

ISCAP

INDEPENDENT SCHOLARSHIP
& CREATIVE ACTIVITIES PRESENTATIONS



MAY 4, 2022

ISCAP Day

Wednesday, May 4, 2022

Sweigart Hall

10:00 AM – 2:15 PM

Schedule at a Glance:

10:00-12:00	Undergraduate Research Scholar Awards Session	<u>Sweigart Hall</u> Rue Auditorium
12:00-1:15	ISCAP Poster Session and Lunch	Atrium/Lobby
1:15-2:15	ISCAP Panel Session	Room 117

Planned by the URSA Committee:

Kerrie Sendall, Chair
Hee Young Kim
Phillip Lowrey
Bhesh Mainali
Jane Rosenbaum
Kelly Ross
Jay Stern
Stephanie Sussmeier

May 4, 2022

Dear Students, Scholars, Faculty and Families,

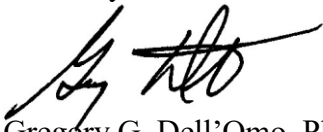
Today the Rider University community will hear about the remarkable scholarship, research, and creative endeavors of our students as they apply their college education in innovative ways. To those students who are presenting their work today, I extend congratulations on your achievements. To all those who supported these students in their academic adventures, I offer appreciation and thanks. These activities exemplify the many valuable opportunities and resources students enjoy at Rider to enrich their learning experience. Frankly, our students could not have done their work without you.

Special congratulations to this year's Undergraduate Research and Scholarship Award winners. These students proposed detailed independent projects to be carried out in the following academic year and will each receive a \$5,000 tuition scholarship. You will hear about the wide variety of projects they will be undertaking in the awards session later this afternoon.

Whether you conducted research or helped to make it happen, your efforts send a strong message about the academic excellence students can achieve at Rider.

Congratulations to everyone involved!

Sincerely,



Gregory G. Dell'Omo, Ph.D.
President



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Vice President for Academic Affairs
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May 4, 2022

Dear Students, Faculty, and Family Members,

Today is a full day dedicated to honoring and showcasing the creative works and research of Rider University students in collaboration with their faculty mentors. Each year, the Undergraduate Research Scholar Awards (URSA) Committee hosts ISCAP (Independent Scholarship & Creative Activities Presentation) Day in an effort to display student originality and contributions to their fields of interest. ISCAP Day is also meant as a forum for members of the Rider community—both faculty and students—to come together in an interdisciplinary dialogue focused on students' creative projects.

Another very important purpose for ISCAP Day is to announce the new URSA scholarship recipients, as well as to hear about the progress made among last year's URSA award winners on their year-long projects. This portion of the day is particularly important as we honor some of the most gifted undergraduates at Rider. We congratulate you on your outstanding accomplishment.

Please join us as we celebrate these student achievements and honor their creative works.

Congratulations on a job well done!

Sincerely,

DonnaJean A. Fredeen
Provost and Vice President for Academic Affairs

Undergraduate Research Scholar Awards Session

Sweigart Hall, Rue Auditorium

10:00 AM – 12:00 PM

Chair: Kerrie Sendall (Biology, Behavioral Neuroscience and Health Sciences)

10:00	Welcome by Provost DonnaJean Fredeen
	Presentations by 2021-22 URSA Recipients
10:15-10:30	Niamh Cashin (Exercise Science) <i>A Correlation Between Exercise Intensity, Conditioning, Frequency and the Related Psychoactive Effects</i> (Advisor: John Guers)
10:30-10:45	Natalie Critchfield (Criminal Justice and Sociology) <i>The Structural Impact of a Pandemic on Crime Patterns - An Analysis of Drug and Domestic Violence Arrests in the City of Newark</i> (Advisor: James Wojtowicz)
10:45-11:00	Madison Doran (Biology) <i>Understanding the Roll of Toll-like Receptor 4 in the Body's Innate Immune Response</i> (Advisor: James Riggs)
11:00-11:15	Carly O'Sullivan (Biology) <i>Immunological Characterization of the MyD88 Knockout Mouse and the Effect of the Tumor Microenvironment</i> (Advisor: James Riggs)
11:15-11:30	Joshua Stein (Psychology and Musical Theatre) <i>The Effects of Arts Experiences on Wellness in College Students</i> (Advisor: Wendy Heath)
	Announcement of 2022-23 URSA Recipients
11:30-12:00	Lindsey Co (Popular Music and Film Studies) <i>Asian American (In)Visibility in 21st-Century Film and TV: Representation and Its Implications for Asian American Identity</i> (Advisors: Cynthia Lucia and Richard Zdan)
	Shamiya Ford (English) <i>Spirituality in Slave Narratives: Patriarchy, Power, and Religious Coercion in the American South</i> (Advisor: Kelly Ross)
	Evelyn McNelis (Behavioral Neuroscience) <i>Potential Anti-Inflammatory Actions of Baicalin Derivatives on Behavior</i> (Advisors: Jonathan Karp and Danielle Jacobs)
	Emily Porter Siegel (Acting and English) <i>Of Bodies Changed: Modern Adaptations of Ovid's Metamorphoses</i> (Advisor: Laurel Harris)
	Emma Zinser (Health Science) <i>Physarum Polycephalum: Learning About and Responding to the Environment</i> (Advisor: Julie Drawbridge)

Poster Session and Lunch

Sweigart Hall Atrium, 12:00 PM – 1:15 PM

1. **Samantha Haines** (Computer Science) and **Eric Eaton** (Computer Science); Advisor: **Md Ali**
Machine Learning Models for Histopathological Breast Cancer Image Classification
2. **Rebecca Swiderski** (Game and Interactive Media Design); Advisor: **Stephan Gonzalez**
Unbelievable: A 2D Game Made with Unreal Engine
3. **Nicolas Kaltenhauser** (Chemistry); Advisor: **Joshua Stratton**
Assessing Low-Cost Air Quality Sensors to Detect Hotspots on the Rider Campus
4. **George Afoakwah** (Biochemistry); Advisor: **Todd Weber**
Unavoidable Caloric Restriction in Temporal Food Restricted BALB/cJ Mice
5. **Callie Bevacqua** (Biochemistry) and **Oliva de la Torre Coca** (Biochemistry); Advisor: **Danielle Jacobs**
Optimization of Choline Geranate Derivatives as Antibacterial Agents
6. **Alessia Bradley** (Biochemistry); Advisor: **Todd Weber**
The Effects of Short vs Extended Light Exposure on Expression of Fos Proteins in the Circadian Clock of C57BL/6J Mice
7. **Ayushi Maity** (Biochemistry); Advisor: **Bryan Spiegelberg**
An Optimized Assay to Detect Free Thiols for in vitro Analysis of BHMT
8. **Daniel Gaines** (Behavioral Neuroscience); Advisor: **Todd Weber**
Lack of Effect of the Per2-Luciferase Construct on Tau Length in the Male BALB/cJ Mouse
9. **Kerry Opperman** (Biology); Advisor: **James Riggs**
Peritoneal Cavity Biology of TLR-5 Knockout Mice
10. **Emma Zinser** (Health Science) and **Sanjana Butala** (Biology); Advisor: **Julie Drawbridge**
Physarum polycephalum: Responding to the Environment
11. **Kellie Ervin** (Health Science); Advisor: **John Guers**
The Effect of Salivary Estradiol and Progesterone on Perceived Pain and Mood
12. **Amber Loo** (Health Science); Advisor: **Bryan Spiegelberg**
Dependence of Alcohol Dehydrogenase Activity on Salt Concentrations
13. **Anna Fredeen** (Dance Science); Advisor: **Drue Stapleton**
The Effect of Ballet on Measures of Athletic Performance
14. **Jerome Boyer** (Psychology); Advisor: **Gary Brosvic**
Age and Sex as Predictors of Injury During Exercise and Sports
15. **Robby Arpaio** (Marine Sciences), **Gabby Banyacski** (Environmental Sciences), **Stessie Chounoune** (Environmental Sciences); Advisor: **Daniel Druckenbrod**
Using Tree-Ring Measurements to Study Past Climate from Southeast Asia through Australia and New Zealand

- 16. Jacquelyn Cook** (Environmental Science); Advisor: **Hongbing Sun**
Rider's Contribution of Winter De-Icing Salt to the Rising Sodium Concentration in the Delaware River Watershed
- 17. Kaylee DiPasquale** (Elementary Education and Earth Sciences); Advisor: **Gabriela Smalley**
*Effect of Prey Species and Concentration on the Feeding Rate of the Dinoflagellate, *Oxyrrhis marina**
- 18. Joseph Medina** (Marine Science); Advisor: **Gabriela Smalley**
Phytoplankton Guide of Centennial Lake at Rider University
- 19. Angela Ritter** (Biology and Environmental Science); Advisor: **Kerrie Sendall**
Comparing Bleach and Cold Treatment to Improve Germination Rates of Seven Shade-Tolerant Species
- 20. Kayley Tezbir** (Biology and Environmental Science); Advisor: **Kerrie Sendall**
*The Influence of Roadside Conditions on the Shoot Growth of Wisconsin Fast Plants (*Brassica rapa*)*
- 21. Jordan Wilson** (Marine Science); Advisor: **Gabriela Smalley**
Effects of Benzalkonium Chloride on Growth, Mortality and Feeding in Freshwater Plankton Assemblages
- 22. Aeryn Gilmore** (Psychology); Advisor: **Cara DiYanni**
Play-Based Learning: An Integrative Review of Literature
- 23. Darla Haas** (Psychology); Advisor: **Cara DiYanni**
High School Burnout: Assessing Causes and Consequences
- 24. Grace Lee** (Psychology); Advisor: **Michael Carlin**
Generational Differences
- 25. Katie Candray** (Psychology and Elementary Education) and **Tara Mason** (Psychology); Advisor: **Cara DiYanni**
An Exploration of Children's Trust
- 26. Suhriti Sarangal** (Psychology); Advisor: **Cara DiYanni**
Impact of Work from Home on Mental Health
- 27. Victoria Witerska** (Psychology); Advisor: **Nadia Ansary**
Young Adults and Social Media: Links Between Usage and Internalizing Outcomes
- 28. Maheen Mumtaz** (Political Science and Global Studies); Advisor: **Frank Rusciano**
Iraq's Political Crisis: The U.S.'s Role and Responsibility
- 29. Elena Gonzalez** (Geology); Advisors: **Paul Jivoff** and **Hongbing Sun**
Mineral Composition of Nourished Beaches in North Jersey and Possible Effect of Potassium Mineral Concentrations on the Abundance of Inhabiting Organisms.

Panel Session:

Sweigart Hall, Room 117

1:15 PM – 2:15 PM

Chair: Hee Young Kim (Management)

1:15-1:30	Christopher Walako (Environmental Science) <i>Association of Nutritional and Environmental Stresses with Vitamin C Concentration of Food Items in the United States</i> Advisor: Hongbing Sun
1:30-1:45	Victoria Burd (Secondary Education and History) <i>"Rights, Redistribution, and Recognition": Newark and its Place in the Civil Rights Movement</i> Advisor: Erica Ryan
1:45-2:00	Amirah James (M.A. Special Education), Caleb Holt (Clinical Mental Health Counseling), and Sibel Siglam (Special Education) <i>The Impact Virtual Education Has on the Social Anxiety of Undergraduate College Students</i> Advisor: Christina Hamme-Peterson
2:00-2:15	Sibel Siglam (Special Education), Sunika Sindkar (Special Education), and Jamie Spampinato (Special Education) <i>A Comparative Study of the Most Common Accommodations at the Middle School, High School, and Collegiate Levels for Students with Disabilities in the State of New Jersey</i> Advisor: Diane Casale-Giannola

PSTR = Poster Session

PNL = Panel Session

URSA = URSA Session

PROJECT ABSTRACTS

Afoakwah, George

Unavoidable Caloric Restriction in Temporal Food Restricted BALB/cJ Mice

In prior experiments addressing food entrainable rhythms in mice in which food access was restricted to 4 hours per day, we observed that while C57BL/6J mice were able to overcome temporary weight loss during initial adjustment to the feeding regimen, BALB/cJ mice were unable to consume comparable amounts of food each day than ad lib controls over 6-8 weeks of experimentation. To determine the duration of restricted food access required to avoid caloric restriction, we restricted food access in BALB/cJ mice to 4, 6, 8 or 10 hours per day, monitoring food intake, body weight and wheel-running activity daily for 4 weeks. We found that BALB/c mice ate significantly less than ad lib controls regardless of restriction duration. Restrictions shorter than 10 hours per day resulted in significantly lower body weights, and significant rebounds in body weight upon providing ad lib food access. Intensity of food anticipatory activity was highly variable but was highest when access to food was most restricted. Results suggest that it may not be possible to temporally restrict food access in BALB/cJ mice without the confounding effects of caloric restriction. (Advisor: **Todd Weber**) **PSTR**

Arpaio, Robby; Gabby Banyacski; Stessie Chounoun

Using Tree-Ring Measurements to Study Past Climate from Southeast Asia through Australia and New Zealand

Traditionally, dendrochronology measures ring widths from trees to get various past climate signals that are embedded within the tree's growth rate. We hypothesize that analyzing tree ring samples collected along a transect from the Southern Ocean to the Himalayan Mountains will help us get a better past climate signal and a better understanding of the impacts of past volcanic events, among other climatic events, in that region. Our methods for this research project, which is part of a larger study with other universities, include scanning, dating, and generating Blue-Intensity data, which measures the amount of light reflected by the tree-rings from core samples collected in Southeastern Asia. During this academic year, we have learned how to prepare and measure the cores and generate Blue Intensity data using the computer software programs CDendro and CooRecorder. Our initial results have shown that our measurements from tree rings show common fluctuations in past climate responses that can be correlated with known climate events, such as floods and droughts. We expect the measuring of those tree-ring samples will improve our record of past climate further back in time along this transect. (Advisor: **Daniel Druckenbrod**) **PSTR**

Bevacqua, Callie; Oliva de la Torre Coca

Optimization of Choline Geranate Derivatives as Antibacterial Agents

Deep-eutectic solvents (DES) are a unique class of ionic liquids that have gained importance over the past twenty years for exhibiting applications in organic synthesis, biocatalysis, drug delivery, and microbiology. Specifically, choline geranate (CAGE) has been identified as a potential bactericidal and biofilm eradicating agent against Gram-negative bacteria; however, previous research performed at Rider University has confirmed that CAGE has no appreciable activity against Gram-positive bacteria. In an attempt to optimize the antimicrobial activity of CAGE against Gram-positive bacteria, our lab has successfully synthesized aliphatic derivatives of choline chloride with 12-, 14-, 16-, and 18-carbon chains, as intermediates toward the ultimate synthesis of their corresponding CAGE DESs. However, the ultimate pairing of the choline derivatives with geranic acid has proven challenging. This is due to the unknown impurities in commercial geranic acid that are difficult to remove, and a required chloride/bicarbonate anion

exchange that does not proceed to completion, as well as the products cannot be characterized by standard analytical techniques. Our lab has successfully performed the purification of commercial geranic acid, and we have been able to drive the anion exchange to 75.5% completion. Once we obtain a method for a 100% ion exchange, the cholines will be paired with pure generic acid to synthesize the desired CAGE derivatives, which will be applied in microbiological studies and inform a theoretical approach to understanding their interactions with lipid bilayers. (Advisor: **Danielle Jacobs**) **PSTR**

Boyer, Jerome

Age and Sex as Predictors of Injury During Exercise and Sports

Sports injuries prevent athletes from having optimal performance during practices and competitions. When athletes do not take proper care of themselves, they are at increased risk of injury. This study examined the incidence and consequences of acute and chronic injuries in exercisers and athletes relative to their sex (female, male) and age. Participants (n = 1014) completed a set of demographic items, an item group assessing overall preparation to engage in physical activity, an item group assessing physical injuries and medical interventions, and the Athletic Coping Skills Inventory-28. Our results showed that sport injuries were highly sensitive to the sex and age of the individual. In terms of psychological skills, men remained more positive during adverse events and accepted constructive criticism while women were significantly more confident, positively motivated when challenged as well as followed goal-setting strategies. Collectively, these results highlight the incidence and outcomes of injuries as well as psychological skills needed to assist those without injuries to prepare for continued training and those with injuries to adhere to treatment protocols. For athletes to sustain their physical performance, effective warm up procedures produce higher levels of success in their contributing sport and well-being. (Advisor: **Gary Brosvic**) **PSTR**

Bradley, Alessia

The Effects of Short vs Extended Light Exposure on Expression of Fos Proteins in the Circadian Clock of C57BL/6J Mice

Prior studies have shown that light induces expression of the intermediate-early gene c-Fos, a sign of neuronal activation, in the suprachiasmatic nuclei (SCN, the “clock” for the circadian system) of nocturnal rodents, but only during times of the circadian cycle that light induces shifts in the phase of the circadian system. While light-induced cFos mRNA expression has been described, no time course of Fos protein expression has been published. In this experiment, we are determining the pattern of Fos expression at different intervals following light exposure in mice as a baseline for measures of extended SCN sensitivity to light in future experiments. C57BL/6J mice were exposed to a 15-minute light pulse at a time in their late nighttime known to induce Fos, and then perfused 90, 135 or 180 minutes later. Brains were sectioned coronally throughout the rostral-caudal extent of the SCN and brain sections are currently undergoing immunohistochemical staining for Fos. This preliminary experiment will provide a basis for future experiments using c-Fos expression as a measure of light sensitivity of the circadian system in different strains of mice when subjected to long (e.g., 9-12 hr) light pulses that produce exaggerated shifts of the circadian system. (Advisor: **Todd Weber**) **PSTR**

Burd, Victoria

“Rights, Redistribution, and Recognition”: Newark and its Place in the Civil Rights Movement

This research analyzes key distinctions between inciting events of the Civil Rights movement riots in the North and South, including the differing ideologies on nonviolent versus violent protesting, the phenomenon of “White flight” and subsequent redlining, the housing crisis and

poverty caused by rapid urbanization and lack of public welfare programs. Additionally, this analysis distinguishes the legal discrimination that Black Americans largely faced in the South and the private and institutionalized discrimination experienced by Black Americans in the North, as well as how violence was a distinguishable and effective method of protest in the Northern Civil Rights movement. This paper explains how intercommunity autonomy and government transparency, along with anti-poverty measures were underutilized tools in curbing civil unrest amongst Black communities, leading to increased tensions, anger, and distrust between Black Americans and White communities and government. It also compares the violence prevalent in Northern Civil Rights movement protests, stemming from disregard and denial of the blatant systemic racism rampant in the states, to the nonviolent protesting measures characteristic of the South and the Civil Rights movement as a whole. Through this clarification, one can see the effects this history still has on New Jersey and the United States today. (Advisor: **Erica Ryan**) PNL

Candray, Katie; Tara Mason

An Exploration of Children's Trust

Previous studies have explored factors that influence children's willingness to trust and learn novel information from informants. We wanted to examine how parents perceived the factors that affect their children's willingness to trust in and conform to others. We designed an online parent survey using Google Forms. It consisted of 34 questions, and a total of 28 parents with children ages 3 to 6 responded. Included in the survey were questions about basic demographics, the child's personality, the importance of various traits to the parent, and parental perceptions of whom their children were most likely to trust for new information. Additionally, there were two hypothetical scenarios asking parents about their beliefs on what their children would do if they witnessed a model demonstrate a task with an inefficient tool. As a result, we learned that parents' ratings of their child's rebelliousness and their beliefs about the importance of conventionality were correlated with parents' perceptions of whom their child would trust. Also, we discovered that parents' beliefs about what their child would do in the hypothetical task were correlated with their beliefs about their child's likelihood of trusting a stranger, and the importance to the parents of independent-mindedness in their child. (Advisor: **Cara DiYanni**) PSTR

Cashin, Niamh

A Correlation Between Exercise Intensity, Conditioning, Frequency and the Related Psychoactive Effects

Exercise has psychoactive characteristics which can lead to exercise induced analgesia and addiction to exercise and our data support these findings. Despite some evidence that exercise improves mood state and can blunt pain it is an underutilized treatment option. A proper "dose" of exercise has not yet been established. We have discovered that there is a dose response relationship between exercise intensity and analgesia. Higher intensity exercise has a greater pain killing effect relative to low intensity. However, exercise intensity has no effect on a subject's mood state. Further, exercise frequency but not exercise conditioning enhances the feel-good effects of exercise. (Advisor: **John Guers**) URSA 2021-22

Co, Lindsey

Asian American (In)Visibility in 21st-Century Film and TV: Representation and Its Implications for Asian American Identity

This study will analyze the production contexts, content, and reception of prominent film and TV works released in the past 20 years in order to assess the path Asian American entertainment

media has taken to achieve unprecedented heights of mainstream success. While this progress is cause for celebration, many vulnerable communities within Asian America remain underrepresented. By considering how media portrayal of Asian Americans impacts the perception of Asian American identity, I hope to explore how Asian American media can promote equity for its community both within film and television and society as a whole. (Advisors: **Cynthia Lucia** and **Richard Zdan**) **URSA 2022-23**

Cook, Jacquelyn

Rider's Contribution of Winter De-Icing Salt to the Rising Sodium Concentration in the Delaware River Watershed

Frequent rise of sodium concentrations in the Delaware River (DR) above the 20 mg/l limit for potable water (recommended by USEPA) in recent years has been alarming. Most of the increase in sodium level can be attributed to the winter deicing salt application by communities in the DR watershed (DRW), including Rider University. Comparing stream water that left Rider (exit water) to that entered (entry water), concentrations of sodium in the exit water more than doubled that in the entry water this spring. Salt ratio of exit to entry water this year is significantly higher than that of 2018. The sodium contribution from Rider was also reflected in the ratio of water conductance, that is more than doubled this year as well between exit and entry water. High concentrated sodium can deplete calcium and magnesium from soil on campus and increase water conductance. Water in DRW supplies potable water to approximately 15 million people. Continuous monitoring of sodium and chloride levels and their interaction with other ions, and understanding the impact of rising sodium levels on the ecosystem are critical for sustainable water supply, public health and well-being of the ecosystem in the DRW. (Advisor: **Hongbing Sun**) **PSTR**

Critchfield, Natalie

The Structural Impact of a Pandemic on Crime Patterns - An Analysis of Drug and Domestic Violence Arrests in the City of Newark

Criminology suggests theories to help explain the causes of crime in society. Structural theories of crime attribute criminal likelihood on characteristics of a geographic region regardless of who lives and/or interacts there. This research will examine the impact of the COVID-19 pandemic on the structural patterns of drug crimes and domestic violence (DV) in the City of Newark. By mapping drug and DV arrests for the two years prior to the start of the health emergency in March 2020 as well as the arrests since through March 2021, the structural patterns can be compared to identify any significant pattern changes. (Advisor: **James Wojtowicz**) **URSA 2021-22**

DiPasquale, Kaylee

*Effect of Prey Species and Concentration on the Feeding Rate of the Dinoflagellate, *Oxyrrhis marina**

The microbial food web consists of phytoplankton (autotrophic primary producers) and the zooplankton who feed upon them (primary consumers). Studies have shown that variation in prey species and abundance can affect the feeding rate of plankton predators. This study was conducted to improve the understanding of how prey species and concentration effect the feeding rate of *Oxyrrhis marina*, a predatory zooplankton. A feeding experiment was completed to assess the relationship between prey concentration and the rate at which *O. marina* feed on the prey, *Isochrysis galbana*. Three replicates were set up for each of the four concentration ratios of predator to prey (1:100, 1:250, 1:500, and 1:750). Samples of the cultures were collected every 20 minutes for 2 hours. A fluorescent microscope was used to determine the

amount of prey cells consumed per *O. marina* over time and calculate feeding rates. The findings of this experiment showed that higher predator: prey ratios lead to higher feeding rates which became saturated at a ratio of 1:500. An additional experiment determined the feeding rate of *O. marina* on two additional prey species, *Phaeocystis globosa* and *Skeletonema marinoi*. Feeding rate data on these additional species will also be presented. (Advisor: **Gabriela Smalley**) **PSTR**

Doran, Madison

Understanding the Roll of Toll-like Receptor 4 in the Body's Innate Immune Response

The goal of these studies is to better understand the role of toll-like receptor 4 (TLR4) in the body's innate immune response. Specifically, this research will investigate the importance of TLR4 in the peritoneal cavity, and compare this information to prior experiments involving TLR4 in the spleen and lymph nodes. Both TLR4 knockout mice (TLR4 $-/-$) and wild type mice will be studied in this experiment. Flow cytometry and Cell Trace CFSE will be used to detect immune cells and observe cell division. It is expected that TLR4 will play a vital role in immune regulation in the peritoneal cavity. (Advisor: **James Riggs**) **URSA 2021-22**

Ervin, Kellie

The Effect of Salivary Estradiol and Progesterone on Perceived Pain and Mood

Our lab has evidence that exercise (EX) increases analgesia and this effect is more robust in females relative to males. Objective: To assess changes in minimal pain threshold (MPT) and subjective mood state at different stages of the menstrual cycle (follicular vs. ovulatory) and correlate these findings with salivary estradiol and progesterone levels. Methods: Subjects ($n=8$; age = 20.6 ± 0.9) performed submaximal treadmill EX at two different time points (follicular phase and luteal phase). EX analgesia was tested by minimal pain threshold (MPT) and a Psychoactive Effects Questionnaire (PEQ) was used to assess mood. Saliva was collected before EX and ELISA assays were used to quantify estradiol and progesterone. Relationships were evaluated using a Pearson's correlation coefficient. Results: Progesterone was significantly correlated with MPT ($r=0.8431$; $R^2=0.771$; $p<0.05$) but not PEQ. Further, there was a relationship between estradiol and PEQ ($r=0.79$; $R^2=0.63$; $p<0.05$) Conclusion: Perceived pain and mood state may be sensitive to changes in salivary estradiol and progesterone levels. (Advisor: **John Guers**) **PSTR**

Ford, Shamiya

Spirituality in Slave Narratives: Patriarchy, Power, and Religious Coercion in the American South

This project's goal is to write a 25-30-page research paper on the manifestation of spirituality in slave narratives written before the Civil War, with special attention to the intersection of race and gender. This essay argues that the planter class used religious coercion to create and maintain patriarchal value systems amongst enslaved African communities. This essay also evaluates the role of performance in religious worship as it pertains to the divide between Christian religious practices enforced on the enslaved community by the planter class and the practice of liberation theology that the enslaved truly embraced. (Advisor: **Kelly Ross**) **URSA 2022-23**

Fredeen, Anna

The Effect of Ballet on Measures of Athletic Performance

Ballet has been shown to improve physical and mental performance. The impact of ballet training on movement quality and athletic performance, however, lacks clarity. Therefore, the purpose of this study was to explore the effects of 13 weeks of ballet training on movement

quality and athletic performance. Participants were recruited from an entry-level ballet class, completing the Functional Movement Screen™, Y Balance test, vertical jump, and the NFL combine test at the start of the semester and again following 13 weeks of training. YBT posteromedial reach (97.29 ± 8.53 , 105.08 ± 7.56 , $p = 0.002$, Cohen's $d = -1.345$), posterolateral reach (96.23 ± 8.69 , 103.06 ± 10.58 , $p = 0.064$, Cohen's $d = -0.669$), and composite YBT with the right leg (87.54 ± 8.12 , 91.86 ± 7.61 , $p = 0.004$, Cohen's $d = -1.199$) improved. Agility decreased (5.41 ± 0.92 s, 6.06 ± 0.54 s, $p = 0.037$, Cohen's $d = -0.774$), but vertical jump improved (14.05 ± 2.09 , 15.97 ± 1.82 , $p = 0.002$, Cohen's $d = -1.668$). Aspects of movement quality, balance, and vertical jump improved after completion of 13 weeks of entry level ballet, highlighting the potential for its inclusion as a training modality. (Advisor: **Drue Stapleton**) **PSTR**

Gaines, Daniel

Lack of Effect of the Per2-Luciferase Construct on Tau Length in the Male BALB/cJ Mouse

The Per-2-Luciferase construct has been commonly used to evaluate circadian rhythm in mice. Recent evidence has come out that abnormal light conditions cause different behavioral outputs in the commonly used C57 mice that possess the construct. This experiment observed the construct in the BALB/Cj strain of mice to help determine if the differences found in C57s are not found in BALB/Cj mice. The lack of differences observed between BALB/Cj and BALB mice indicate that the mutation does not have a significant effect on period (tau) in BALB mice. This indicates that BALB mice may have use when studying the Per-2-Luc construct. (Advisor: **Todd Weber**) **PSTR**

Gilmore, Aeryn

Play-Based Learning: An Integrative Review of Literature

The support for the implementation of play-based learning (PBL) curricula in early childhood education has been steadily increasing. PBL drastically differs from traditional learning in both pedagogical style and assessment. Despite the developmental benefits enhanced through play, teachers, administrators, and parents have differing opinions on the primary goal of play as an educational tool. Additionally, the pressure to excel in standardized testing caused tangible assessment records to gain greater necessity in classrooms. Current research explains the complexity of assessing playful learning experiences and the need for a valid and reliable measure for PBL. The completion of this integrative research review resulted in the identification of a research gap within play-based learning (PBL). There is a need for a psychometrically sound measure of PBL to evaluate the use and effectiveness of this type of curriculum. (Advisor: **Cara DiYanni**) **PSTR**

Elena Gonzalez

Mineral Composition of Nourished Beaches in North Jersey and Possible Effect of Potassium Mineral Concentrations on the Abundance of Inhabiting Organisms.

Sediment samples from 9 different nourished beach sites of north Jersey between Point Pleasant and Long-beach Island was analyzed to determine the similarity of the mineral modal composition. Quartz is the overall most abundant mineral among all the sites. Potassium rich microcline and sodium-rich anorthoclase feldspars compositions are significantly different among different sites. The site with the most abundant microcline K-feldspar is IBSP 2 transect 1 (5.2%) and the site with the most abundant Na-anorthoclase is ISBP 23 transect 2 (2.7%). Aragonite is the third most abundant mineral type with a combined 34.3% weight percentage from all nine sites. The most abundant site is Winter Normandy (3.8%). Quartz and feldspars were mainly from the weathering products of other minerals while aragonite was mainly from

the shell fragments. Mineral modal abundance was analyzed by the X-ray powder diffraction and USGS-RockJock software where compositions of all other minerals were compared to the composition of reference mineral ZnO. Our work also shown different mineral composition, particularly potassium feldspar abundance because of K nutrient might have affected growth of inhabiting organisms of the nourished beaches. (Advisors: **Paul Jivoff** and **Hongbing Sun**) **PSTR**

Haas, Darla

High School Burnout: Assessing Causes and Consequences

School burnout is a state of depletion that occurs in students faced with prolonged overwhelming school responsibilities. There are societal factors such as remote learning from the pandemic, that have vastly affected the school, and therefore burnout, experience recently. Adolescents today also face levels of societal pressure from social media, prioritized academic success, a college-centered future, and eventually job and family success, all from this young age. These pressures create a very stressful environment for adolescents to learn in today. While high levels of school burnout contribute to student dropout rates, there are limited tools that currently exist to exclusively measure school burnout. Creating self-assessment tools to identify differing levels of school burnout is imperative to identifying correlational contributors and symptoms of the burnt-out condition, and, ultimately, to helping to prevent or manage it. This study analyzed the symptoms and consequences of school burnout, to create and pilot a new assessment tool for measuring it in high school students. It was found that students today are facing varying levels of burnout. Student ineffectiveness and detachment from social Interactions predict overall burnout in high school students. Various student factors also play a role in determining their overall burnout. (Advisor: **Cara DiYanni**) **PSTR**

Haines, Samantha; Eric Eaton

Machine Learning Models for Histopathological Breast Cancer Image Classification

Breast cancer is one of the most common types of cancer in women, representing 30% of new cancer cases in the United States per year and is the leading cause of cancer-induced mortality among women. Diagnoses are determined through mammography screenings and biopsies followed by analysis of histopathological images. Machine Learning has been proven to be an essential tool in image classification, with Convolutional Neural Networks (CNN) providing high accuracy, but long training time. In a medical setting, fast and efficient diagnoses are imperative to life-saving treatment. To provide the optimal machine learning model for medical use, we converted unstructured data to structured data to further explore model performance. We used Singular Value Decomposition (SVD) to extract features from 277,524 histopathological images and implemented Recursive Feature Selection to reduce the dimensionality of our resultant dataset. We then trained Logistic Regression, Decision Tree Regression, XGBoost Regression, K-Nearest Neighbors and Artificial Neural Network models. XGBoost was found to have the highest accuracy of 77.21%, with a Root Mean Square Error value of 0.41. While our models trained faster on the dataset than a CNN, the low accuracy led us to conclude these models are not suitable for image classification applications. (Advisor: **Md Ali**) **PSTR**

James, Amirah; Caleb Holt; Sibel Siglam

The Impact Virtual Education Has on the Social Anxiety of Undergraduate College Students

The Coronavirus Pandemic has caused the world to shift its instructional methodologies. One hundred sixty-nine undergraduate students enrolled at Rider University completed one survey developed under four categories consisting of demographic questions, questions regarding factors that have affected their social anxiety in virtual settings (Zoom) and to what degree, questions regarding types of virtual settings (Zoom) structures they feel most comfortable

socially interacting, and questions regarding how anxious they feel in virtual classroom settings via Zoom. The results showcase social anxiety in virtual settings (Zoom) differing between subjects in junior undergraduate grade levels (freshmen and sophomores) versus senior undergraduate grade levels (juniors and seniors) specifically in light of the COVID-19 pandemic, the factors that affected social anxiety in virtual settings (Zoom) amongst these undergraduate groups and to what degree, and the types of virtual setting (Zoom) structures participants feel most comfortable socially interacting in. From the survey data, we identified and defined universal stressors within the virtual classroom as well as potential supports for students experiencing social anxiety on Zoom. (Advisor: **Christina Hamme-Peterson**) **PNL**

Kaltenhauser, Nicolas

Assessing Low-Cost Air Quality Sensors to Detect Hotspots on the Rider Campus

This study aimed to compare Aeroqual's AQY1 sensors (n=6) with state operated real time ozone (O₃) (ultraviolet absorption), nitrogen dioxide (NO₂) (chemiluminescence) and fine particulate matter (PM_{2.5}) monitors (beta-attenuation) under real-world conditions in New Jersey (USA). Aeroqual AQY1 sensors were evaluated to understand their potential for hotspot monitoring utilizing high-time-resolution data (<60 min averages). During collocation, AQY1 O₃ concentrations were correlated ($R^2 = 0.62-0.82$) with the reference monitor concentrations (monitor mean = 33 ppb and maximum = 80 ppb) but were largely underestimated (slope = 0.22-0.29). NO₂ concentrations were low (monitor mean = 8 ppb and maximum = 25 ppb) with little correlation between sensors and the reference monitor. During collocation, AQY1 PM_{2.5} concentrations agreed with the reference monitor when including impacts of fireworks during the 4th of July celebrations ($R^2 = 0.83-0.85$ and slope = 0.99-1.09), however, it decreased when excluding this episode (slope = 0.42-0.50, $R^2 = 0.40-0.51$). After co-location, the five of the six sensors (one remained at the co-location site) were distributed across campus to assess the campus mall and a US highway near a dominant entrance to campus. The AQY1s detected episodic changes in pollutant concentrations from campus activities and may be used in community-level projects. (Advisor: **Joshua Stratton**) **PSTR**

Lee, Grace

Generational Differences

This paper addresses the relationship between different ages and different factors such as views on politics, what concerns each generation, general knowledge, and what each generation views as most important to them. The main research question here was to find out if throughout the generations people generally stayed the same, or if differences arose when it came to different things. The generations that were studied were Baby Boomers, who were born between 1955 and 1964, Gen X, who were born between 1965 and 1980, Millennials, who were born between 1981 and 1996, and Gen Z, who were born between the years 1997 and 2012. The study is based on data collected from MTurk. Overall, we hypothesize that there will be differences in the generations on certain views, while other views will be the same. (Advisor: **Michael Carlin**) **PSTR**

Loo, Amber

Dependence of Alcohol Dehydrogenase Activity on Salt Concentrations

Enzymes in the liver act as the first line of defense against various toxins. One of these enzymes, a zinc-dependent enzyme called alcohol dehydrogenase (ADH), is our main defense against ethanol, which can compromise the function of the nervous system. When ethanol enters the liver, it is converted by ADH into acetaldehyde. Acetaldehyde is a main cause of hangovers, but a second enzyme (aldehyde dehydrogenase) eventually degrades it. ADH is also responsible for

metabolizing other alcohol-containing chemicals, including drugs and toxins and endogenous steroids, retinoids, and fatty acids. Therefore, ADH is an important part of the body's chemical defenses, and the conditions under which it works optimally are important to understand. Recent students in the biochemistry lab at Rider demonstrated that Na⁺ ions strongly inhibit a related enzyme, lactate dehydrogenase, but it is not known whether changes to cellular salt concentrations that may occur due to liver damage impact ADH and its protective effect. Knowing how Na⁺ and other ions alter ADH activity could inform treatment strategies of patients with liver disease or other conditions that affect ion homeostasis. Therefore, I hypothesized that Na⁺ would inhibit ADH activity. I implemented a chemical assay of ADH activity and actually found that Na⁺ and the related ions K⁺ and Li⁺ had no effect. However, I found that Ca²⁺, Mg²⁺, and even Zn²⁺ do inhibit the oxidation of ethanol by ADH. Further studies are needed to identify the mechanism of inhibition. (Advisor: **Bryan Spiegelberg**) **PSTR**

Maity, Ayushi

An Optimized Assay to Detect Free Thiols for in vitro Analysis of BHMT

High concentrations of homocysteine are strongly correlated with incidence of several cardiovascular diseases, especially diabetic patients. The enzyme betaine homocysteine methyl transferase (BHMT) catalyzes the transfer of a methyl group from betaine onto the free thiol of homocysteine to form dimethyl glycine and methionine. Despite the abundance of BHMT in human liver and its important role in homocysteine remethylation, little analysis of the catalytic activity of BHMT has been performed due to lack of convenient assay. The primary goals of this research were to optimize a novel simple assay in which the compound monobromobimane (mBBBr) becomes fluorescent upon reaction with the free thiols of unreacted homocysteine and to use this assay to analyze factors influencing the catalytic rate of BHMT. A series of reactions followed by fluorescent detection confirmed that mBBBr detects the model thiol, L-cysteine, in a dose- and time-dependent manner. The rate of fluorescent signal generation was found to be increased with increasing pH, likely due to the increased nucleophilicity of the deprotonated thiol. Additional assays involving a potential catalyst of the reaction and increasing reaction temperatures are undergoing. Future experiments will include the application of this tool to studies of the enzyme activity itself. (Advisor: **Bryan Spiegelberg**) **PSTR**

McNelis, Evelyn

Potential Anti-Inflammatory Actions of Baicalin Derivatives on Behavior

Baicalin is used in traditional Chinese herbal medicine to treat inflammatory disorders. There exist two limitations in advancing understanding of the mechanisms of action of baicalin (1) baicalin is not soluble and (2) verification of the anti-inflammatory properties on behavior. I will synthesize derivatives of baicalin and evaluate the solubility of these compounds. Second, I will evaluate the ability of the novel soluble baicalin-derivatives to reverse well-known inflammation-mediated changes in mouse behavior. This research will provide novel molecule(s) to study the potential baicalin-mediated responses and provide data addressing the possible these molecules might have anti-inflammatory effects in living animals. (Advisors: **Jonathan Karp** and **Danielle Jacobs**) **URSA 2022-23**

Medina, Joseph

Phytoplankton Guide of Centennial Lake at Rider University

As primary producers at the base of the food web, phytoplankton are important in aquatic ecosystems. Some species also indicate unhealthy environmental conditions or cause toxic blooms. At Centennial Lake at Rider University there are millions of phytoplankton and thousands of different species. For this project, I created a phytoplankton guide of the different

species present during the spring. Once a week, water from Centennial Lake was collected and whole water and concentrated samples were preserved in Lugol's Iodine solution for later analysis. In addition, live concentrated samples were viewed immediately after collection. Phytoplankton in these samples were photographed and identified to the genus or species level, where possible. Their sizes were also measured to help with identification. Some of the more commonly found species this spring were various diatoms, such as *Melosira varians*, *Synedra famelica*, and *Cymatopleura solea*. Other common phytoplankton were *Mallomonas* (a flagellate) and *Closterium moniliferum* (a freshwater green algae). All species are compiled into a phytoplankton guide, including photos of each species, their dimensions, and other pertinent information. This guide will serve as a resource for students at Rider University who are studying Centennial Lake. (Advisor: **Gabriela Smalley**) **PSTR**

Mumtaz, Maheen

Iraq's Political Crisis: The U.S.'s Role and Responsibility

Iraq is experiencing a crisis that overlaps political and security challenges and affects prospects for stability, both internally and regionally. The 2003 U.S. invasion of Iraq contributed to the current crisis when the fall of Saddam Hussein created a power vacuum. Since then, Iran has inserted itself into Iraqi politics, while the Islamic State remains a threat. In addition, there has been growing discontent among Iraqis, particularly the youth, as they continue protesting against the political elites and demanding a new political system be implemented. As a key contributor to the crisis, the U.S. has a responsibility to not turn away from Iraq in this moment of vulnerability, nor should it view Iraq as a proxy war against Iran or the Islamic State. Instead, the U.S. should take this opportunity to redefine its strategy toward the Middle East. For example, with recent peace talks between the U.S. and Iran, it would be beneficial for the two nations to recognize their mutual interest in defeating the Islamic State and work together to preserve a coherent and functioning Iraq. (Advisor: **Frank Rusciano**) **PSTR**

O'Sullivan, Carly

Immunological Characterization of the MyD88 Knockout Mouse and the Effect of the Tumor Microenvironment

Several primitive recognition molecules exist within the immune system. These molecules respond to bacteria and other foreign material. For an immune response to be launched, these receptors must signal through a molecule called MyD88. The specific function of this molecule is not well understood, and has become a topic of interest in the field of immunology. The role MyD88 plays in the immunological environment surrounding tumor cells is even less well understood, but could play a significant role in the treatment of cancers going forward. This proposal seeks to expand upon the knowledge of the function of the MyD88 molecule. (Advisor: **James Riggs**) **URSA 2021-22**

Opperman, Kerry

Peritoneal Cavity Biology of TLR-5 Knockout Mice

Toll-like receptor 5 (TLR5) recognizes flagellin, the primary protein comprising bacterial flagella. Mice that have had this molecule deleted from their genome (TLR5 $-/-$ or TLR5KO mice) exhibit metabolic syndrome, specifically hyperlipidemia, hyperglycemia, obesity, and insulin resistance. This pathology, associated with a shift in the composition of their microbiome, also impacts their immune system. To explore the immune status of these mice, their *in vitro* and *in vivo* immune function was assessed with particular focus upon their peritoneal cavity (PerC) B cell biology. TLR5KO PerC B cells had heightened lipopolysaccharide (LPS) responses relative to normal control mice. Flow cytometry experiments revealed a B cell subset shift that might

account for the enhanced LPS response. In preliminary experiments, vaccine responses to 3 types of antigens were heightened in the TLR5KO mice relative to normal controls. These data show how minor perturbations in pathogen sensing can shift the microbiome and the health of the host. (Advisor: **James Riggs**) **PSTR**

Ritter, Angela

Comparing Bleach and Cold Treatment to Improve Germination Rates of Seven Shade-Tolerant Species

Native wildflower seeds acquired from nurseries can be difficult to germinate because they are not always exposed to the same natural processes that wild seeds experience. For example, fruit-eating organisms such as birds expose seeds to acidic conditions in their guts, causing seed coats to begin breaking down. Most seeds are also subjected to cold winter temperatures before germination takes place in the spring, another process that can help break seed dormancy. To examine if seed dormancy can be broken using at-home materials that mimic these cold and/or acidic conditions, this experiment studied seeds of seven wildflower species native to New Jersey. Seeds were subjected to time in a refrigerator (7, 24, or 49 days) and/or soaking in household bleach for one hour. The cold treatment significantly affected germination rates when all seven species were compared, with the highest rates of germination observed in control and 7-day cold treatments for most species. For the three species tested with bleach, cold, and their combination, there were no significant treatment effects on germination rates. More work is needed to determine which methods can be recommended to the public for improving germination of these wildflower species. (Advisor: **Kerrie Sendall**) **PSTR**

Sarangal, Suhriti

Impact of Work from Home on Mental Health

The study examined the influence of work from home on mental health, particularly because COVID 19 forced many people to work remotely. There have been many studies exploring the impact of COVID 19 on mental health, but not much research has been done specifically about the impact of working from home on mental health. This study therefore focused particularly on the effects of working from home, instead of measuring the general impacts of the pandemic to help better understand the impact of the work environment on the mental health of people. The participants were 100 individuals over the age of 18 from the USA (62), Lebanon (18), India (16), Australia (3) and the UAE (1). Every participant gave consent and answered questions on a survey. Questions were categorized into five main topics. Total scores were calculated for each of these categories for the final results. Tests did not reveal significant differences between the impact on mental health of working at home versus in person. However, several factors emerged as significant that might relate to mental and physical health. For example, the relationship between both workload at home and mental health at home, workload in person and mental health in person. (Advisor: **Cara DiYanni**) **PSTR**

Siegel, Emily

Of Bodies Changed: Modern Adaptations of Ovid's Metamorphoses

This project will explore the power of mythology as the means by which, historically, the human condition is documented and processed. While myths endure through time, they also capture the transformation of individuals and society. Ovid's *Metamorphoses*, being an anthology of mythological transformation, reflects the change that humanity sees within itself as it progresses. I propose a project with three final outcomes. First, a 15-page research paper, based on collaborative discussion on the works in my bibliography. Following that, I will direct a cabaret showcasing those works, the culmination of which will be a group reflection to display

this project's contribution to Metamorphoses' lasting power. (Advisor: **Laurel Harris**) **URSA 2022-23**

Siglam, Sibel; Sunika Sindkar; Jamie Spampinato

A Comparative Study of the Most Common Accommodations at the Middle School, High School, and Collegiate Levels for Students with Disabilities in the State of New Jersey

Accommodations are the backbone behind the success of a student that has documented disabilities. All participants were sent one survey to be completed through Google Forms comprising of approximately three categories. In this survey, the participants answered basic demographic questions, questions related to their use in the educational institution that they work in, and how educators would rate commonly used accommodations for students with disabilities in terms of its effectiveness. We studied accommodations that are most commonly offered to students with disabilities in current secondary and post-secondary schools in New Jersey, which accommodations are most useful and most used by students in secondary and post-secondary classrooms, and accommodations differ when students move from middle to high school and eventually to college. (Advisor: **Diane Casale-Giannola**) **PNL**

Stein, Joshua

The Effects of Arts Experiences on Wellness in College Students

Research shows that arts experiences can benefit wellness. Yet many studies in this field are not well controlled. In the present experiment, undergraduates ($N = 103$) were randomly assigned to groups that varied in their experience of art (creating, appreciating) and the type of art they experienced (music, visual art) to determine how these manipulations affect measures of wellness. Those who created art or music rather than just appreciated art or music reported less anxiety, higher levels of calm and more enjoyment. Only those who created music as opposed to all other groups reported significantly higher levels of intellectual stimulation. These results suggest that arts programming for undergraduates can be especially beneficial when they incorporate the creation of art or music, and not just the appreciation of art or music. (Advisor: **Dr. Wendy Heath**) **URSA 2021-22**

Swiderski, Rebecca

Unbelievable: A 2D Game Made with Unreal Engine

Unbelievable is a game I made during my first semester here at Rider University, as part of my Game Development I class. I learned a lot of thanks to the help of Professor Stephen Gonzalez and creating my own 2D game was a great introduction to the Game and Interactive Media design major. I learned various techniques such in the realms of animation and programming. I'm really pleased with the final product and would love to present it to different people outside of the major. I intend to present via a multi-media presentation. I plan on presenting by bringing my own laptop and having guests play the game for themselves, all the while having concept art, sprite sheets, screenshots of the code, and the basic premise of the game on some posterboard. (Advisor: **Stephan Gonzalez**) **PSTR**

Tezbir, Kayley

*The Influence of Roadside Conditions on the Shoot Growth of Wisconsin Fast Plants (*Brassica rapa*)*

Urban runoff from snowmelt and rain events is caused by impermeable surfaces such as roads and parking lots, and has the ability to carry an array of pollutants into roadside environments. Contaminants in runoff such as salt from road deicing efforts, motor oil from leaking cars, or excess water can affect surrounding soils and bodies of water, and therefore vegetation. To see

how different roadside conditions and seed varieties affect the aboveground growth of Wisconsin Fast Plants (*Brassica rapa*), three seed varieties were grown under conditions in which they were watered weekly with varying concentrations of saline (230 mg/L NaCl, 4 g/L NaCl, or 35g/2L NaCl), grown in motor oil polluted soil (5% oil w/w or 10% oil w/w), or were grown in compacted soils (1.5cm or 3.0 cm compaction). Seed variety had a significant effect on aboveground growth ($p < 0.05$). Increased salinity and oil pollution in soil caused significant declines in aboveground growth ($p < 0.05$), while soil compaction prior to planting caused a marginally significant decline in plant growth ($p = 0.0547$). These results indicate that urban runoff should be monitored to ensure that roadside plants continue to grow successfully and aid in flood control and soil erosion. (Advisor: **Kerrie Sendall**) **PSTR**

Walako, Christopher

Association of Nutritional and Environmental Stresses with Vitamin C Concentration of Food Items in the United States

Correlation and dendrogram analyses of the elemental concentrations revealed that concentration of potassium is probably the most important elements that promote the growth of vitamin C in vegetables and fruits based on the USDA standard reference concentration data release 28 (released in 2015). In addition, concentration of sodium is inversely correlated with vitamin C in the vegetables and fruits. My laboratory measurement of vitamin C concentration using iodine titration method indicates significantly higher vitamin C concentration in red pepper than in green pepper (50% higher). Freshness and temperature that the pepper exposed also affect the vitamin C concentration in the pepper. The elemental concentration measured using ICP for the pepper also shows that potassium, calcium, magnesium and copper concentrations might significantly affect the concentrations of vitamin C. Therefore, there is a possibility that proper environmental management and artificial fertilizer such as potassium can be used to enhance vitamin C level in vegetables and fruits. Our study of NHANES data also demonstrated people with higher consumption of fruit and vegetables (in the highest consumption quarter) have higher serum vitamin C. Enhancing vitamin C level in fruit and vegetables can therefore be a plus for increasing vitamin C level in people. (Advisor: **Hongbing Sun**) **PNL**

Wilson, Jordan

Effects of Benzalkonium Chloride on Growth, Mortality and Feeding in Freshwater Plankton Assemblages

Benzalkonium chloride (BAC) is a cationic quaternary ammonium compound and surfactant used in household and medical disinfectants. While regulated by the EPA as a pesticide, BAC is unregulated by the FDA. Studies have repeatedly shown negative effects of BAC on aquatic life, including neurotoxicity and increased mortality. Here, we investigated the effect of BAC on growth, mortality, and feeding in natural plankton assemblages from Centennial Lake, Lawrenceville, NJ. Mortality experiments were performed on natural zooplankton assemblages at BAC concentrations ranging from 0 to 90 $\mu\text{g/L}$. Prominent zooplankton groups (rotifer *Keratella*, adult copepods and copepodites, copepod nauplii) were enumerated before and after a 24-h incubation period. Mortality in all groups was not significantly affected by the BAC concentrations used in this experiment ($p > 0.05$). Additional phytoplankton growth experiments were conducted in laboratory cultures to determine growth and survival at concentrations ranging from 0 to 1 mg/L. Investigating sublethal effects of BAC on plankton communities can help elucidate additional impacts on ecosystem dynamics. As the Covid-19 outbreak continues to increase the use of disinfectants, such effects may become increasingly problematic for the environment. (Advisor: **Gabriela Smalley**) **PSTR**

Witerska, Victoria

Young Adults and Social Media: Links Between Usage and Internalizing Outcomes

Since the Covid-19 pandemic temporarily stopped the outside world, causing the digital world to become more salient, it has become even more vital to investigate the impact of social networking sites on society. The purpose of the current investigation was to examine the effects that social media may have on young adults between the ages of 18 to 22 ($M = 19.67$, $SD = 2.139$). In particular, the study sought to examine whether frequency of social media use or negative social media content is associated with poorer well-being among young adults.

Whereas earlier research suggests that overall frequency of social media use is associated with negative health outcomes, the findings of the current study suggest that exposure to negative social media content is far more detrimental than overall frequency of social media use with respect to anxiety, depression, self-esteem, and body satisfaction. Findings from the study shed light on disparities within the field by contributing more information on the effects that social media may have on individuals of different racial or gender identities ultimately suggesting that for some outcomes, cisgender women and people with non-binary gender identities may be more susceptible to the harmful effects of negative social media content than cisgender men.

(Advisor: **Nadia Ansary**) **PSTR**

Zinser, Emma

Physarum polycephalum: Learning About and Responding to the Environment

The limited environment of *Physarum polycephalum*, an acellular slime mold, has made scientists interested in how this organism responds to its environment. However, information surrounding this organism's behavior is severely limited. This experiment will study the behavioral responses to environmental cues and the learning ability of this organism. Cultures of *Physarum* will be trained to feed under adverse conditions and forced to choose between food sources under different conditions. The preferences of the *Physarum* will be indicated by the food of choice. Studying how *Physarum* respond to and learn about the environment can establish further studies on learning and memory. (Advisor: **Julie Drawbridge**) **URSA 2022-23**

Zinser, Emma; Sanjana Butala

Physarum polycephalum: Responding to the Environment

Physarum polycephalum, an acellular slime mold, can make strategic decisions when foraging for food. However, not much is known about the foraging preferences of this multinucleate plasmodium. In addition, the signal transduction pathways required for the organism to make foraging decisions remain largely unexplored. We performed three sets of experiments designed to increase our understanding of how this organism navigates in its environment. In the first set of experiments, the plasmodium was forced to choose between two noxious stimuli to get to food. It is understood, that *Physarum* communicate and migrate through the actin cytoskeleton², which can be modeled through AKT signalling. The second test predicted that inhibition of AKT signaling will interrupt mechanosensation and distance recognition. Finally, the environments that *Physarum* are faced within the laboratory versus the wild vary widely. To determine the organism's preferences for the surfaces it crawls on, the organism was given a set of binary choices of crawling substrate and analyzed for preferences. (Advisor: **Julie Drawbridge**) **PSTR**