghazali, Biology Undergraduate Student
Faculty Mentor: Matt Estep, Biology
Co-Author(s): N/A
Title: DEVELOPMENT OF MICROSATELLITE MARKERS FOR THE YELLOW LADY SLIPPER ORCHID (CYPRIPEDIUM PARVIFLORUM)
Cypripedium Parviflorum (Orchidaceae, Salisbury) is a perennial orchid commonly known as the Yellow Lady Slipper. Cypripedium Parviflorum is present throughout North America but is currently on the Natural Heritage Program's "List of Rare Plant Species of North Carolina," and is considered rare across its entire range (SR-T) (Wichmann, 2021). In North Carolina, it is considered to be imperiled or critically imperiled (S1S2) and on a global scale it is generally secure but its varieties or subspecies may be vulnerable (G5T3T5) (Wichmann, 2021). Botanists have described three varieties (var. parviflorum, var. pubescens, and var. makasin) based on observed ecological and morphological differences, but these groupings can be difficult to differentiate (Wallace & Case, 2000). This research aims to construct genetic markers that can be used to measure genetic diversity of the species and facilitate differentiation of varieties."

Poster 94
Jenna Hall, Biology Graduate Student
Faculty Mentor: Mary Kinkel, Biology
Co-Author(s): N/A
Title: AN INVESTIGATION INTO THE GENES INVOLVED IN GUT MOTILITY IN ZEBRAFISH

Gut motility disorders are common worldwide, yet the causes are not well understood. Gut motility disorders not only impart a great physical burden on those who suffer, but also a healthcare burden due to lengthy treatments. Zebrafish are highly genetically similar to humans but have more simplistic gastrointestinal tracts, allowing for gut motility to be more easily studied in this model organism. This study aims to 1) spatiotemporally map gene expression in the zebrafish gut and 2) confirm the role of Trpa1a for stimulating intestinal transit following a meal. To map the zebrafish gut, RT-PCR will be utilized to test for the presence expression of candidate genes in the adult gut. Samples were collected from a dissection across four areas of the zebrafish gut: the intestinal bulb, loop, small intestine and colon. RNA was then isolated and later transcribed to cDNA. To test our gene-specific PCR primers, we are using genomic DNA. To confirm the role of Trpa1a, trans-cinnamaldehyde will be used as an agonist in the absence of other nutrients. Nile red will serve as a tracer, allowing us to visualize the gut movement. Understanding the genes involved in gut motility of zebrafish will allow for further direction in developing therapeutic targets for gut motility disorders to be gained.

Poster 95
Hudson Koch, Biology Undergraduate Student
Faculty Mentor: Matt Estep, Biology
Co-Author(s): Matt Estep
Title: GENETIC DIVERSITY OF THE TIMBER RATTLESNAKE (CROTALUS HORRIDUS) IN WESTERN NORTH CAROLINA
Crotalus horridus, also known as the Timber Rattlesnake, is a pit viper whose range extends throughout the Eastern United States. These vipers typically inhabit deciduous forest areas and can be found throughout North Carolina where the species is listed as a species of special concern. This study aims to describe the genetic diversity and population structure of Western North Carolina populations. Using seventeen previously published microsatellite markers, a total of 126 individuals were genotyped using sheds. The study will present estimates of genetic diversity and population structure. This type of data is critical in determining the health of the Western North Carolina Timber Rattlesnake population and can be used to direct management activities for the species.

Poster 96
Emi Postal, Biology Graduate Student
Faculty Mentor: Matt Estep, Biology
Co-Author(s): Christof den Biggelaar
Title: WHAT'S IN A NAME?
MICROSATELLITE ANALYSIS OF RICE VARIETAL DIVERSITY IN MADAGASCAR

Oryza sativa is the most widely consumed grain worldwide and constitutes 55% of the caloric diet of Malagasy peoples. While the rich, endemic biodiversity of Madagascar is well studied, far less attention has been devoted to understanding the introduced crop diversity. Previous researchers found a large number of synonyms and homonyms among Malagasy rice varieties, named by farmers based on phenotypic characteristics (primarily of the seed and reproductive structures) and method of production (swamp or upland/rainfed). A 2019 survey of rice varieties grown by 73 households around the Betampona Nature Reserve in East Madagascar identified 81 locally named varieties (den Biggelaar et al., 2024). This study seeks to determine the relatedness of those named varieties by conducting a microsatellite fingerprinting analysis of O. sativa. Eighty fresh tissue samples were collected along with varietal names and specific collection coordinates. These samples were subjected to a modified CTAB extraction before conducting PCR using thirteen primers established by previous studies. Microsatellite bands were scored using a 50bp ladder on 3% agarose gels run for 3 hours at 50V. Comparing the relatedness of these varieties with the techniques used to produce them in various locales will assist in the development of further agriculture extension programs and could potentially improve crop productivity.

Poster 97
Maxwell Ramey, Biology Undergraduate Student
Faculty Mentor: Jon Davenport, Biology
Co-Author(s): N/A
Title: Sexual dimorphism of head size in Notophthalmus viridescens viridescens
Many species of animals display some level of sexual dimorphism, which can be seen in a wide array of different physical features across different taxa. In salamanders, a common sexually dimorphic trait is head size. This trait is especially prevalent and well studied in various Plethodontid salamanders, with male heads typically being larger in most species. Sexual dimorphism in head size, however, is less understood in Salamandrid salamanders, especially the Eastern Newt, Notophthalmus viridescens. Based on one study in Pennsylvania, we expected that male newts would have larger heads than female newts. To test this hypothesis, we examined head size in Eastern Newts in the northwestern region of North Carolina, using individuals from Watauga and Ashe Counties. We recorded the sex, Snout-vent Length (SVL), head length, and head width of 115 individuals (38 females and 72 males). We sampled sites across varying elevations to reduce bias into our dataset. We found that the average SVL of both sexes were not statistically different from one another. We also found that females had both statistically greater average head width (8.32 mm) and head length (11.46 mm) compared to males (7.93 mm and 10.19 mm, respectively). This result differs from the only other study examining newt head width in Pennsylvania. Our results suggest that generality in sexual dimorphism may not exist across newt populations. Further

investigation into other factors influencing morphological plasticity of adult newts will shed light on these differences.

Poster 98
Jenna Tullis, Biology Undergraduate Student
Faculty Mentor: Ashley Adams, Biology
Co-Author(s): Jon Davenport, Elyssa Winterton, Rosie Ronca
Title: CHARACTERIZING EDAPHIC FACTORS OF PLETHODON HABITATS AS DRIVERS OF ABUNDANCE
Edaphic characteristics such as salinity, pH, organic matter percentage and nutrient content and their effects on organisms that reside within soil habitats have been the focus of much research throughout the years. We can look into these factors in combination with species data in order to determine if there are possible environmental factors driving their abundances and diversity. Salamanders are abundant in the southern Appalachian Mountain range, and are very important species within their ecosystems, both contributing immensely to and being affected by changes in their natural habitats. Soil plays an integral part in their lives as both a habitat and place to forage. Environmental drivers of salamander distribution and abundance in the Southern Appalachians remains unresolved. This thesis research, with samples provided by Dr. Jon Davenport's lab, aims to analyze the pH, soil salinity, organic matter percentage, and nutrient content of 52 samples of soil from numerous sites in both Western North Carolina and Eastern Tennessee with the goal of characterizing the soil habitat and establishing predictors of terrestrial salamander distribution and abundance.

Poster 99
Abby Turner, Biology Undergraduate Student
Faculty Mentor: Jon Davenport, Biology
Co-Author(s): Rosemary Ronca
Title: EFFECTS OF ELEVATION ON MORPHOLOGICAL TRAITS IN A VULNERABLE SALAMANDER: PLETHODON WELLERI (WELLER'S SALAMANDER)
Southern Appalachia is home to an array of diverse wildlife taxa. One prolific group in this region is lungless salamanders of the Plethodontidae family. Despite the prevalence of these amphibians, fundamental data on many species is missing from current literature, which can lead to voids in information that is crucial to conservation planning. Plethodon welleri (Weller's salamander) is an example of a data-deficient species that is endemic to Southern Appalachia and considered vulnerable in its conservation status. Our study set out to determine if certain morphological traits of P. welleri vary along an elevational gradient. We hypothesize that body size (snout-vent-length, SVL) will increase with elevation. Additionally, we hypothesize that head size (head length and width) and limb length (humerus/femur length) will also be

positively correlated with elevation. To investigate morphological variation at different elevations, we measured and compared P. welleri individuals from 11 populations in North Carolina and Tennessee. Individuals were photographed and measured using ImageJ. We found no significant effect of elevation on SVL or head morphology across populations. We did find a significant effect of elevation on leg length with both front and rear limbs being shorter in populations from higher elevations. These findings suggest that P. welleri body size may not be influenced by elevational gradients, a trend that has been documented in other Plethodontid salamanders. Our results also suggest that leg length in P. welleri may be impacted by elevation, but more research is needed to understand the biological implications of this finding. Overall, our study provides new information on how an important life history trait may interact with this species' environment which could be valuable in developing informed, targeted conservation efforts.

Poster 100

Aubrey Mann, Nutrition Graduate Student
Faculty Mentor: Laurel Wentz, Nutrition and Health Care Management
Co-Author(s): Paul Moore, Jared Skinner

Title: SEASONAL EFFECTS ON BODY COMPOSITION AND INJURY RISK IN COLLEGIATE WRESTLERS

BACKGROUND: Wrestling focuses on power to weight ratio within weight classes to maximize performance. Previous literature examined the effects of rapid weight loss techniques and muscle strength on physical/cognitive implications, such as injury, among combat sports. Few studies have focused on body composition changes across season's association to specific injuries or injury occurrence. The purpose of this study was investigating how body composition changes throughout wrestling season affect injury rate. METHODS: Body composition (body mass, fat free mass, fat mass), was collected using the Dual X-ray absorptiometry. Members of the ASU wrestling team were tested at four time-points; pre-season, weight certification, mid-season, postseason. Sports medicine personnel track injury type/date. Using SPSS software, independent samples t-test to identify differences in body composition over the season in injured vs un-injured wrestlers were conducted. RESULTS: 35 wrestlers completed DXA once. 33 wrestlers completed DXA at four timepoints (11 lightweight, 11 middleweight, 11 heavyweight). 18 wrestlers incurred 24 injuries. Body mass (kg) decreased from baseline to weight certification (80.2 ± 15.1 to 75.0 ± 18.7; $p = 0.029$). Body Fat (%) decreased at weight certification from 15.8 ± 2.5 to 14.3 ± 2.3 ($p = 0.024$). Lean body mass (kg) declined at weight certification from 64.1 ± 10.8 to 61.9 ± 15.7 for all wrestlers ($p = 0.56$). At weight certification, wrestlers with injuries to the right upper side ($n = 4$) had a significantly lower LBM ($p = .045$) of 3.3 ± 2.5 kg than wrestlers with no injury, 4.7 ± 0.8 kg. CONCLUSION: Wrestlers with upper body injury had lower LBM than uninjured athletes at weight certification. The decline in LBM and FM suggest

harmful weight cutting techniques, failing to preserve muscle while losing fat mass. Subsequently, the loss of muscle increases an athlete's risk for injury throughout wrestling season.

Poster 101
Sheridan Northcutt, Nutrition Graduate Student
Faculty Mentor: Alisha Farris, Nutrition and Health Care Management
Co-Author(s): Manan Roy PhD and Danielle L. Nunnery PhD, RDN
Title: THE PREVALENCE OF ORTHOREXIA AND WEIGHT BIAS AMONG NUTRITION PROFESSORS
BACKGROUND: Orthorexia (ON), an obsession with food, self-punishment regarding food and exercise, restrictive eating behaviors, and a belief that one's morals and self-validity is based on their dietary choices has been reported between 50-72% among registered dietitians and dietetic students. Research has shown a link between internalized weight bias and ON for health professionals, but the prevalence has not been documented in nutrition professors, who are responsible for the education of future nutrition professionals. The aim of this study was to explore the prevalence of ON and weight bias among nutrition professors. METHODS: The ORTO-R and the Weight Attitude and Implicit Association Test (IAT) were used to assess ON tendencies and weight bias in nutrition professors across 12 mid-southeast states. Data were analyzed using descriptive statistics. RESULTS: A total of 48 participants completed the survey. The majority were white (54%), and 40-60 years of age (92%). A majority believed they should lose weight (64%), but were somewhat satisfied (54%) with their body perception. For ON, the most commonly reported tendency towards ON (50%) was "do you believe eating healthy food increases your self esteem?". Approximately, 70% had a strong or moderate preference for thin people over fat people. DISCUSSION: This study found a strong weight bias among nutrition professors and a small prevalence of ON tendencies. These tendencies are relatively low, despite 64% of participants also reporting wanting to lose weight. The findings of this study do not represent all nutrition professors due to the small sample size. However, there is little research with nutrition professors and orthorexia tendencies/weight bias and further research is needed. CONCLUSION: Nutrition professors help to train future nutrition professionals. The weight bias present in this population encourages further research to examine effective interventions on decreasing weight bias.

Poster 102
Landon Green, Nutrition Graduate Student
Faculty Mentor: Danielle Nunnery, Nutrition and Health Care Management
Co-Author(s): N/A
Title: A CULTURAL COMPETENCE INTERVENTION IN UNDERGRADUATE NUTRITION STUDENTS USING NON-TRADITIONAL LITERATURE.

Introduction: Most cultural competence research in nutrition and dietetics focuses on ethnic and racial differences, cultural foods, and health disparities disproportionately affecting minority communities, but few to none focus on disability as a culture. To our knowledge, there are no current studies in nutrition research that assess cultural competence and measure the impact of a cultural competence intervention focusing on people with disabilities (PWD) despite The World Health Organization, Surgeon General, and United Nations all call for competent healthcare for those with disabilities. Methods: This study included a brief intervention exposing undergraduate dietetic students to first-person, disability-focused literature followed by a discussion and 33-item survey assessing prior experience with PWD and the effectiveness of the intervention in affecting attitudes, knowledge and readiness when interacting with PWD as future dietitians. Results: While 82% of students surveyed (n=10) reported that their nutrition courses prepared them to work with diverse cultures, beliefs and communication styles, 55% felt coursework prepared them to work with diverse mental disabilities. Students who participated in the instructor-mediated reading and discourse stated that it encouraged them to, "be mindful while also recognizing that they (PWD) do the same things as everybody else. Recognize that like everybody, they are unique and have a personality." Conclusion: Using literature in cultural competence curriculum may be a helpful and effective tool in building awareness and fostering readiness and competence for undergraduate dietetic students. Further research should include a larger quantity of participants and assess the long-term impacts of the didactic intervention through reassessment in future courses.

Poster 103

Benjamin O'Donnell, Nutrition Graduate Student
Faculty Mentor: Laurel Wentz, Nutrition and Health Care Management
Co-Author(s): Marco Meucci, PhD, Dr. Danielle Nunnery, PhD

Title: ENERGY EXPENDITURE UNDER LOAD CARRIAGE: A FIELD STUDY

ABSTRACT. Outdoor enthusiasts embark on distance hikes for adventures, while military service members trek long distances to execute their missions. In both cases, load carriage is required to transport gear, fluid, and food. However, providing recommendations for dietary intake while hiking under load is challenging, since literature is limited on energy expenditure and the most common predictive equation, Pandolf, was formulated predominately using male participants. PURPOSE : The purpose of this study was to examine the energy expenditure through a metabolic cart compared to the predictive equation and to compare males and females during a 10-kilometer hike under load carriage. METHODS : Seven participants aged 18-30 yrs (4 females and 3 males) volunteered to hike a 10K loop gaining 600 feet of elevation under 30 lbs of load. Body composition was assessed through a SECA bioimpedance analysis During the hike, the participants wore a COSMED K5 and heart rate monitor. Data was analyzed for energy expenditure and compared to the Pandolf equation.

RESULTS: The average time for participants to complete the 10K hike was 109 ± 5 minutes for men and 112 ± 5 minutes for women. The average energy expenditure per kg of FFM was 12.6 ± 0.2 kcal/kg for men and 15.4 ± 2.5 kcal/kg for women, giving a mean total energy expenditure to complete the hike of 853 ± 145 kcals and 720 ± 168 kcals, respectively. CONCLUSION: The total mean energy expenditure measured by the COSMED k5 was 129% of the estimated energy needs by the Pandolf equation for men and 132% of the prediction for women. This helps show the need for further evaluation on our current predictive equations to improve accuracy for energy expenditure during load carriage activities.

Poster 104
Paula Yelton, Nutrition Graduate Student
Faculty Mentor: Sydeena Isaacs, Nutrition and Health Care Management
Co-Author(s): Jennifer Schroeder Tyson, Ashley Parks
Title: CONTENT VALIDATION OF PROVIDER AND STAFF SURVEYS IN HEALTHCARE: A SYSTEMATIC REVIEW PROTOCOL
Survey-based studies are ubiquitous to research where questionnaires are used to collect information from respondents. Thus, given the importance of questionnaires to research, ensuring their validity is crucial to producing high-quality survey research. This systematic review protocol presents an objective and transparent methodology to document the available practices around content validation of health-related surveys aimed at collecting data from healthcare workers. This study focuses on using a search strategy developed with guidance from a health sciences librarian. Search strings were developed using Boolean operators for each database combined with natural language search terms, keywords, and validation terms. Keywords were matched to database-specific indexing terms such that each search string utilized a comparable search strategy. Four review authors applied the search strategy which retrieved titles and/or abstracts of 323 articles of studies. Utilizing specific inclusion/exclusion criteria, the titles and/or abstracts will be independently screened. Relevant data will be extracted from the included studies utilizing a standardized pre-piloted form developed by the authors. The extracted data will be used in both the assessment of the quality of the studies and in the evidence synthesis. Methodological quality will be assessed using criteria adapted from the Academy of Nutrition and Dietetical Evidence Analysis. Findings from the systematic review will inform best practice recommendations for a consistent methodology for content validation of health-related surveys aimed at collecting data from healthcare workers.

Poster 105
Alyssa Mathew, Psychology Undergraduate Student
Faculty Mentor: Andrew Smith, Psychology
Co-Author(s): Marwa Farid, Avery Blackwell and Abigail Branco

Title: DO STEREOTYPES FREE UP COGNITIVE RESOURCES?
Stereotypes are overgeneralizations made about someone based on group membership. Macrae et al. (1994) established that stereotypes "free up" cognitive resources, allowing effort to be allocated to other tasks. Macrae's study consisted of a small, homogenous sample and failed to examine the presence of extra information that aids recall. Our study aims to replicate and extend Macrae et al.'s research by updating the materials and adding a new condition. Macrae's study consisted of a label-absent condition (e.g., Carla-Caring) and a stereotype-consistent label condition (e.g., Carla-Teacher-Caring). Cognitive ease was evaluated via participants' ability to complete simultaneous tasks. Adding a stereotype-inconsistent label condition (e.g., Carla-Lawyer-Caring) will eliminate the alternate explanation for Macrae's findings. Participants in Macrae's stereotype-consistent label condition performed better on both tasks. They concluded that stereotyping freed cognitive resources. Our research investigates whether this effect will replicate, or if the memory cue given in the stereotype-inconsistent condition is a sufficient recall aid. This study re-tests the idea that stereotypes are beneficial by freeing up cognitive resources and examines if any label produces the same result. If the results replicate, stereotypes may provide cognitive benefit; if not, a new explanation is necessary. These results have broad implications for social psychology research and other related fields.

Poster 106
Luke Millen, Psychology Undergraduate Student
Faculty Mentor: Jessica Doll, Management
Co-Author(s): Paige Couturier, Clara Lobsiger, Tim Huelsman, Kristl Davison
Title: A PICTURE WORTH A THOUSAND WORDS: HOW CAREER WEBSITE IMAGES INFLUENCE APPLICATION INTENTIONS
Organizations are motivated to persuade qualified applicants to apply for open positions so they can identify and select higher-quality candidates (Phillips & Gully, 2015). As organizations realize the value of a diverse workforce, they have deployed recruitment strategies to attract underrepresented applicants (Greenberg, 2015). Studies conducted in 2003 and 2006 by Avery and McKay suggested that targeted recruitment advertisements positioning non-White employees as recognized and included in the organization increased non-White job seekers' attraction to the organization. It has not yet been examined if this same effect extends to White members of other marginalized groups - specifically White and non-White members of the LGBTQ+ community (Avery & McKay, 2006; Walker et al., 2011). To conduct our survey we are utilizing a 2x2x2x2 quasi-experiment, where we will measure the application intentions between groups of White & non-LGBTQ+, Non-white & non-LGBTQ+, White & LGBTQ+, and Non-white & LGBTQ+ participants. Findings from this study will quantify the effect elements of website images supporting diversity and inclusion have on different applicants' application intentions. We will be able to better understand if the perception of any

marginalized identity in the workforce, whether or not it is the applicant's identity, increases the perception that one would be welcomed and included there.
We hypothesize that: Images portraying a racially and ethnically diverse workforce will positively affect application intentions of non-White applicants, images portraying LGBTQ+ symbolism will positively affect application intentions of LGBTQ+ applicants, images representing one marginalized group will have positive, but slightly smaller effects on the application intentions of other marginalized groups, and application intentions of White applicants will remain unaffected by images portraying a racially and ethnically diverse workforce.

Poster 107
James West, Community and Regional Planning Undergraduate Student
Faculty Mentor: Bhuwan Thapa, Geography and Planning
Co-Author(s): Josh Platt, Song Shu
Title: IDENTIFICATION OF RURAL BUILDING FOOTPRINT USING HIGH-RESOLUTION REMOTELY SENSED IMAGERY.
Accurate information on building footprints can be of use in various urban planning applications. While building footprint data are available for larger cities, there is limited data in rural and small-town communities. Utilization of high temporal and spatial resolution satellites– such as PlanetScope– can aid in identifying built environment features in these cases. The purpose of this study is to employ PlanetScope imagery (3 meter spatial resolution) to identify the building footprint network for Watauga County, North Carolina. Within ArcGIS Pro's Image Classification Wizard, object-based and pixel-based supervised classification were both utilized to obtain the building footprints. Training sites were derived from vegetated areas (forests and grass/lawns) and non-vegetated areas (building roofs, roads/sidewalks, and water) of leaf-off season imagery. Classified images from ArcGIS Pro were further analyzed in ENVI to clean up improperly classified pixels. The results were validated manually using Google Earth imagery and field visits. The preliminary results show that building footprint can be identified using the above stated techniques, however, the issues of differentiating with parking lots and streets may hinder accurate assessment of the building footprint.

Poster 108
Duncan Burns, Technology Graduate Student
Faculty Mentor: Sohad Abu-elzait, Sustainable Technology and the Built Environment
Co-Author(s): Joey Crews
Title: DESIGNING A HYBRID RENEWABLE ENERGY SYSTEM FOR CALDWELL COMMUNITY COLLEGE AND TECHNICAL INSTITUTE - WATAUGA CAMPUS
This work is part of an externally funded project that aims to design a cost-effective hybrid renewable energy system to serve another educational institute in our state. This comes as an effort to raise public awareness of clean and renewable energy systems in

order to help mitigate climate change and create more involvement of higher educational institutes toward these efforts. Our project targeted our local community college, Caldwell Community College and Technical Institute's (CCC&TI) Watauga campus. The project consists of 2 phases, phase 1 takes place in the Fall 2023 semester and involves designing the system and providing a complete cost analysis. At the end of this phase the final design of the system is submitted to the funding agency to be reviewed and approved by industry personnel. Phase two takes place in the Spring 2024 semester and it involves the implementation of the designed system at CCC&TI campus. The research group will be directly involved in the implementation of the project.
We present here our results from phase one. We created two different system designs and calculated their costs to allow for more choice from the College. One system includes solar and battery energy storage, the other system includes an addition of a wind turbine.

Poster 109

Mary Walton, Recreation Management Undergraduate Student
Faculty Mentor: Dr. Shannon Cline, Recreation Management and Physical Education
Co-Author(s): Dr. Mandy Harrison, Rivers Johnson

Title: INTERACTIVE NATURE TRAIL PROJECT: MAKING NATURE ACCESSIBLE

This is a study of the experiences of two undergraduate classes as they navigate working with each other and a federal agency in a service learning project. One class focuses on understanding how the formative experiences youth have in nature can influence their adult perceptions of the natural environment. The other course explores the provision of services to populations that may have limited access to recreation. Both classes will work together, and with the Army Corps of Engineers which manages W. Kerr Scott Dam and Reservoir and has a goal of creating an accessible, inclusive trail. With over half the world's population living in urbanized areas there are increasing concerns over the quality of life for urban residents. Studies confirm that direct exposure to nature is essential for the physical and emotional health of both children and adults. In the Wilkesboro, NC area, the only nature based interpretive opportunities for the public exist at W. Kerr Scott Dam and Reservoir (WKS). More than 300,000 visitors visit WKS per year and most of those visitors visit the Lakeside Nature Trail, which is outdated and not accessible. An App State Civic Engagement Grant is allowing students to redesign the trail signage, combining interpretive methods with universal design, a first at WKS. Students enrolled in Nature and Youth are using this semester to explore and learn about the connection between nature, play and the brain. They are doing so by choosing a topic identified by the W. Kerr Scott Ranger as important for the visitors at WKS Dam and Reservoir. Students in Inclusive Recreation are using this semester to gain knowledge and experience working with diverse groups, as well as learning how to create and facilitate accessible activities. They will be adding the component that uses universal design to make accessible interpretive display. We will report the students'

experiences of group work across these classes and the result of their ongoing work and learning.

Afternoon Poster Session 2 - 2:40-4:00pm Parkway Ballroom
Posters 110-138

Poster 110
Rylee Strassner, Biology Graduate Student
Faculty Mentor: Ashley Adams, Biology
Co-Author(s): N/A
Title: BRANCHING OUT: AN EXAMINATION OF SHORT-TERM COARSE WOODY DEBRIS DECOMPOSITION IN THE SOUTHERN APPALACHIANS
Forests use carbon dioxide from the atmosphere for energy and to build biomass. Many studies that evaluate forest structures tend to ignore a major variable – coarse woody debris (CWD). Often, researchers focus on the long-term effects of CWD decomposition by evaluating decomposition across decades. My study focuses on the short-term (1 year) decomposition of CWD in two distinct forest stands to compare the quantity of CWD, the decomposition stages, and the effect of nitrogen enrichment on decomposition rate and carbon storage. The study site is located in the Southern Appalachians and contains both coniferous- and deciduous-dominant forest. In each forest type, I will: 1) survey the amount and decay status of CWD; and 2) establish an experiment to test the effects of nitrogen enrichment on short-term wood decomposition across time. Here, I will take soil samples before and after CWD decomposition occurs in order to evaluate the amount of nutrient deposition into the immediate soil that occurs. Comparing coniferous and deciduous short-term CWD decomposition can improve our understanding of the role of forest type in soil carbon retention after death and how future atmospheric nitrogen deposition will affect carbon transfer to the soil. Overall, this study strives to recognize differences in decomposition between two distinct forest stands with the goal of identifying future management practices for forests best adapted to the long-term concern of climate change.

Poster 111
Christopher Cafasso, Biology Undergraduate Student
Faculty Mentor: Elizebeth/Ashley Adams, Biology
Co-Author(s): Rylee Strasner
Title: DO FOREST TYPES INFLUENCE SOIL ORGANIC MATTER AND NUTRIENT CYCLING
Understanding how the trait diversity of both plant and soil communities affects ecosystem function is a key question in ecology, but it is notoriously difficult to study in situ due to the difficulty of assessing belowground plant traits and soil communities. Temperate deciduous forests offer a natural contrast of plant traits. Here, both coniferous and deciduous species grow. Coniferous and deciduous trees differ in multiple traits (lower vs. higher pH leaves, for example), which feedback to important functions like organic matter storage and soil nutrient cycling. A temperate deciduous

forest, the Department of Biology's Gilley Research Property has coniferous-dominant and deciduous-dominant stand. Here, we have been working to establish long-term plots that will be monitored for a number of factors including the abundance of coarse and fine woody debris, leaf litter accumulation, soil organic matter, and soil nutrients. We expect that coniferous-stands exhibit lower pH, and more slowly degrading leaf litter, decreasing soil nutrient availability. By contrast, deciduous stands exhibit more easily decomposable tissues, leading to faster organic matter and nutrient cycling. To test this, we set up three replicate blocks, within which two forest-type plots (coniferous-dominate, deciduous-dominate) were established. Here, I will present preliminary results of soil factors (pH, organic matter, nutrients) and compare the two forest types.

Poster 112
Kimberly Carter, Biology Undergraduate Student
Faculty Mentor: Mary Kinkel, Biology
Co-Author(s): N/A
Title: THE ROLE OF HORMONE RECEPTORS IN GUT MOTILITY
This project aims to understand the roles of the ghrelin and motilin receptors in gut motility. Gut motility diseases such as constipation, irritable bowel syndrome, and GERD have a large impact on daily life. Defects in the ghrelin and motilin receptors are predicted to have important roles in gut motility disorders. To study the normal functions of these receptors we are using zebrafish as a model. In previous studies, the receptors were determined to be structurally similar in humans and zebrafish and are predicted to function similarly. To begin to understand their function, we are mapping their expression patterns in the zebrafish gut. Specific genes are predicted to be expressed in specific regions. The ada gene is predicted to be expressed only in the intestinal bulb, slcl-a2 is predicted to be expressed only in the small intestine, and aqp4 is predicted to be expressed only in the colon. Therefore, we will use these as control genes in RT-PCR experiments. In my research, I used wild-type adult zebrafish to obtain tissue for genomic DNA extraction. This DNA was quality-checked and quantified using a Nanodrop spectrophotometer. In ongoing studies, the DNA is being used to test primers for my control genes and the genes of interest. These primers will then be used to amplify cDNA to map gene expression along the regions of the gut. Overall, this research is aimed to understand the genetic causes of gut motility disorders and to provide insight for better treatments.

Poster 113
Julia Ringo, Biology Undergraduate Student
Faculty Mentor: Ava Udvadia, Biology
Co-Author(s): Olivia Carter, Denissa Mate

Title: FUNCTIONAL TESTING OF PUTATIVE REGENERATION-SPECIFIC GENE ENHANCER

Gene therapy has been presented as a promising new approach to treat central nervous system (CNS) disorders and injuries. Considering that regeneration-associated genes are temporally regulated; the treatment of CNS injuries will likely require more precise control of gene expression than current treatments designed to replace faulty genes in monogenic diseases. To refine a nuanced method for treating neurodegenerative diseases and injuries, the regulatory elements that drive therapeutic gene expression must be identified and tested experimentally to elucidate their involvement in the molecular switches turned on and off during CNS regeneration. This project will functionally evaluate candidate regulatory elements governing the expression of the regeneration-associated jun gene in zebrafish. Two plasmids were designed, to identify regions of within a putative 5kb enhancer fragment that are sufficient in promoting gene expression during optic nerve regeneration. One plasmid utilizes the native jun promoter and the other utilizes a neuron-specific promoter from a heterologous gene, gap43. These plasmids will be microinjected into the one-cell stage of zebrafish to establish transgenic founder lines and the developmental expression patterns will be documented as the fish mature. The successful establishment of these founder lines will be validated by using fluorescence microscopy and PCR to evaluate the transmission of the transgene to progeny. Eventually these founder lines will be crossed into the isI2-GFP transgenic line, allowing for visual observations to be made regarding which regions of the Jun enhancer enables expression during regeneration. This work will investigate a novel regulatory element, previously uncharacterized, to determine its role in CNS regeneration, broadly contributing to the development of targeted gene therapies for neurodegenerative diseases, such as glaucoma.

Poster 114

Katelyn Herring, Nursing Graduate Student
Faculty Mentor: Rebecca Turpin, Nursing
Co-Author(s): Sarah Martin (Faculty Mentor)

Title: THE ROOT OF RESILIENCE: NURSE EDUCATORS ROLE MODELING TO ENHANCE THE NURSING WORKFORCE

It is well known that the nursing profession has been experiencing a rapidly growing shortage in the past few years which has worsened since the COVID-19 pandemic. To decrease stress, burnout, Post Traumatic Stress Disorder and the rates of suicide in nursing professionals, resiliency must be developed to help nurses overcome hardships they face during their careers. The question is posed however when is the time to start building resiliency and how should it be incorporated into nursing education. The purpose of this novel research topic in nursing literature is to explore the effect nurse educators role modeling resiliency has on students' abilities to build resilience. An original translation of Erickson's Modeling and Role Modeling Theory is used to explore

the nurse educator-nursing student relationship and a student's ability to try resiliency building behaviors due to the role modeling behavior of nurse educators.

Poster 115
Emily Bauer, Exercise Science Graduate Student
Faculty Mentor: Herman van Werkhoven, Public Health and Exercise Science
Co-Author(s): N. Travis Triplett & Kimberly S. Fasczewski
Title: THE DIFFERENCE BETWEEN BACK SQUATTING WITH A STRAIGHT BARBELL VERSUS A SAFETY SQUAT BAR: THE EFFECT ON 1-REPETITION MAXIMUM VALUES, POWER OUTPUT, AND MUSCLE ACTIVATION
Conflicting evidence exists on whether there are differences in muscle activation between squatting with a straight barbell (SB) or safety squat bar (SSB) during the back squat movement, and no study to date has investigated the power outputs of the ankle, knee, and hip joints between the variations (SB vs SSB). The study aimed to determine if the SSB is a useful implementation in strength training programs. Twelve resistance-trained participants with prior SSB experience performed back squats using both a SB and SSB at 65% of 1RM and 85% of 1RM for a total of 12 repetitions. The participants had 1RM SB values of 392.04 ± 79.46 in pounds and 1RM SSB values of 339.12 ± 72.51 in pounds. An eight-camera VICON motion capture system was utilized to capture motion data and EMG data was recorded bilaterally for the vastus lateralis and semitendinosus. There was a 14.48% difference in the 1RM values between the SB and SSB, and there were significant differences displayed by a one sample t-test ($p<0.05$) between the two variations. A multivariate ANOVA (Bar Type x Phase) showed there were no significant differences in power output at the ankle, knee, and hip joints when compared across SB and SSB. However, we did find significant differences in ankle power ($p<0.05$) and hip power ($p<0.05$) at 65% and 85% of 1RM when analyzing eccentric and concentric phases of the movement. An independent t-test showed no differences in muscle activation of the vastus lateralis and semitendinosus between SB and SSB. The main finding of this study suggests that the safety squat bar is a useful implementation in strength training programs. If an individual cannot tolerate placing a straight barbell on their back due to mobility, discomfort, or inability to create a "shelf" to comfortably hold the barbell on their back, power output of the ankle, knee, and hip joints and muscle activation will not be altered while performing the back squat movement at 65% and 85% of 1RM with the safety squat bar.

Poster 116
Briana Robinson, Exercise Science Graduate Student
Faculty Mentor: Herman van Werkhoven, Public Health and Exercise Science
Co-Author(s): Alan Needle, N. Travis Triplett
Title: THE USE OF THE OPENCAP FRAMEWORK TO ESTIMATE BILATERAL VERTICAL GROUND REACTION FORCES DURING JUMPING TASKS

Measures of human movement dynamics have been used to improve athletic performance, predict injury risk, and monitor musculoskeletal diseases. Current gold standard methods of human movement analysis (i.e., marker-based motion capture and force plates) present several limitations related to high cost, marker placement, and procedure duration. A new open-source, web-based software called OpenCap, has proposed the use of smartphones to estimate three-dimensional kinematics and associated kinetics. This study investigated the validity of the OpenCap framework in its ability to estimate ground reaction forces when compared to force plates. It was hypothesized that the OpenCap method would show no significant differences in its ability to estimate bilateral vertical ground reaction forces generated during jumping tasks compared to the bilateral vertical ground reaction forces measured using force plates. Twenty participants performed three trials each of a countermovement jump (CMJ), single leg countermovement jump (SLCMJ), drop jump (DJ), and single leg drop jump (SLDJ). During data collection, OpenCap was used to record video from two smartphones and ground reaction force data were collected using two force plates. Resultant kinematic data were (1) input into a torque-driven model simulation using OpenSim to estimate ground reaction force (GRFTORQUE) and (2) input into OpenSim to calculate body center-of-mass acceleration to predict the ground reaction force (GRFCOM). Continuous force measures were analyzed for 0.5 s prior to toe-off for the CMJs and from foot-contact to toe-off for the DJs. Comparison of the force signals were done by calculating differences between data from force plates and the OpenCap framework and quantifying root mean square error (RMSE), mean absolute error (MAE), and R2, as well as calculating differences in peak force values. Results show that GRFTORQUE method estimated ground reaction forces with an average RMSE of between 19% BW and 47% BW, average MAE between 15% BW and 36% BW and average R2 values between 0.45 and 0.65 across the different jump tasks. The GRFCOM method showed RMSE errors between 32% BW and 40% BW, MAE errors between 23% BW and 29% BW and average R2 values between 0.48 and 0.59 across the single leg activities. A Wilcoxon signed ranked t-test did not reveal a significant difference when comparing peak force values between GRFFP and GRFTORQUE (GRFFP: 121.5 ± 24.1% BW, GRFTORQUE: 123.1 ± 23.7% BW, $n = 178$, $p = 0.054$) during double leg CMJ and DJ. Additionally, there were no significant differences between the three different methods' peak forces values (GRFFP: 202.4 ± 38.4% BW, GRFTORQUE: 197.0 ± 40.0% BW, GRFCOM: 201.6 ± 33.2% BW, $F1.808, 338.176 = 2.684$, $p = 0.075$). While these findings highlight the potential use of OpenCap for estimating ground reaction forces during jump tasks, they also indicate the need for further improvement.

Poster 117

Katherine Fearn, Exercise Science Graduate Student
Faculty Mentor: Caroline Smith, Public Health and Exercise Science

Co-Author(s): Favian A Morales, Killian D. Wustrow, Dristen Trate, Roman Galaska, Lainey Hunnicutt, Scott R. Collier, Marta Venier, Zachary Schlader.
Title: REDUCED NITRIC OXIDE-MEDICATED CUTANEOUS VASODILATION IN FIREFIGHTERS FOLLOWING A STRUCTURAL TRAINING BURN
Toxicants present in structural fire smoke, including polycyclic aromatic hydrocarbons (PAHs), present sizable health risks to firefighters. PAHs cause inflammation and oxidative stress resulting in vascular dysfunction. Limited research is available in the skin vasculature, which represents an easily accessible, typical vascular bed to investigate dysfunction. PURPOSE: Investigate the effects of a structural training burn (acute toxicant exposure) on Local heating (LH)-mediated cutaneous vasodilation and the nitric oxide (NO) contribution to vasodilation during local heating due to its role in vascular health. METHODS: An intradermal microdialysis (MD) fiber was inserted in the ventral forearm of 7 male career firefighters (34 ± 7 yrs) [SCJ2] within 1 week pre-burn and within 48 hours post-burn. The MD fiber was perfused with 10% 2-hydroxypropyl-β-cyclodextrin with lactated Ringer's at 1 µl/min during baseline. A local heater with a laser Doppler flowmeter was placed over the MD site to clamp skin temperature (Tsk) and assess skin blood flow (SkBf). Baseline Tsk was clamped at 33°C then raised to 42°C during LH. L-NAME (20 mM) was perfused at 4 µl/min to inhibit nitric oxide synthase until a plateau in SkBf occurred. Sodium nitroprusside was perfused at 4 µl/min and the local heater was clamped at 43°C to achieve maximal SkBf. RESULTS: Preliminary data indicate that SkBf was similar pre- and post-burn during baseline (15.01± 8.31 vs. 21.69±14.37 CVC%max, P=0.242) and the LH plateau (90.44±14.89 vs. 91.35±7.97 CVC%max, P=0.859). The L-NAME plateau was significantly higher during post-burn testing (28.15 ± 12.08 vs. 36.48±11.99, p=0.044), resulting in a significantly lowered LH-induced NO-dependent contribution to cutaneous vasodilation post-burn (69.03±12.62 vs. 60.15±12.39% CVC%max P=0.016). CONCLUSIONS: Preliminary data indicate that participation in a single structural training burn attenuates NO-dependent cutaneous vasodilation within 48-hours post exposure.

Poster 118
Samuel Grattan, Exercise Science Graduate Student
Faculty Mentor: Alan Needle, Public Health and Exercise Science
Co-Author(s): N/A
Title: COMBINING 1ST PERSON IMMERSIVE VIRTUAL REALITY WITH PHYSICAL SENSORY PERTURBATIONS FOR THE REHABILITATION OF CHRONIC ANKLE INSTABILITY
Current rehabilitation of chronic ankle instability (CAI) involves stability-based training (SBT). CAI patients present with strength and range of motion scores similar to uninjured individuals following SBT. However, high rates of ankle reinjury and increasing kinesiophobia over time reveal current stability-based methods aren't

effective for CAI. Virtual reality (VR) interventions in rehab settings with CAI has been studied, however no previous report has evaluated the impact of immersive 1st person VR combined with ankle perturbations, a sub-set of SBT. The purpose of this experimental study was to evaluate how integrating physical sensory perturbations with a fully immersive VR environment will affect characteristics of CAI. Twenty people (mean age: 19) with CAI as defined by the idFAI screening tool were allocated to two groups via stratified randomization. The experiment followed a pretest-posttest protocol where subjects came in on three successive days with 24 hours between each visit: one visit for baseline, one for intervention, and one for retention. A neurocognitive function test was used to measure ankle function, with measures taken at 4 time points across 3 visits, twice on the intervention day. This test challenged subjects' ability to memorize specific letters and respond to specific colors simultaneously. Intervention groups were VR Only, where participants were only shown the VR video, and VR + Perturbations, where participants received VR and perturbations concomitantly. The VR video was a 10-minute video of someone walking down a hiking trail shown from a first-person perspective. The VR+Perturbation group was given ankle "rockings" at timings and intensities that correlated to what subjects experienced in VR in real-time. Preliminary results show that mean reaction time (MeanBaseline=1.44 sec±0.20, MeanRetention=1.48 sec±0.21) and number of letters memorized (MeanBaseline=21%±0.13, MeanRetention=34%±0.16) increased from baseline to retention.

Poster 119

Chris Wing, Exercise Science Graduate Student
Faculty Mentor: Kimberly Fasczewski, Public Health and Exercise Science
Co-Author(s): Andrew Shanely, Kimberly Fasczewski

Title: HEART RATE VARIABILITY: AN OBJECTIVE MARKER FOR TRAINING STATUS IN ELITE FREESTYLE KAYAKERS

Freestyle whitewater kayakers have been unable to exploit training load management tools and often find themselves injured or experiencing overtraining symptoms. Due to the environmentally challenging nature of the sport, information on overtraining and burnout is extremely limited in this population. Therefore, the study aimed to investigate the interaction between validated psychophysiological measurements and heart rate variability (HRV) as a predictive tool for training status. Daily HRV measurements were recorded in 2 competitive freestyle (male = 1, female = 1) whitewater kayakers across 12 weeks through the 2023 World Championships via the HRV4Training smartphone application. The weekly average HRV was compared to two other validated subjective monitoring modalities: the RESTQ-76 survey and a weekly average of the daily rate of perceived exertion (RPE). HRV and RPE showed a moderate correlation ($r^2 = .516$, $p = .010$), indicating a delayed dose/response relationship. HRV showed a moderate negative correlation to self-regulation and self-efficacy ($r^2 = -.482$, p

= .017, r2 = -.387, p = .052). Despite significantly different athlete experiences, these responses were consistent. These results demonstrate a latent psychophysiological response predicted by RPE, self-regulation, and self-efficacy towards HRV. Continued research should explore the dose/response relationship to physical/psychological stressors and performance outcomes.

Poster 120
Kennedy Bueche, Exercise Science Undergraduate Student
Faculty Mentor: Rich Christiana, Public Health and Exercise Science
Co-Author(s): Lydia Waddell
Title: EXPLORING THE ASSOCIATIONS BETWEEN PHYSICAL ACTIVITY, OUTDOOR ENGAGEMENT, AND HEALTH AMONG STUDENTS AT APPALACHIAN STATE UNIVERSITY
Physical activity (PA) and spending time outdoors has benefits to mental and physical health for children and adults. This study examined these relationships among college students. An online survey was conducted with a random sample of full-time undergraduate students at Appalachian State University (n=478). Respondents self-reported mental and physical health and frequency of moderate to strenuous PA, outdoor PA, and time spent outdoors. Only 1.7% and 5.0% of students rated their mental and physical health as excellent, respectively, while 58.6% and 40.1% rated these as fair or poor, respectively. There was a significant positive correlation between mental and physical health. Moderate and strenuous PA and time spent outdoors were correlated with better mental and physical health. Frequency of visits to green spaces on- and off-campus and time spent in green spaces off-campus were correlated with better mental and physical health, while time spent in green spaces on-campus was only correlated with better physical health. These results show that physical and mental health is concerning among App State students. The university should focus on ensuring that students have opportunities to spend time in nature for outdoor PA. Further research should examine strategies to increase outdoor PA among college students to improve mental and physical health.

Poster 121 Withdrawn

Poster 122
Katie Fisher, Nutrition Graduate Student
Faculty Mentor: Alisha Farris, Nutrition and Health Care Management
Co-Author(s): Manan Roy, Danielle L. Nunnery, Sheridan Northcutt
Title: PREVALENCE AND PERCEPTION OF WEIGHT INCLUSIVE CURRICULUM BY NUTRITION PROFESSORS
Background/Rationale: Receiving weight bias has been shown to have a negative impact on an individual's health causing impaired communication and mistrust with

health professionals. Rates of weight bias in nutrition professionals have been reported around 37 - 76%. Teaching weight inclusive curriculum such as Health At Every Size (HAES) in nutrition programs could potentially reduce weight bias for future nutrition professionals. The aim of this study was to explore the use and perception of weight inclusive curriculum with nutrition professors. Methods: Professors teaching in nutrition programs in ten states were recruited to participate in an anonymous qualitative survey. Data were analyzed using thematic analysis. Results: A total of 43 participants completed the survey. The majority were white (54%), and 40-60 years of age (92%). Some taught weight inclusive curriculum topics (56%) and some did not (44%). Less than half perceived nutrition curriculum as weight-inclusive (42%). Common themes for including HAES topics were: awareness of internal bias, and to promote a health over weight approach. Common themes for not including were lack of fit, and lack of knowledge/expertise. Discussion: This study highlights a lack of weight inclusive curriculum in nutrition programs. Professors are aware of HAES curriculum but do not know how to use it, do not feel it applies, or do not agree with the ideology. While almost half were not including HAES topics, many somewhat or strongly agreed that it should be included in community, counseling, clinical, and professional development courses. Providing resources for professors to easily incorporate HAES topics into curriculum is warranted. Conclusion: Weight inclusive curriculum may impact weight bias in university nutrition students and professors. Future research should evaluate the effectiveness of this curriculum on reducing weight bias for future health professionals.

Poster 123

Abby Portell, Nutrition Graduate Student
Faculty Mentor: Paul Moore, Nutrition and Health Care Management
Co-Author(s): N/A

Title: MILK WASTE AT A LOCAL DAYCARE IN WESTERN NORTH CAROLINA

The study observed pre-consumer milk waste at a local daycare center in Western NC. Pre-consumer milk waste was defined as milk thrown away before being served to children based on the “best by” date on the packaging. The product was discarded per organizational policy once the “best by” date had passed. This QI project did not measure milk waste that children might produce at the daycare facility from not drinking milk already served. The daycare center ordered several weekly milk varieties, including whole, fat-free, soy, organic, and organic soy milk. Whole and fat-free milk was ordered in gallon jugs through a food vendor, while soy, organic, and organic soy milk were purchased in half-gallon cartons. The whole and fat-free milk orders were submitted each Monday from the food vendor that supplies the daycare. The daycare’s food order delivery truck arrived on Tuesday mornings, including whole and fat-free milk. The soy, organic, and organic soy milk half-gallon cartons were purchased from a local grocery store as needed, as the food vendor did not offer these specific types of

milk. Data collection took place for six consecutive weeks. During this time, the daycare facility was open from 7:00 a.m. to 6:00 p.m. Milk was offered to children three times a day, during breakfast, lunch, and afternoon snacks. The type of milk offered is based on the parent's or guardian's request. If no specific request is made, the default milk is whole milk. The amount of milk purchased was compared with the amount disposed of to determine the amount of milk wasted. Milk waste was analyzed for all milk bought and the categories purchased and served. A percentage was calculated given the amount of milk purchased divided by the amount disposed of.

Poster 124
Karlee Prater, Nutrition Graduate Student
Faculty Mentor: Ayron Walker, Nutrition and Health Care Management
Co-Author(s): Manan Roy, Danielle Nunnery, Alisha Farris
Title: INVESTIGATING RELATIONSHIPS BETWEEN CHILDHOOD EXPERIENCES AND ADULT DISORDERED EATING AMONG FUTURE HEALTH PROFESSIONALS.
Disordered eating is associated with a greater risk for an eating disorder, in which disordered eating is high among healthcare providers. However, more research is needed on the relationship between various related factors and the effect on disordered eating among future health professionals. Therefore, the purpose of this study was to further understand how food insecurity, adverse childhood experiences, family fat talk, eating disorders, and fat phobia are associated disordered eating among future health professionals to explore possible solutions in health curricula. A 98-item, online, Qualtrics survey assessed for demographics, family fat talk, adverse childhood experiences, adult and childhood food insecurity, presence of eating disorders, fat phobia, and disordered eating using validated survey questionnaires. It was sent to 3,000 randomly selected, enrolled health sciences students at Appalachian State University in Spring 2023. A linear regression analyzed the relationship between disordered eating and contributing factors while controlling for covariates. 552 participants completed the survey. Of which, 83% identified as female, 88% were White, 26.4% were third-year undergraduate students, and had a mean score of 88 on the disorder eating scale (min 43- max 147). Presence of eating disorders, adverse childhood experiences, adult and childhood food insecurity, had a positive relationship with disordered eating. However, external fat phobia, year of enrollment, and family fat talk were negatively associated with disordered eating. Our research suggests greater education level (higher year of enrollment) reduces disordered eating tendencies in future healthcare providers. Therefore, a potential solution would be to investigate how the incorporation of more intuitive eating and Health at Every Size principle into entry level health classes could reduce risk of disordered eating and ultimately eating disorders in future healthcare providers.

Poster 125
Ian Russell, Nutrition and Foods Graduate Student
Faculty Mentor: Danielle Nunnery, Nutrition and Health Care Management
Co-Author(s): Ashley Parks
Title: CHRONIC DISEASE MANAGEMENT BY FREE CLINICS IN NORTH CAROLINA
The U.S. has come a long way in reducing the health coverage gap for underinsured individuals with expansion of programs like Medicaid. However, many fall into the gap of underinsured who do not qualify for these programs but still do not make enough to afford even bare catastrophic coverage. As of 2022, 43% of working adults were under or inadequately insured in the U.S. And of those, 59% reported poor health and a chronic health condition. Fortunately, free clinics act as social safety nets for this population and could serve as critical bridges to chronic disease management services. An exploratory approach was used to identify chronic disease and nutrition-focused services offered in free clinics across NC. Information on 89 identified clinics was obtained through each free clinic's website, the NC Association of Free and Charitable Clinics organization, and direct contact by email/phone. Social Explorer was used to display locations of free clinics, income, health insurance status, and poverty level in conjunction with free clinic sites. Summary statistics were used to describe number and types of chronic disease care and nutrition services.Of 89 identified clinics, 48% (n=43) offered diabetes education/management, 43% (n= 38), behavioral health, obesity 42% (n = 37), and hypertension 38% (n=34). The top 3 nutrition-focused services offered by free clinics included counseling or education 24% (n = 21), food pantry or bank 16% (n=14), and weight management 15% (n=13). In conclusion, this study identified the top chronic disease management and nutrition services offered through free clinics in NC. While free clinics fill a critical gap in these services for the underinsured, further research should examine how free clinics are structuring chronic disease management, evaluate program effectiveness, and determine if funding models could be expanded to further support nutrition services in clinics to cover needed care for individuals managing these conditions.

Poster 126
Risdon Byrd, Exercise Science Undergraduate Student
Faculty Mentor: Christian Wallen, Chemistry and Fermentation Sciences
Co-Author(s): N/A
Title: EXPLORING SECOND-SPHERE HYDROGEN BONDING IN METAL-ORGANIC COORDINATION COMPLEXES FOR THE CAPTURE OF HYDROGEN SULFIDE.
Hydrogen sulfide is a hazardous component of naturally occurring "sour gas" due to its highly toxic and catalyst-poisoning properties. It poses serious health and safety risks to both humans and the environment. The Claus process is the state-of-the-art method for removing hydrogen sulfide from sour gas streams; however, achieving complete

conversion is precluded thermodynamically and 3-5% of hydrogen sulfide remains in tail gas, necessitating secondary treatment. As concerns of air pollution loom, regulatory standards aimed at reducing atmospheric emissions of sulfur compounds promote the continued installment of the units otherwise considered uneconomical. The Wallen group aims to synthesize metal-organic coordination complexes with second-sphere hydrogen bonding that may be utilized for the capture of hydrogen sulfide. Divalent first-row transition metals are integrated with ligand platforms which employ aryl sulfonamidate groups with electronically varied substituents. This project encompasses examination of spectroscopic data on these complexes and investigation into their reactivity with protic nitrogen, oxygen, and sulfur species."

Poster 127

Adam Lucas, Environmental Science Undergraduate Student
Faculty Mentor: William Armstrong, Geological and Environmental Sciences
Co-Author(s): Christopher McNeil, David Sutherland, Irina Overeem, Seth Campbell
Title: MODELING THE ROLE OF FRONTAL ABLATION IN THE 21ST CENTURY EVOLUTION OF LAKE-TERMINATING GLACIERS ON THE JUNEAU ICEFIELD, ALASKA, U.S.A.

As proglacial lakes increase in both size and quantity, it becomes increasingly important to simulate lacustrine frontal ablation in glacier models and estimate its impact on long-term glacier change. While a substantial body of literature investigates the role of frontal ablation on marine-terminating glaciers, much less work investigates these processes on lake-terminating glaciers, despite abundant examples of spectacular lake-terminating glacier retreat. Southeast Alaska's Juneau Icefield is drained by multiple lake-terminating glaciers which have yet to fully retreat and detach from their proglacial lakes. We model the 21st century evolution of the icefield's Gilkey, Field, and Meade glaciers using the Open Global Glacier Model (OGGM), an open-source numerical framework for modeling glacier change. Atmospheric forcing is provided via global circulation models from a multi-model ensemble that are constrained by in-situ data from the Juneau Icefield Research Program. We utilize the model to estimate the role of frontal ablation in modulating glacier mass loss under a range of future climate projections as well as parameterizations of frontal ablation. Preliminary results suggest that frontal ablation varies little with different climate projections and that varying frontal ablation parameterizations leads to larger sensitivities on glaciers with deeper and longer overdeepenings. Further research will involve analyzing glaciological variables to assess how lacustrine frontal ablation varies across space and time. This work will improve understandings of frontal ablation processes and their effect on glaciers over multi-decadal timescales.

Poster 128
Gloria Hope, Geography Graduate Student
Faculty Mentor: Bhuwan Thapa, Geography and Planning
Co-Author(s): Jason Ehlenberger
Title: SPATIAL ANALYSIS OF WIND EVENTS AND WIND-RELATED CROP LOSS FOR THE MIDWEST, USA
Wind-driven crop loss is a significant and costly agricultural issue in the Midwest United States. The Crop Loss Windbreak project is a GIScience seminar initiative that aims to investigate the effect of windbreaks through spatial analysis of wind events and wind-related crop loss. Windbreaks are carefully selected trees and shrubs planted linearly in agricultural areas to regulate wind speeds and redirect flow. The strategic placement of windbreaks helps reduce soil erosion and protect crops, livestock, and agricultural implements from wind-related damage. This project uses satellite and ground-based data to explore the spatiotemporal variability of wind speed and wind events. Data sources include hourly wind speed measurements from the COPERNICUS climate data store from 2017 to 2019 and the wind events datasets, documenting the location, duration, and severity of wind events. The project applies statistical data programming methods to examine wind speed distribution, frequency, and intensity, the association between wind-related variables, the monthly wind-related crop loss data at the county scale, and the spatial differences with or without windbreaks. The preliminary results reveal a positive correlation between these two variables, but the correlation coefficient varies depending on the existence of windbreaks. The project provides methods and findings that can apply to other studies or practices promoting windbreaks in agriculture as a means of crop loss mitigation.

Poster 129 Withdrawn

Poster 130
Bella Vanden Boom, Geography Undergraduate Student
Faculty Mentor: L. Baker Perry, Geography and Planning
Co-Author(s): Maxwell Rado, Marcos Andrade, Sandro Arias, Laura Ticona
Title: OBSERVATIONS OF PRECIPITATION PHASE IN THE TROPICAL HIGH ANDES OF BOLIVIA AND PERU
High-elevation glacierized cordilleras of the tropical Andes of southern Peru and Bolivia serve as significant water towers that sustain communities and ecosystems downstream. Recent climate change associated with increasing precipitation variability, rising freezing levels, and a higher percentage of precipitation falling as rain has accelerated glacier retreat across the region, exacerbating concerns about future freshwater availability for natural systems, agriculture, hydroelectric generation, and other human activities. This poster investigates methods to partition precipitation phase (e.g., snow, graupel, mixed rain/snow, rain) – a critical control on glacier behavior – using in situ

observations from Laguna Sibinacocha (4,895 m) in the Cordillera Vilcanota of Peru and Nevado Chacaltaya (5,160 m) in the Cordillera Real of Bolivia. Precipitation phase was recorded at the top of each hour by an OTT Parsivel present weather sensor and an OTT Pluvio2 weighing precipitation gauge recorded hourly liquid equivalent precipitation totals. The frequency and total liquid equivalent partitioned by precipitation phase were analyzed according to wet and dry bulb air temperature. Initial results indicate that 8% of all precipitation at Laguna Sibinacocha was identified by the OTT Parsivel as rain, with approximately 56% of precipitation identified as snow. Succeeding results at Nevado Chacaltaya indicate that 3% of all precipitation was categorized by the OTT Parsivel as rain, with approximately 61% of precipitation categorized as snow. These findings will improve partitioning of precipitation phase by temperature-based methods at other tropical high mountain regions where observations of precipitation phase are not available.

Poster 131
Bella Carpenter, Sustainable Development Undergraduate Student
Faculty Mentor: Bhuwan Thapa, Geography and Planning
Co-Author(s): Jonah Bird
Title: CLIMATE MITIGATION AND ADAPTATION ACTIONS OF CITIES ACROSS THE WORLD USING CDP DATASET
Cities are taking climate actions across the world, however, the extent and intensity of action varies by region. As 70% of the world population will live in cities by 2050, generating 80% of the global GDP and contributing to 70% of greenhouse gas emissions (CDP, 2024), they are critical for reducing global GHG emissions. The study uses the Carbon Disclosure Project (CDP) dataset that tracks climate actions across 1200 cities over 8,000 current sustainability actions (CDP, 2024). The study synthesized and visualized mitigation and adaptation actions taken by these cities in different sectors such as transportation, water, waste, and climate hazards. Our preliminary analysis reveals heterogeneity in the quantitative reporting of emissions and adaptation actions, especially at the finer resolutions (parcel level). However, the data possesses significant missing information from the earlier version. The study helps us gain a better understanding of the climate actions of cities globally.

Poster 132
Caeden Carter, Geology Undergraduate Student
Faculty Mentor: Andrew Heckert, Geological and Environmental Sciences
Co-Author(s): NA
Title: PRELIMINARY STATISTICAL ANALYSIS OF ARCHOSAURIFORM TOOTH FRAGMENTS FROM THE HOMESTEAD SITE, A LATE TRIASSIC MICROVERTEBRATE ASSEMBLAGE LOCATED IN NEW MEXICO

During the Triassic, archosaurs underwent dramatic diversification and, while their modern-day representatives have either simplified (crocodilians) or even lost (birds) their dentition, Triassic archosauriformes exhibited great dental diversity. The Homestead site (HS), in the Upper Triassic Garita Creek Fm of east-central New Mexico, yields thousands of teeth, bones, scales, and coprolites, most of microvertebrate (<1cm) size. This is a relatively rare Revueltian (Norian) age site, from which we sampled 28 archosauriform teeth, comparing them to two other specimens from the Owl Rock Formation. Past, largely qualitative, studies have shown that teeth are some of the most diagnostic specimens from these microvertebrate sites, but as specimens get smaller (<2mm) identifications get more tenuous. Taxonomically assessing this diversity is difficult due to the isolated and/or fragmentary nature of fossil teeth. Morphotypes based on qualitative observations may not account for, or discriminate among, convergence or ontogenetic, positional, or other sources of variation. Non-metric Multidimensional Scaling (nMDS) analysis uses descriptive characters (e.g., binary traits) to create a table of quantitative data; attempting to show the pairwise dissimilarity between objects in a low-dimensional space. As of now, the HS has differentiated roughly 2 different morphotypes, here they are called morphotype A and morphotype B. Morphotype A is roughly defined by its low height, and relatively robust serrations; although morphotype A appears to have more variation within the data plot. B is taller and laterally compressed, with finer serrations, though in some individual specimens the serrations only appear on the distal surface. While the separation of the two morphotypes are easily distinguishable in the data set, differences within these groupings are more subtle. We expect that these differences will become more apparent with more characters and the addition of more specimens.

Poster 133
Abigail Branco, Psychology Graduate Student
Faculty Mentor: Andrew Smith, Psychology
Co-Author(s): N/A
Title: LIMITING THE CONTINUED INFLUENCE EFFECT ACROSS CONTEXTS
In the wake of controversies surrounding online misinformation, many scholars have turned their attention to evaluating and limiting the spread of misinformation. The continued influence effect (CIE) occurs when people continue to believe information after its correction. While interventions have been developed to limit the CIE, none have been tested across scenarios. My research aims to examine the efficacy of two interventions across contexts to evaluate their generalizability. At the beginning of the study, some participants will be given an intervention to inhibit the CIE. Participants will be shown information about an event with a piece of information corrected and then asked questions about the event. Responses referencing the corrected information will indicate the CIE's presence. After a distractor task, the process will be repeated in a different context, allowing us to measure each intervention's generalizability.

I hypothesize that both interventions will reduce reliance on misinformation in the initially presented context and in the secondary context, though I expect the effectiveness of interventions to reduce over time and across contexts.
This research will contribute to the growing body of misinformation literature and propose recommendations for future research. If the interventions successfully limit the CIE, practical implications can be proposed; if they fail, researchers may need to reexamine the roots of the CIE and develop more effective interventions.

Poster 134
Sophia Chapdelaine, School Psychology Graduate Student
Faculty Mentor: Crystal Taylor, Psychology
Co-Author(s): Hannah Maple, Shallah Glover, Siena Padua, and Cassie Hynek
Title: A SYSTEMATIC REVIEW OF SOCIAL-EMOTIONAL AND BEHAVIORAL SCREENING MEASURES
This study will explore currently available social-emotional and behavioral universal screening measures to help schools make informed decisions about their screening procedures. The primary goal is to synthesize the literature to better support and guide schools in selecting a universal screener and implementing a universal screening program in their schools. Therefore, the study will first identify universal screening tools that target social-emotional and behavioral risks for K-12 students, followed by an examination of the screeners' reliability and validity. Finally, the study will identify moderators that may influence the performance of social-emotional and behavioral screeners. Method: Four school psychology graduate students independently searched psychological and educational electronic databases ERIC, PsychINFO, and PsycARTICLES. Following the initial search, two graduate students independently searched for commonly identified screeners, based on the first author's expertise and knowledge of universal screening. Next, two graduate students reviewed abstracts to identify articles that met specific criteria. Articles that mainly focused on interventions or aspects of screening unrelated to psychometrics were not included. Articles were then fully reviewed to identify articles that met inclusion criteria using a predetermined coding scheme. Results and Conclusions: In this session, we will present the findings of our study on universal screeners' psychometrics and mediating factors. We will then discuss the advantages and disadvantages of different universal screening measures and discuss factors that may influence schools' choice of one screener over another. By the end of the session, attendees will have a clearer understanding of social-emotional and behavioral screening and be better prepared to make informed decisions on selecting the most suitable screener for their school and students.

Poster 135
Sydney Andrews, Physics Undergraduate Student
Faculty Mentor: Adam McKay, Physics and Astronomy
Co-Author(s): N/A
Title: MEASURING THE VOLATILE COMPOSITION OF ESA ROSETTA MISSION TARGET COMET 67P/CHURYUMOV-GERASIMENKO WITH NARROWBAND PHOTOMETRY
Comets are leftover remnants from the formation of the solar system, which means that by studying their composition we can gain insights into the physics and chemistry operating during the solar system's earliest stages. Specifically, comets are rich in water and organic material, which are necessary for life as we know it. This makes comets particularly valuable tools for understanding the formation of astrobiologically significant material and its incorporation into forming planetary bodies. The comet studied here, Comet 67P/Churyumov-Gerasimenko, was discovered on October 22, 1969 and was the target of the European Space Agency's (ESA) Rosetta mission in 2014-2016. The mission included a lander named Philae, which took images and samples of the surface. The Rosetta spacecraft orbited the comet for two years, collecting data on its composition and activity. Despite this detailed study of one comet, most comets are studied from Earth via telescopic observations, meaning Earth-based observations of 67P are needed to better place the Rosetta observations in context with the larger population. We observed the comet using special filters that isolate emission from OH, CN, NH, and C2 molecules from August 2021-April 2022, and will present results from these observations. The aim of this research is to compare the production rates of these molecules found from ground-based observations of 67P/Churyumov-Gerasimenko to the production rates determined from the Rosetta mission in order to place results from the Rosetta mission in context with studies of the cometary population as a whole.

Poster 136
Halen McMorris, Physics Undergraduate Student
Faculty Mentor: Adam McKay, Physics and Astronomy
Co-Author(s): n/a
Title: CHEMICAL COMPOSITION AND PRODUCTION IN COMA OF COMET 252P/LINEAR AND POSSIBLE FRAGMENTATION P/2016 BA14 (PANSTARRS) WITH MCDONALD OBSERVATORY
Discovered as a near-Earth object in the LINEAR survey in April 2000, 252P/LINEAR is a Jupiter family comet (Wikipedia). A comet is an astronomical object made of ice, gas, and dust which travels around the solar system in large orbits. The comet is made up of a nucleus, coma, and two tails: one ionized, pointing in the direction of the solar wind, and the other a collection of gas and dust particles in the opposite direction of the comet's trajectory. The coma, which surrounds the nucleus, is composed of gas and

dust. Using narrowband imaging obtained by A. J. McKay with McDonald Observatory, it is possible to identify the composition of the coma and map out the distribution of each type of molecule. Using programs developed by A. J. McKay, including elements from repositories developed by M. Kelly, it is possible calculate the production rate of each molecule in the coma. Analyzing the composition of the comas of comets are components in discovering the chemical origins of our solar system, as comets have a very long lifespan. We can also look at comet-specific evolution and connect that to solar system evolution. Comet 252P/LINEAR was observed to have separated from fragment P/2016 BA14 in 2016 (Wikipedia). It will be presented that the fragment of 252P/LINEAR is less active due to its lower production rates and visibly less luminous flux. The main molecules detected in 252P/LINEAR and P/2016 BA14 were C2, OH, CN, and H2O, but dust filters BC and UC were used to obtain dust flux counts as well. The fluxes calibrated from the counts in each narrowband image were calculated into production rates for each molecule. These production rates are analyzed against its proximity to perihelion which enables hypotheses on the relationship between its distance to the sun and the chemical production of the coma. It will also be supported through data that P/2016 BA14 experiences less chemical production.

Poster 137
Tess Mickey, Physics Undergraduate Student
Faculty Mentor: Chris Thaxton, Physics and Astronomy
Co-Author(s): Dr. James Sherman
Title: ANALYZING AEROSOL PROPERTIES OF AIR PARCELS ABOVE BOONE, NC, DURING THE 2023 SUMMER WILDFIRE SEASON
This research investigates how mass source regions and meteorological factors influence aerosol loading along air mass trajectories over Boone, North Carolina, spanning June 1, 2023 to August 31, 2023. Specifically, we assess the impact of northeast Canadian wildfires on measured aerosol properties, including particle light scattering coefficients at 550 nm, as recorded at AppalAIR. We seek to identify correlations between air parcel aerosol loading classifications, their respective origin points, and the meteorological conditions that affect aerosol processing along each trajectory. Using NOAA's HYSPLIT model, we generate hourly back trajectories at 500, 1500, and 3500 meters above ground level and cluster them to identify common source regions. For each cluster, we categorize trajectories into four unique aerosol loading classifications, along with precipitation, humidity, and solar irradiance categories from which we can derive correlation statistics for each distinct geographical point of origin. Initial results show a significant correlation between aerosol loading and wildfire-induced air pollution, demonstrating viability of our analytical process toward a better understanding of aerosol-meteorology coupling for a wide range of applications.

Poster 138

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

Title: USING A RAMAN SPECTROMETER TO DETECT DOWN-CONVERTED PHOTONS

A Raman spectrometer is a super sensitive device that can measure precise wavelengths of light. The Raman spectrometer system being used in this work was disassembled previously and has been rebuilt to detect down-converted photons. Down-converted photons are photons in which the energy has been reduced and incident photons are created that sum to the energy of the original photon. Down-converted photons provide a source of entangled photons for exploring quantum optics. A 405 nm, 50 milliwatt laser is reflected from two mirrors and undergoes down-conversion using a Beta Barium Borate(BBO) crystal. Photons are emitted in a conical shape that is directed towards the Raman spectrometer. The down converted light is invisible and low intensity, which is why the use of a liquid nitrogen cooled Raman spectrometer is important. This research encourages further knowledge of quantum optics and emphasizes the importance of having precise photon detection methodologies.

Morning Oral Session 1 – 10:00am - 10:40am – 415 Plemmons Student Union

Presentation at 10:00am
Aidan Keaveney, Engineering Physics Graduate Student
Faculty Mentor: Christopher Thaxton, Physics and Astronomy
Co-Author(s): Joshua McNeill, Nick Mencis
Title: MODELING THE EFFECTS OF OBJECT-INDUCED TURBULENT ENHANCEMENT ON SEAFLOOR OBJECT SCOUR AND BURIAL
As fluid flows around a seabed object, the object-induced turbulence intensifies sediment dynamics around and near the object as compared to the far field, which may enhance object scour at various points along the object as well as its overall burial. Empirical models of object scour and burial based on far-field parameterizations (e.g. Shields number) necessarily disregard certain object and environmental properties, such as object shape, and commonly exhibit high predictive uncertainties. Appalachian State's Applied Fluids Laboratory is working to improve existing object scour and burial models through the introduction of a scalar amplification factor derived from these properties, which include the geometry of the object, orientation to flow, and forcing conditions. Here, we present initial results as to the effect of object shape specifically on turbulence production, as represented by a so-called turbulence sourcing function (TSF). Using the open source computational fluids dynamics model OpenFOAM, we simulate steady flow at varying forcing conditions for a representative sphere, cylinder, and square pyramid. We present initial results observing the relationship between TSF calculations and the diagnostic fields generated by these steady-flow simulations. Future work will couple TSF with other factors, such as orientation to flow, object density, relative sediment grain size, and so on, to produce the aforementioned scalar amplification factor. Our goal is to provide the seafloor sciences community with a fast and effective improvement to the prediction of object scour and burial for a wide range of applications.

Presentation at 10:20am
Grant Fox, Environmental Science Undergraduate Student
Faculty Mentor: Ellen Cowan, Geological and Environmental Sciences
Co-Author(s): Zhen Wang, Stephanie A. Brachfeld, Avner Vengosh, Keith Seramur
Title: UTILIZATION OF PARTICLE SIZE VARIABILITY AND GEOCHEMICAL SIGNATURES IN TRACKING COAL ASH RELEASE IN HYCO LAKE, NC
In North Carolina, impounded lakes supplying cooling water for coal fired power plants serve multiple roles. Sediment cores collected from Hyco Lake document the presence of coal fly ash released from Roxboro power plant ash storage ponds following impoundment in 1964.Three gravity cores were collected near the ash pond discharge and along an 8 km transect downstream. A multi-proxy dataset from 3 cores dated with

210Pb and 137Cs is presented. Each core was sampled at 1-cm intervals. Particle size was measured via laser particle analysis. Mean grain size and- sorting was calculated using GRADISTAT statistical software. These data were compared with ash content determined from optical point counting, sediment geochemistry, and magnetic susceptibility (χ). At all core sites, a boundary between pre- and post-impoundment sediments is shown by an up-core shift to better sorted, finer, sediments corresponding with detection of ash in optical point counts. At Hyco Core 1, closest to the storage pond, mean particle size ranges from 4 to 20 μm. The coarsest particles (14 to 20 μm) occur at the base of the lake sediment. Larger ash particles coincide with lower concentrations of trace elements, such as Se and As. This corresponds to the release of larger Fe-enriched amorphous fly ash from ash ponds until the late 1970's. In 1980, mean particle size fines to 8 μm as smaller spheres were stored at the plant as required by the Clean Air Act. These particles were retained in situ before release. Release of this spherical ash introduces higher concentrations of trace elements like As, Se, Tl, U, Mo, and Sb. Core 3 displays finer, 2 to 6 μm range, and better sorted distribution than Core 1. An abundance of clear spherical ash explains elevated As concentrations and finer particle sizes. Observations demonstrate temporal and spatial changes in fly ash morphology, size, and geochemistry in Hyco Lake sediment, related to both waste management practices and sediment transport.

Morning Oral Session 2 – 11:00am - 11:40am – 417 Plemmons Student Union

Presentation at 11:00am
Mackenzie Law, Business Administration Graduate Student
Faculty Mentor: Carol Kline, Management
Co-Author(s): Scott Gray(Appalachian State) Hin Hoarau Heemstra (Nord University)
Title: Advancing Aquatic Life through Best Tourism Practices
The uses that animals play within recreation/tourism is well-documented, including transportation; environmental education; racing, fighting, and other sports; passive and active entertainment; selfies; hunting and fishing; wildlife photography; and culinary experiences. Often, however, the animals that receive the most attention are terrestrial or classified as charismatic. This talk will introduce is a ten-year research and outreach endeavor to bring together a number of projects focusing on tourism within aquatic environments. The program seeks to develop and disseminate information regarding aquatic species who benefit from or whose life is diminished by tourism. By focusing on specific species – and crafting outreach programs that focus on one to three species at a time - the public will engage in a more intimate understanding of fish and marine mammals thus opening up their awareness of life below water – and how our decisions ultimately affect it. Additionally, there are many activities that occur in aquatic environments falling outside of tourism (e.g. military activities, shipping sonar, microplastics). Thus engaging in research within aquatic environments must address the complementary or conflicting nature of these activities. This assemblage of research will bring illuminate interesting characteristics/ behavior of lesser-known species that live in water, study the impacts of tourism and other human activities on the species, and study the impacts of the other activities on tourism. By understanding how humans are wholly influencing the species, we will be able to propose best tourism practices that will be beneficial for the animal and the communities who depend on tourism.

Presentation at 11:20am
Carter Rodgers, Chemistry Undergraduate Student
Faculty Mentor: Christian Wallen, Chemistry and Fermentation Sciences
Co-Author(s): Petia Bobadova
Title: EXPERIMENTAL AND THEORETICAL INVESTIGATIONS ON METAL-ORGANIC COMPLEXES FOR THE CAPTURE OF HYDROGEN SULFIDE
Hydrogen sulfide is a toxic gas found in petroleum feedstocks that poses harm to both humans and industrial processes, even in low concentrations. Current removal processes, including the Claus process, leave ~5% within the tail gas, necessitating secondary treatment. One of the goals of the Wallen research group is to synthesize novel metal-organic complexes that incorporate second-sphere hydrogen bonding to promote the selective binding of hydrogen sulfide for the eventual conversion to safer

forms of sulfur. An asymmetric tetradentate sulfonamidate-pyridine ligand coordinated to divalent late first row transition metals will be presented. The coordination chemistry and reactivity of this complex under atmospheric, anaerobic, and anhydrous conditions are explored via UV-Vis, IR and NMR spectroscopy. Furthermore, in collaboration with the Bobadova research group, density functional theory is utilized to explore, predict, and explain phenomena occurring when these complexes react with protic oxygen and sulfur species.

Presentation at 11:40am
Withdrawn

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

Presentation at 1:00pm
Freedom Johnson, Biology Graduate Student
Faculty Mentor: Rachel Bleich, Biology
Co-Author(s): Nicholas Shaw
Title: A CHEMICAL APPROACH TO GENE DETECTION: RECOGNITION OF THE CLBR GENE IN ESCHERICHIA COLI WITH HAIRPIN POLYAMIDE-FRET CONJUGATES

The hypothesis of this research is that hairpin polyamide-fluorescence resonance energy transfer conjugates can be used to provide a high-throughput method for gene detection and their viability proven when used to signal a genetic predisposition for Crohn's disease. The polymerase chain reaction (PCR) is currently the standard technique used for DNA amplification, a crucial step in gene detection. Yet, despite its widespread use, PCR has inherent disadvantages. PCR involves numerous time-dependent steps in DNA amplification, where errors can occur, and it only amplifies the DNA sample.
A chemical-based approach to gene detection offers the potential to avoid the time-consuming aspects of DNA amplification, errors in associated PCR amplification of DNA, and the analysis of PCR products. This approach requires two essential components–the ability to recognize and bind a DNA sequence of interest and to generate an observable signal upon binding. The recognition of a specific DNA sequence can be achieved with the use of heterocyclic rings, covalently bound by repeating amide bonds, forming crescent-shaped molecules known as hairpin polyamides. These polyamides are structured to bind to the minor groove of DNA and can be engineered to exhibit high specificity and affinity for specific DNA sequences. To facilitate chemical signaling, Förster (fluorescence) energy transfer (FRET) is used. FRET is a spectroscopic phenomenon that occurs when a relaxing donor fluorophore transfers its energy to an acceptor fluorophore. In biological systems, FRET has been employed to investigate DNA structure and DNA-drug/protein interactions. To establish hairpin polyamide-FRET conjugates (HPFCs) as a viable means for gene detection, we seek to target the clbR gene, a gene that is implicated in Crohn's disease. It can be inferred that if this 32-base pair sequence within the clbR gene operon is detected, the patient possesses a genetic predisposition for Crohn's disease.

Presentation at 1:20pm
Tan Lin, Chemistry Undergraduate Student
Faculty Mentor: Nicholas Shaw, Chemistry and Fermentation Sciences
Co-Author(s): Dasha Ivannikava
Title: FROM WASTE COOKING OIL TO BIODIESEL FUEL: A COMPLETE ANALYSIS

Biodiesel as an alternative fuel is a promising long-term replacement to petroleum-based diesel fuels. Biodiesel is advantageous to fossil-derived diesel as it is biodegradable, improves engine longevity, is safer to handle, is compatible with the existing fuel distribution infrastructure, and reduces combustion emissions to near zero. Given biodiesel's numerous advantages, it is a surprise that it does not significantly contribute to total energy generation. While contributions from other (non-biofuel) renewable energy are expected to increase in the United States by 2040, projected contributions from biodiesel remain consistent with today's meager contributions. Why doesn't biodiesel play a larger role in the energy landscape moving forward? Feedstock Selection Challenges: The major cost factor in biodiesel production is the cost of the raw material - catalyst and raw material costs account for 70-88% of the overall costs. Furthermore, competition between the edible oil market and the biodiesel market remains a global concern. The use of waste cooking oils (which are up to three times less expensive than pure oils) is capable of producing around 50% of the current biodiesel demand but poses unique chemical challenges. Production Challenges: Waste cooking oil differs chemically from its pure counterparts as pure oils slowly and partially decompose into free fatty acids (FFAs). The presence of FFAs requires immensely time-consuming production methods and/or produces unwanted side products which dramatically decreases the overall yield of biodiesel. Purification Challenges: Biodiesel derived from waste cooking oil must be absent of FFAs to prevent accelerated engine degradation. The presence of FFAs complicates biodiesel purification - biodiesel produced from used cooking oil with an FFA of 10% requires different purification procedures than biodiesel produced from cooking oil with an FFA percentage of 23%. Chemists are routinely forced to sacrifice yields to produce market-worthy biodiesel, which increases production costs. The authors will report the novel use of nano-reactors in the efficient and complete conversion of used cooking oil for biodiesel production."

Presentation at 1:40pm
Claire Crane, Religious Studies Undergraduate Student
Faculty Mentor: Cuong Mai, Philosophy and Religion
Co-Author(s): N/A
Title: THE SHIFTING ROLES OF THE JAPANESE BODHISATTVA JIZŌ
The bodhisattva Jizō is one of the most widely venerated Buddhist deities in Japan. He is regarded as one of the most “Japanese” of religious figures, despite originating in China as the deity Dizang. His assimilation into Japanese culture, daily life, and politics at large– throughout history and to the present– poses interesting questions as to how (and more importantly, why) Jizō obtained his multi-dimensional identity in Japan. Through research on secondary literature and observational fieldwork, I will examine a host of practices of Jizō devotion, particularly focusing on how they reflect the ways that religion in Japan has responded to social and political crises across time. I will consider the social impacts of Jizō’s shift in symbolism from a salvific figure in the Kamakura

Period to a protector of children, childbirth, and unborn children, particularly with the rise of abortion and infanticide. Additionally, I will investigate how devotion to Jizō has generated conflict and contestation regarding opinions on abortion policies and practices in the post-war era. By analyzing the historical shifts in devotional practices to Jizō throughout history, I will explore the development of Japan's complex bi-directional interaction of religion and society into the modern era.

Afternoon Oral Session 4 – 2:00pm - 3:20pm – 417 Plemmons Student Union

Presentation at 2:00pm
Kerri Durkan, Biology Graduate Student
Faculty Mentor: Darren Seals (PhD), Biology
Co-Author(s): Dakota Goad, Maryam Ahmed, and Darren Seals
Title: VESICULAR STOMATITIS VIRUS MODULATES INVADOPODIA DEVELOPMENT IN SRC-TRANSFORMED FIBROBLASTS
The aggressive nature of metastatic cancer may arise from the formation of actin-dense, proteolytic cell surface protrusions called invadopodia. Invadopodia facilitate extracellular matrix degradation to acquire space for tumor growth and initiate invasion into surrounding and distant tissues. We are investigating the use of vesicular stomatitis virus (VSV) as an oncolytic agent against a variety of tumor types. VSV is well-appreciated for its selective cytopathicity towards cancer cells and its ability to promote anti-tumor immunity, but its effects on the invasive properties of cancer cells has been little studied. To investigate the impact of wild-type VSV (rwt virus) and an immunogenic matrix (M) protein mutant of VSV (rM51R-M virus) on invasion of cancer cells, Src-transformed NIH3T3 (Src3T3) cells, known for being highly invasive and forming both punctate and rosette-shaped invadopodia, were utilized. Cells were cultured on glass coverslips to assess invadopodia formation and morphology and on fluorescent gelatin-coated coverslips to assess invadopodia-associated matrix degradation following infection with rwt and rM51R-M viruses at multiplicity of infections (MOIs) of 0.1 or 10 pfu/cell. An MOI of 10 pfu/cell represents a synchronous infection and tests the cytopathic effects of VSV on cells, while the lower MOI (0.1 pfu/cell) determines how VSV is able to spread within the cellular environment. Current data show that VSV inhibits the formation of invadopodia by Src3T3 cells regardless of viral strain or MOI. VSV-infected Src3T3 cells possess fewer punctate invadopodia, but with no change in the number of larger, rosette-shaped invadopodia relative to mock conditions. These cytoskeletal changes are consistent with the approximately 50% decrease in gelatin degradation. Future experiments seek to analyze how VSV-induced reductions in invadopodia development might translate to changes in the migratory and invasive behaviors of these cancer cells.

Presentation at 2:20pm
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 for the treatment of tumors due to its ability to target cancer cells and modulate components of the tumor microenvironment. However, studies have shown that not all cancer cells are sensitive to infection and killing by VSV. Therefore, there is a need to investigate combination approaches to augment the oncolytic activity of VSV. My project aims to test the ability of melittin, an anticancer bioactive component of honeybee venom, to synergize with VSV for the treatment of triple negative breast cancer (MDA-MB-231 cells). Additionally, we will assess the functional capacity of M2 pro-tumorigenic macrophages commonly found in the tumor microenvironment in response to combination treatment. We hypothesize that melittin, in combination with an immunogenic strain of VSV (rM51R-M virus), will decrease the viability of cancer cells, and decrease the phagocytic function of M2 macrophages. Our results show that cell viability of MDA-MB-231 cells was less than 50% by 26 hours when cells were infected with VSV and subjected to melittin concentrations above 2.5 μg/mL. At this time, the combination therapy was significantly more effective at killing MDA-MB-231 cells as compared to melittin alone or VSV alone, suggesting a synergistic effect of the two treatments. Furthermore, VSV plus melittin inhibited the phagocytic capacity of M2 macrophages, with a significant decrease in the degree of phagocytosis after 18 hours of infection with VSV and incubation with 5.0 μg/ml of melittin, as compared to the melittin alone group. These data suggest that melittin aids the oncolytic activity of VSV in breast cancer cells and helps to modulate the tumor microenvironment. Future studies will confirm the phagocytic function of M2 macrophages in response to combination treatment and determine if melittin can convert M2 macrophages to proinflammatory M1 macrophages to induce anti-tumor immunity.

Presentation at 2:40pm
Allison Tippin, Elementary Education Undergraduate Student
Faculty Mentor: Greg McClure, Learning, Teaching and Curriculum
Co-Author(s): Dr. Jessica Martell
Title: BEYOND THE CLASSROOM: EXAMINING STUDY ABROAD'S ROLE IN SHAPING PRE-SERVICE TEACHERS' THINKING ABOUT TEACHING.
The educator workforce in the United States is predominantly white and female, and thus many educators lack cultural awareness to support the increasingly diverse student population, as indicated by the achievement gap and disproportionate academic discipline rates. Studying abroad is one opportunity for pre-service teachers to expand their cultural awareness and likely influences how they will interact with their future students of varying backgrounds; however, it is not a highly sought-after opportunity amongst education majors despite its many benefits. This study explores how pre-service teachers' thinking about teaching is affected by their study abroad experiences. Seven students from a teacher preparatory program at a university in the Southeastern US participated in one of two focus groups to reflect on and discuss their

study abroad experiences and teaching views. The focus groups provided a space for critical reflection and highlighted participants' development of intercultural competencies including open and respectful attitudes, cultural and academic knowledge, skills such as observing and evaluating, flexibility, adaptability, empathy, and overall self-awareness. Participants also created art pieces to explicitly connect their teaching views and study abroad experiences, providing a culminating multimodal reflection component to the focus group. The focus groups were transcribed, and qualitatively coded, and common themes were organized. These outcomes suggest that there are many instances of commonality between studies abroad and teaching including flexibility, reflection, and bias confrontation. This study demonstrates the importance of study abroad experiences with critical reflection components for pre-service teachers and how they influence culturally relevant teaching practices.

Presentation at 3:00pm
Joshua McNeill, Physics Graduate Student
Faculty Mentor: Christopher Thaxton, Physics and Astronomy
Co-Author(s): Nick Mencis
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 Sciences 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 publicly 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 generates an equilibrium burial estimate for each data point in the historical dataset and averages these values temporally to provide an estimate for the average equilibrium burial depth at each location in a user-defined grid for an object of arbitrary size. 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; and calibrating the physics engine to emerging experimental field and lab data.

2024 Presentations by Faculty Mentor Department

Department	Total
Fine and Applied Art	
Art	**1**
Sustainable Development	**1**
Sustainable Technology & the Built Environment	**2**
Arts and Sciences	
Biology	**34**
Chemistry & Fermentation Sciences	**13**
Computer Science	**1**
Geography & Planning	**13**
Geological & Environmental Sciences	**17**
Philosophy & Religion	**2**
Physics & Astronomy	**12**
Psychology	**9**
Sociology	**1**
Walker College of Business	
Economics	**3**
Management	**2**
Reich College of Education	
Learning, Teaching & Curriculum	**1**
Beaver College of Health Sciences	
Nursing	**1**
Nutrition & Health Care Management	**9**
Public Health & Exercise Science	**17**
Recreation Management & Physical Education	**2**
Rehabilitation Sciences	**2**
Total	**143**

Abstracts related to the Quality Enhancement Plan

Author First Name	Author Last Name	Major.	Year	Faculty Mentor First Name	Faculty Mentor Last Name	Faculty Mentor Department	Abstract Title.
George	Hotelling	Environmental Science	UG	Shea	Tuberty	Biology	EXPLORING PHOSPHORUS FLUX DYNAMICS IN THE HEADWATERS OF THE SOUTH FORK NEW RIVER
Dominik	Bettini	Biology	GR	Shea	Tuberty	Biology	MONITORING THE RECOVERY OF THE PIGEON RIVER FOLLOWING THE PERMANENT CLOSURE OF THE PACTIV EVERGREEN PAPER MILL IN CANTON, NORTH CAROLINA
Tarona	Commodore	Biology	UG	Rachel	Bleich	Biology	IMPACT OF ESCHERICHIA COLI AND ENTEROCOCCUS FAECALIS ON BIOFILM PRODUCED IN CO-CULTURE
Leigha	Henson	Biology	GR	Howard	Neufeld	Biology	EFFECTS OF WARMING ON FOUR MOSS SPECIES FROM THE SOUTHERN APPALACHIAN MOUNTAINS
Tan	Lin	Chemistry	UG	Nicholas	Shaw	Chemistry and Fermentation Sciences	FROM WASTE COOKING OIL TO BIODIESEL FUEL: A COMPLETE ANALYSIS
Jesse	St John	Exercise Science	UG	Christian	Wallen	Chemistry and Fermentation Sciences	EXPLORING LIGAND FRAMEWORKS FOR FUTURE CATALYSTS IN HYDROGEN SULFIDE CAPTURE IN NATURAL GAS PURIFICATION
Katie	Baker	Chemistry	UG	Christian	Wallen	Chemistry and Fermentation Sciences	SYNTHESIS OF ELECTRON-RICH METAL-ORGANIC COMPLEXES FOR HYDROGEN SULFIDE CAPTURE
Risdon	Byrd	Exercise Science	UG	Christian	Wallen	Chemistry and Fermentation Sciences	EXPLORING SECOND-SPHERE HYDROGEN BONDING IN METAL-ORGANIC COORDINATION COMPLEXES FOR THE CAPTURE OF HYDROGEN SULFIDE.
Matthew	Mair	Economics	UG	John	Whitehead	Economics	FACTORS THAT IMPACT FARMER WILLINGNESS TO PARTICIPATE IN CONSERVATION PROGRAMS IN THE TAR-PAMLICO WATERSHED OF NORTH CAROLINA

Meghann	Pitts	Community and Regional Planning	UG	Josh	Platt	Geography and Planning	ESTIMATING GHG EMISSIONS FROM MULTIMODAL TRANSPORTATION: A CASE STUDY OF BOONE, NC
William	Pearson	Geography	GR	Buwan	Thapa	Geography and Planning	SPATIOTEMPORAL ANALYSIS OF WIND-RELATED CROP LOSS IN THE MIDWEST, USA
Ashley	Mallare	Public Health	UG	Maggie	Sugg	Geography and Planning	ECO-ANXIETY AMONG YOUTH IN RESPONSE TO THE CLIMATE CRISIS: A THEMATIC ANALYSIS
Sarah	Widderich	Political Science	GR	Bhuwan	Thapa	Geography and Planning	ACCESSIBLE BUILDABLE SPACE: CASE STUDY IN BOONE AND WATAUGA COUNTY
Gloria	Hope	Geography	GR	Bhuwan	Thapa	Geography and Planning	SPATIAL ANALYSIS OF WIND EVENTS AND WIND-RELATED CROP LOSS FOR THE MIDWEST, USA
Sarah	Ulrich	Geography	GR	Maggie	Sugg	Geography and Planning	SPATIAL ANALYSIS OF FLOOD RISK, NEIGHBORHOOD CHARACTERISTICS, AND HEALTH OUTCOMES IN NORTH CAROLINA
Bella	Vanden Boom	Geography	UG	L. Baker	Perry	Geography and Planning	OBSERVATIONS OF PRECIPITATION PHASE IN THE TROPICAL HIGH ANDES OF BOLIVIA AND PERU
Bella	Carpenter	Sustainable Development	UG	Bhuwan	Thapa	Geography and Planning	CLIMATE MITIGATION AND ADAPTATION ACTIONS OF CITIES ACROSS THE WORLD USING CDP DATASET
Justin	Hites	Geography	GR	Bhuwan	Thapa	Geography and Planning	SPATIOTEMPORAL ANALYSIS OF TREE WINDBREAKS AND CROP LOSS FROM WIND EVENTS IN KANSAS AND NEBRASKA, USA
Kristen	Lysne	Geography	GR	Maggie	Sugg	Geography and Planning	A SPATIAL ANALYTIC APPROACH TO MATERNAL HEALTH AND BIRTH OUTCOMES FOLLOWING HURRICANE FLORENCE (2018).
Chris	Lucero	Geography	UG	Maggie	Sugg	Geography and Planning	MAPPING THE EPIDEMIC OF ISOLATION: SPATIAL DISPARITIES IN LONELINESS AMONG US ADOLESCENTS AND YOUNG ADULTS (2016-2022)
AG	Berry	Geology	UG	Steve	Hageman	Geological and Environmental Sciences	EXPLORING THE RELATIONSHIPS BETWEEN SHORT-TERM CHANGES IN DIATOMS (MICROSCOPIC ALGAE) AND COAL ASH CONTAMINATION WITHIN HYCO LAKE, NORTH

							CAROLINA
Emma	Ferm	Environmental Science	UG	Sarah	Evans	Geological and Environmental Sciences	QUANTIFYING VARIATIONS IN SOIL MOISTURE ACROSS ARCTIC HILLSLOPES UNDERLAIN BY CONTINUOUS PERMAFROST
Rachel	Harris	Environmental Science	UG	Sarah	Evans	Geological and Environmental Sciences	USING GROUND-PENETRATING RADAR TO INVESTIGATE THE CONTROL OF GROUND ICE ON CONTINUOUS PERMAFROST HILLSLOPE HYDROLOGY
Mackenzie	Law	Business Administration	GR	Carol	Kline	Management	Advancing Aquatic Life through Best Tourism Practices
Ben	Pluska	Sustainable Development	UG	Rebecca	Witter	Sustainable Development	ECOLOGY BY A DIFFERENT SOUND: TROUBLING CONTAINMENT AMIDST REVERBERATING INJUSTICE
Duncan	Burns	Technology	GR	Sohad	Abu-elzait	Sustainable Technology and the Built Environment	DESIGNING A HYBRID RENEWABLE ENERGY SYSTEM FOR CALDWELL COMMUNITY COLLEGE AND TECHNICAL INSTITUTE - WATAUGA CAMPUS
Finley	Collins	Sustainable Technology	GR	James	Houser	Sustainable Technology and the Built Environment	A COMPARATIVE ANALYSIS OF TECHNOLOGY AND POLICY OF HIGH-VALUE PV RECYCLING: THE UNITED STATES VERSUS THE EUROPEAN UNION

Thank you for supporting the Office of Student Research!