ISCAP

INDEPENDENT SCHOLARSHIP & CREATIVE ACTIVITIES PRESENTATIONS

RIDER UNIVERSITY

MAY 8, 2019

ISCAP Day

Wednesday, May 8, 2019

Sweigart Hall

10:15 AM – 3:15 PM

Schedule At-A-Glance:

10:15-12:00	**Undergraduate Research Scholar Awards Session**	**Sweigart 115**
12:00-1:00	**Pfizer PURE Career Panel**	**Sweigart 118**
1:00-2:00	**Poster Session and Lunch**	**Sweigart Lobby**
2:15-3:15	**Panel Sessions:**	
	Science Through the Ages	**Sweigart 118**
	Languages and Voices	**Sweigart 119**

Planned by the URSA Committee:

Jamie Ludwig, Chair
Paul Jivoff
Devon Baranek
Emre Yetgin
Melissa Hofmann
Hee Young Kim
Amanda Quist
Lauren Delisio
Nathan Hurwitz
Elizabeth Radziszewski

RIDER UNIVERSITY

Office of the President
2083 Lawrenceville Road
Lawrenceville, New Jersey 08648-3099
P 609-896-5001
F 609-895-5681
www.rider.edu

May 8, 2019

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

Office of Provost and
Vice President for Academic Affairs
2083 Lawrenceville Road
Lawrenceville, New Jersey 08648
T 609-896-5010
F 609-896-5242
dfredeen@rider.edu
www.rider.edu

May 8, 2019

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 Auditorium (SWG 115)

10:15 AM – 12:00 PM

Chair: Jamie Ludwig (Chemistry, Biochemistry, Physics and Computer Science)

10:15	**Welcome by Provost DonnaJean Fredeen**
	Announcement of 2018-19 URSA Recipients
10:30-10:45	**Harish Appiakannan** (Biology) *Impact of voluntary exercise and diet on glucocorticoid regulation in C57BL6/J mice* (Advisor: **Todd Weber**)
10:45-11:00	**Paul David Flood** (Music, Voice and Music History) *Operatic Pursuits of the American Dream* (Advisor: **Sharon Mirchandani**)
11:00-11:15	**Jonnathan Marin** (Chemistry) *Exploration and Optimization of Carbon-13 Isotopic Labeling Methods for Identifying New Biocatalyzed Transformations of Aryl Halides* (Advisor: **Jamie Ludwig**)
11:15-11:30	**Shanoy Thompson** (Psychology) *The Effects of Asian and African American Stereotype Threats on the Ability to Solve Riddles* (Advisor: **Michael Carlin**)
11:35-12:00	**Announcement of 2019-20 URSA Recipients**
	Jessica Forbes (Music Education) *Perception, Muscle Tension and Vocal Production: A Study in Body Interconnectivity* (Advisor: **Sean McCarther**)
	Kristian Gardner (Organizational Psychology) *Application of Herzberg's Two-Factor Theory of Motivation to Turnover Intentions in Millennials* (Advisor: **Gene Kutcher**)
	Kate Lincoln (English and Theater) *Poe's Fallen Angels: How Maternal Abandonment Led to Oedipal Fantasies in "Ligeia," "Berenice," and "The Fall of the House of Usher"* (Advisor: **Kelly Ross**)
	Thomas Long and **Peri Pavicic** (Health Science) *Identification of Risk Factors for Running Related Injuries Using Field Based Data Collection* (Advisor: **Drue Stapleton**)
	Hayley Roy (History) *The Fate of Liberalism in Germany during the Bismarckian Era (1848-1880): A Study of Cause and Effect* (Advisor: **Lucien Frary**)

Pfizer PURE Career Panel

Sweigart SWG 118

12:00-1:00 PM

Chair: Paul Jivoff (Biology, Behavioral Neuroscience and Health Science)

Robert Golding (Firmenich)

Robert Golding is a former Rider chemistry major who currently works at Firmenich. He works as a Scientist in Perfumery Technical Analysis where he combines GCMS, LCMS, perfumery technical analysis, air sampling, thermal desorption, headspace analysis, method development and validation to develop fragrances for some of the most recognizable companies in the world.

Lori T. Sentman, PhD (NOAA)

Lori T. Sentman has worked as a physical scientist at the National Oceanic and Atmospheric Administration (NOAA) Geophysical Fluid Dynamics Laboratory (GFDL) in Princeton for the past 17 years. Her research focuses on developing and using comprehensive climate and biogeochemical numerical computer models of the atmosphere-ocean-ice-land system to study past, present, and future climate and carbon cycle interactions and feedbacks on timescales ranging from decades to centuries.

Jasmine Little (Mathematica Policy Research)

Jasmine Little is a researcher with a passion for supporting healthcare innovation and enhancing quality of care. As a research analyst for Mathematica Policy Research, Jasmine works on mixed-methods evaluations of national initiatives for the Centers for Medicare and Medicaid Services (CMS) and the Substance Abuse and Mental Health Services Administration (SAMHSA) including: the Comprehensive Primary Care Initiative (CPC), the Primary and Behavioral Health Integration Program (PBHCI), and the Certified Community Behavioral Health Clinic Demonstration (CCBHC).

Megan Weindorfer (Syneos Health)

Megan is a former Rider University Biology major and currently an Associate Research Scientist at Syneos Health in Princeton, NJ. She works in a FDA regulated lab that processes and analyzes biological samples for clinical trials. Sheperforms PK (Pharmacokinetic) and ADA (Anti-Drug Antibody) assays as well as program and operate the liquid-handling systems on site.

Denise Driscoll (Breen) (Weston Solutions, Inc.)

Denise is a former Rider student and now a Project Scientist with Weston Solutions, Inc. in their Edison, NJ office. Denise works on a team that evaluates U.S. EPA CERCLIS sites within Region 2 for eligibility in the EPA Superfund program. Environmental investigations include evaluation of hazardous substances in environmental media and their potential impacts to nearby populations and environment. Additionally, Denise manages sampling events to coincide with the clients end goals. She provides her expertise on additional projects within the company for public sector clients as well as provide support to numerous EPA Regions including Emergency Responses. She's worked on projects all across the nation including Niagara Falls, Puerto Rico, Colorado, and the US Virgin Islands. After gaining a couple years' experience in the field, Denise decided to return to school while working to earn her Master's Degree of Soil and Water Sciences through an online program at the University of Florida.

Adriana Bellomo (Syneos Health)

Adriana graduated from Rider University with a degree in Behavioral Neuroscience. After graduation she worked on a project that focused on Coral Health and Diseases for the Mote Marine Lab in Sarasota, FL. She also did part time recruitment work for Rider while living in Florida. She moved back to NJ over a year ago and has been employed at Syneos Health since January 2018 where she started as a lab technician in the Early Phase Princeton Lab. Since the middle of last year she has been working in the role of a Lab Support Associate for the Cooperate Services Branch that supports the Early Phase Laboratories and Clinical Phases of the company.

Marc A. McKithen (Chief Judge, Trenton Municipal Court, NJ)

A chemist turned lawyer, Marc A. McKithen says his training in chemistry is never far from his mind in his current position as chief judge at Trenton Municipal Court in New Jersey. McKithen first became involved with chemistry and Rider University as a Project SEED student in the lab of Dr. John Sheets while he was still a junior at Trenton Central High School. He received his BS in chemistry from Rider, his Masters in chemistry from UNC-Chapel Hill, and his J.D. from Benjamin N. Cardozo School of Law at Yeshiva University. Today, McKithen presides over minor, municipal offenses like health code violations and drug possession.

Robin Leftkowitz (ExxonMobil)

After graduating from Rider University with a BS in Chemistry, Robin earned a Master's degree in Chemistry from Rutgers University. After working at Rive Technology, in Princeton, NJ for 7 years, she began working at ExxonMobil Research and Engineering in Clinton, NJ, in the Analytical Sciences Department in 2018. At both organizations, she has worked in catalyst characterization using a wide range of analytical techniques, such as X-ray Florescence, X-ray diffraction, thermal analysis, and scanning electron microscopy.

Poster Session

Sweigart Lobby, 1:00 PM – 2:00 PM

1. **Loreena Avery** (Environmental Science); Advisor: **Reed Schwimmer**
   The Marriage between Evolutionary Origins and the Genesis Story of Creation

2. **Morgan Ballard** (Biology); Advisor: **Jamie Ludwig**
   Targeting Biofilms with Garlic Defense Molecule Ajoene

3. **Alina Bardaji** (Environmental Science); Advisor: **Daniel Druckenbrod**
   Determining Pith Offset of Pine and Oak Species Using Geometric Method

4. **Olivia Barone** (Environmental Studies); Advisor: **Daniel Druckenbrod**
   The Impacts of China's National Sword Policy on Rider University

5. **Jasmina Biller** (Psychology); Advisor: **Rob Isenhower**
   A Behavioral Intervention to Improve Coloring Behavior in Preschool Students

6. **Antonia Conti** (Biology); Advisor: **James Riggs**
   The Effect of PD-1 on B Cell Subsets

7. **Charlene Cosby** (Biochemistry); Advisor: **Bryan Spiegelberg**
   The Kinetic Measurement of Betaine-Homocysteine Methyltransferase Activity Using Absorption Spectroscopy

8. **Sara Currenti** (Psychology); Advisor: **Michael Carlin**
   Mixed Global and Local Processing Using Words

9. **Laura Fernández** (Psychology); Advisor**: Michael Carlin**
   The Effects of Bilingualism on Inhibition and Delay of Gratification

10. **Joseph Fracasso** (Biology); Advisor: **Md. Ali**
    Machine Learning Tools for Long DNA Sequences

11. **Megan Gallagher** (Psychology); Advisor: **Michael Carlin**
    Defining Normalcy

12. **Jordan Grillo** (Math, Secondary Education); Advisor: **Andrew Markoe**
    Investigation of the Structure of the Real Number System

13. **Tatia Gugeshashvili** (Psychology) and **Hailey Varga** (Psychology); Advisor: **Cara DiYanni**
    The Effect of Instruction on the Imitation and Transmission of Information

14. **Emmaleigh Hauch** (Health Science); Advisor: **John Bochanski**
    Measuring Rotation Periods of Nearby, Co-moving Stars

15. Tom Long (Health Science) and **Peri Pavicic** (Health Science); Advisor: **Drue Stapleton**
Assessment of Running Dynamics in NCAA Division I Distance Runners

16. Steven Mammon (Psychology); Advisor: **Nadia Ansary**
Voting Participants Among Young Adults: Factors Driving the Lack of Youth Political Engagement

17. Jeffrey Maslanka (Biology); Advisor: **James Riggs**
B Cell Subset Changes During Ovarian Cancer

18. Annabella Opoku (Health Sciences); Advisor: **Kristin McCarthy**
Voices from the Field: Can Doulas Help Address Rising Maternal Mortality Rates in New Jersey?

19. Amanda Peterson (Behavioral Neuroscience, Psychology); Advisor: **Nadia Ansary**
Models of Socialization: Effects of Child-Parent Attachment Style on Forming Adult Relationships

20. Patrik Rollefson (Marine Science); Advisor: **Gabriela Smalley**
Problem Solving Capabilities of Coati Mundis in Captivity

21. Hailey Varga (Psychology); Advisor: **Mack Costello**
Piloting a Role Playing Intervention for Aggression in a Translational Study

22. Joseph Warker (Environmental Science); Advisor: **Hongbing Sun**
Deicing salts impact on sodium concentrations in Centennial Lake Watershed: Soil Retention and Vertical Translocation of Sodium and Chloride

23. Joseph Warker (Environmental Science); Advisor: **Gabriela Smalley**
Effect of Scents as a Form of Enrichment on Movement and Behavior of American Alligators

24. Skye Wumbrand (Behavioral Neuroscience); Advisor: **Kelly Bidle**
The Microbial Diversity of Rider University's Campus via Culture-dependent and independent Methods

Panel Session 1:
Science Through the Ages

Sweigart 118

2:15 PM – 3:15 PM

Chair: Dr. Hee Young Kim (Management)

2:15-2:35	**John Gulliver** (Chemistry) *The Illuminating Science of Photochemistry: The Formation of Disubstituted Aniline Derivatives via Photoinitiation* (Advisor: **Danielle Jacobs**)
2:35-2:55	**Carissa Moore** (Environmental Science) *Using tree ring analysis to determine if the Canadian Hemlock on the West Lawn at Mount Vernon was the original planted during Washington's era* (Advisor: **Daniel Druckenbrod**)
2:55-3:15	**Loreena Avery** (Environmental Science) *The Marriage between Evolutionary Origins and the Genesis Story of Creation* (Advisor: **Reed Schwimmer**)

Panel Session 2:
Languages and Voices

Sweigart 119

2:15 PM- 2:55 PM

Chair: Prof. Melissa Hofmann (Library)

2:15- 2:35	**Alexandra Livesey** (Secondary Education and French) *High School Students' Perspectives of their Language Learning Process* (Advisor: **María Villalobos-Buehner**)
2:35- 2:55	**Tara Savarino** (Master of Voice Performance) *Rehabilitating the Singing Voice Post Vocal Injury and Speech Therapy* (Advisor: **Kathy Price**)

PROJECT ABSTRACTS

PSTR= Poster Session
PNL= Panel Session
URSA=URSA Session

Harish, Appiakannan

Impact of voluntary exercise and diet on glucocorticoid and metabolic regulation in C57BL6/J mice

An increasing number of studies relate voluntary exercise with greater resilience to psychological stress and psychological stress, a process that is highly regulated by the hypothalamic-pituitary-adrenal (HPA) axis. In this experiment, we investigated how voluntary exercise might influence the effects of high fat diet on metabolic measures and stress responses associated with the onset of diabetes and obesity in mice. We found that voluntary exercise ameliorated HFD-induced obesity and fat deposition, presumably by preventing a shift toward daytime feeding behavior. Access to running wheels prevented the development of glucose intolerance from HFD. Exercise also blunted the exaggeration of stress responses in corticosterone secretion and glucose secretion resulting from high-fat diet. Elucidation of these physiological mechanisms may provide targets for prevention or treatment for the epidemic of diet-induced obesity and diabetes in the human population. (**Dr. Todd Webber**) **URSA 2018-2019**

Avery, Loreena

The Marriage between Evolutionary Origins and the Genesis Story of Creation

Since the start of the Scientific Revolution, conflicts regarding of the Bible and scientific discovery has divided scientists and the Christian church. Arguably the greatest conflict that persists today is the question of nature's origins. In the past century, creationists have targeted the Theory of Evolution by forbidding the theory from being taught in schools both locally and statewide, by attempting to reframe creationism as a science, and by fabricating a pseudo-science that distorted modern research to rationalize their Christian beliefs. Conversely, many scientists have maintained the notion that Evolution discounts the existence of a supernatural deity. Consequently, these binary parties have provided dissatisfactory answers to questions regarding science and faith. This study investigated whether or not the Genesis story of creation coincides with the scientific explanation behind the origins of the universe. To answer this question, modern science was not put to question, but rather a liberal interpretation of Genesis was considered. After a careful examination of the seven days of creation, Genesis was found to parallel the concepts behind both the Big Bang Theory and the Theory of Evolution, which were discovered thousands of years after Genesis was written. (**Dr. Reed Schwimmer**) **PNL, PSTR**

Ballard, Morgan

Targeting Biofilms with Garlic Defense Molecule Ajoene

The synthesis of the garlic defense molecule ajoene from 3-bromopropanol is attempted. Ajoene is a decomposition product of allicin, which is released when garlic cloves are chopped or crushed. Ajoene has many biologically relevant functions; we are interested in its role as an anti-quorum sensing molecule. Quorum sensing is the molecular mechanism by which individual bacterial cells communicate with one another and influence a colony's behavior & gene expression. Ajoene works by interfering with sRNA molecules to stop the transcription of quorum sensing genes that code for biofilm molecules. A biofilm is an extracellular matrix containing peptides and carbohydrates that bacterial colonies can shield themselves with. In the following research, ajoene is synthesized from

3-bromopropanol. In a series of substitution reactions, bromine is replaced with thiourea, then the urea group is replaced with a propargyl group to generate a propargyl thioether and finally the alcohol is replaced with 2-nitrophenyl selenium (total percent yield 6.9%). The end goal is to generate a sulfonamide derivative of ajoene to enhance ajoene's anti-quorum sensing properties, since the sulfonamide functional group also targets RNA. (**Dr. Jamie Ludwig**) **PSTR**

Bardaji, Alina

Determining Pith Offset of Pine and Oak Species Using Geometric Method

The rings from two tree species from the Paine Run watershed in Shenandoah National Park, Virginia were analyzed to estimate the distance by which tree cores missed the biological center of the tree (i.e. pith offset). Thirteen cores of both pitch pine (*Pinus rigida*) and chestnut oak (*Quercus montana*) species were chosen. The pith offset was calculated using the geometric method, which approximates the offset using the height and width of the innermost visible ring on each tree core as a missing radius. To evaluate the effectiveness of this method, an independent comparison was conducted on a fast-growing Virginia pine (*Pinus virginiana*) cross-section, as well as a slow-growing white oak (*Quercus alba*) cross section. These two samples represent extremes in ring widths, similar to those encountered in Shenandoah. These cross-sections were measured using the same method as a comparison to the actual distance from the center that a core would have been extracted. It was found that the pith-offset calculations were more accurate when applied to the pine species than the white oak species. (**Dr. Daniel Druckenbrod**) **PSTR**

Barone, Olivia

The Impacts of China's National Sword Policy on Rider University

China has imported two thirds of the world's plastic waste for over a decade, but last year imposed new rules that a plastic shipment can only have one tenth of one percent contamination. Typically recycling loads sent to China would have anywhere from 6-15% contamination. With this ban, potentially 111 million metric tons of plastic waste can be displaced by 2030. This thesis hypothesized that Rider's recycling efforts would have been much lower because of the ban. By examining Rider's Waste Management Reports and its diversion rates, it appears that Rider was not impacted by the strict rules China imposed. There could be a number of reasons why China's policy may have not affected Rider. Rider could be recycling so little, or so well, that a contamination ban doesn't make an impact. However, when comparing Rider to alike universities, and conducting a trash analysis, Rider's recycling should have been affected. By default, the data collected by Waste Management may not be the right type of data. The National Sword Policy caused chaos and massive waste stockpiles around the globe, but it also challenges us to rethink our recycling, and overall consumption habits in efforts to stop over consumption. (**Dr. Daniel Druckenbrod**) **PSTR**

Biller, Jasmina

A Behavioral Intervention to Improve Coloring Behavior in Preschool Students

The current study applied the behavioral principle of reinforcement to improving children's coloring behavior. Three preschool-aged children, who demonstrated a lack of appropriate coloring behavior, participated. A multiple baseline design across participants was used. The study consisted of three phases: baseline, direct reinforcement (DR), and token reinforcement (TR). Participants were instructed to color a shape (e.g., square, circle, triangle) as completely as possible while staying inside the lines. Data were taken on the percentage of the shape filled and the number of deviations outside the shape. During baseline participants received no feedback on their performance. During the DR phase participants received a preferred edible item when they met criteria (i.e., at least 90% of the shape filled and fewer than 25 deviations). During the TR phase, when criteria were met, participants

earned a sticker. After earning three stickers participants could trade the stickers for an item from a prize box. The results of the study revealed DR significantly increased the percentage of the shape colored and significantly decreased the deviations outside the shape. When DR was thinned to TR, coloring behavior maintained at levels similar to DR. Implications for addressing motivational versus skill deficits will be discussed. (**Dr. Rob Isenhower**) **PSTR**

Conti, Antonia

The Effect of PD-1 on B Cell Subsets

Programmed death-ligand 1 (PD-L1), a transmembrane protein expressed by antigen presenting cells of the immune system, is often highly upregulated on cancer cells. PD-L1 binds the programmed death-1 (PD-1) receptor on T cells to inhibit their activation, allowing for restraint of immune responses. PD-1/PD-L1 regulation helps prevent chronic inflammation and autoimmune disease. The purpose of this study was to analyze how the absence of PD-1 expression might impact B cell biology in a mouse model. Flow cytometry analyses revealed an increase in follicular B cells (B2 B cells) in the peritoneal cavity (PerC) of aging PD-1 knockout (PD-1 -/-) mice. Serologic analyses by isotype-specific ELISA revealed that PD-1 -/- mice generate much higher concentrations of antibodies (specifically, IgM, IgA, IgG1 and IgG_3) when compared to wild type mice. Older PD-1 -/- mice exhibited a significant increase in IgM and IgG_3 when compared to younger PD-1 -/- mice. Overall, these results suggest that chronic dysregulation of T cells may have downstream effects, specifically an imbalance of B cell activation. (**Dr. James Riggs**) **PSTR**

Cosby, Charlene

The Kinetic Measurement of Betaine-Homocysteine Methyltransferase Activity Using Absorption Spectroscopy

It is known that elevated levels of homocysteine may be correlated to diseases such as Parkinson's disease and heart disease. Research has also shown that betaine-homocysteine methyltransferase (BHMT) can reduce these effects by converting homocysteine to methionine. However, BHMT often possesses an inadequate number of methyl donors for this process, and developing other methyl donors would necessitate measuring how BHMT activity changes upon the addition. Attempts to measure the rate at which the enzyme performs this conversion have been attempted, but these methods are time-consuming to perform. The goal of this research is to use UV-vis spectroscopy to develop a new method to measure BHMT activity which can be performed in a shorter amount of time and which is therefore more amenable to testing more methyl donors. (**Dr. Bryan Spiegelberg**) **PSTR**

Currenti, Sara

Mixed Global and Local Processing Using Words

The purpose of this experiment is to further investigate global and local processing by expanding on the Navon Letter task using words. Thirty-six participants were collected by convenience sampling, mainly on Rider University's campus. Participants were asked to watch three PowerPoints (Letter Condition, Word Condition, Mixed-Word Condition), reporting what they saw. After the presentations, participants took a recognition test including the global and local words from the presentations. Results showed that performance on the presentations (i.e., "global" or "local processor") predicted memory performance. Also, there was a difference in generation of local responses between the Word Condition and the Mixed Word Condition. One was more likely to give a local response in the Word Condition than the Mixed Word Condition. This experiment investigates and gives a deeper understanding of, as well as giving a new outlook on, global and local processing. (**Dr. Michael Carlin**) **PSTR**

Fernández, Laura

The Effects of Bilingualism on Inhibition and Delay of Gratification

This study assessed differences between bilingual and monolingual children's abilities to delay gratification, and how this process could be predicted by their performance in inhibition assessment tasks. This research design is based on the theory by which bilingual children are supposed to be better able to delay gratification due to enhancement of their inhibitory processes resulting from the constant inhibition of one of two languages (Inhibition Practice Hypothesis). Moreover, I assessed monitoring and inhibition abilities (as measured by the Stroop Task) and examined the correlation between these cognitive processes, the child's ability to delay gratification, and their non-verbal IQ (measured by the KBIT matrices). Participants were unbalanced bilingual children from schools in the New Jersey area, ages 4 to 8. For this sample, Stroop performance was negatively correlated with IQ scores, which indicates higher IQ children are better able to inhibit distractions. Also, level of fluency in the second language was positively correlated with Stroop performance, indicating greater interference from the second language. Examining bilingual individuals allows for assessment of the effects of language learning on cognitive abilities, with the purpose of eventually laying the groundwork to establish language acquisition as a protective factor from psychopathology and cognitive decline. (**Dr. Michael Carlin**) **PSTR**

Flood, Paul David

Operatic Pursuits of the American Dream

This project will examine the shift in generational perceptions of the American Dream and how the modern version of this ethos is presented by two 21st century American operas: Glass's The Perfect American and Turnage's Anna Nicole. The American Dream was coined in the 1930s as a term which implied financial stability and upward mobility. This concept has evolved as a result of the sociocultural and technological advancements within America. According to Jim Cullen, today's American Dream is defined by fame, fortune, and personal fulfillment. Glass and Turnage's operas are emblematic of this modern American Dream through their portrayals of Anna Nicole Smith and Walt Disney. (**Dr. Sharon Mirchandani**) **URSA 2018-2019**

Forbes, Jessica

Perception, Muscle Tension, and Vocal Production: A Study in Body Interconnectivity

Singers use auditory feedback to self-monitor while singing. The body makes physiological and muscular changes to adjust the voice based on the perception of previously sung sound. Due to reflex muscle contractions, muscle tension in one area of the body can interfere with muscles involved in singing. This project will explore how muscle tension and vocal production are influenced by the perception of sound received through auditory feedback. Electrical activity of muscles in the upper body will be quantitatively measured using surface electromyography (EMG) while subjects sing under conditions that encourage or discourage the perception of external auditory stimuli. (**Dr. Sean McCarther**) **URSA 2019-2020**

Fracasso, Joseph

Machine Learning Tools for Long DNA Sequences

DNA sequences are useful sources of information for multiple disciplines. Machine learning programs are often used to aid researchers in interpreting these sequences. These programs have been shown to offer accurate predictive analyses of short DNA sequences, though falter for longer sequences. Longer DNA sequences are more valuable than shorter sequences for analysis as they can provide a more complete profile of their organism of origin. Experiments comparing the accuracy of the top

machine learning tools will be performed to confirm or reject the conclusion of a primary literature review and determine the optimal strategy for long DNA. (**Dr. Md. Ali**) **PSTR**

Gallagher, Megan

Defining Normalcy

The concept of normalcy was surveyed through MTurk and PsychData by asking 131 participants from around the United States of America questions pertaining to physical features, personality traits, and psychological/ physical conditions. The hypothesis was that people would project their own traits and experiences onto the concept of "normal." Results generally supported this hypothesis. For instance, there was a significant correlation ($r = .17$, $p = 0.48$) showing that of the people show say they are risk-takers, 35.6% of them believe the norm is risk taking, whereas of the group of people who said they were risk-avoiders, only 19.8% of them said risk taking was the norm. Similar correlations were found with personality traits such as happy or sad, emotionally stable or neurotic, and with other characteristics such as numbers of tattoos and piercing. The data supports Nickerson's (2001) research that projection of one's own traits, knowledge, etc. can be used to successfully navigate the world. (**Dr. Michael Carlin**) **PSTR**

Gardner, Kristian

Application of Herzberg's Two-Factor Theory of Motivation to Turnover Intentions in Millennials

As of 2016, Millennials became the predominant generation comprising the United States labor market. This turning point in workforce history, coupled with increased turnover among Millennials, has proven costly to the American economy. While contemporary research on occupational proclivities of Millennials is growing exponentially, limited research exists on the substantive factors leading to high turnover. Herzberg's Two-Factor Theory of Work Motivation, in conjunction with the six-item Turnover Intention Scale (TIS-6), is applied to identify the most effective work motivators valued by Millennials and examine their turnover intentions while simultaneously testing for potential mediating effects of employee engagement. (**Dr. Eugene Kutcher**) **URSA 2019-2020**

Grillo, Jordan

Investigation of the Structure of the Real Number System

This research had the aim of investigating the structure of the real number system. The first step was to investigate fields, which are mathematical objects that abstract the laws of algebra. There are many fields other than the real number system, so we investigated further what makes the real number system special. For example, the concept of positive and negative numbers exists in the real number system, but not necessarily in other fields. Next, we studied ordered fields in which the concept of positive and negative numbers makes sense, as in the case of real numbers. But, there are still many different ordered fields. We then introduced the completeness axiom, which leads to the idea of a complete ordered field. Surprisingly, there is only one complete ordered field and for that reason we understand that this characterizes the real number system. This project also investigated the complex number system, which is also a field, but surprisingly is in its own way unique. (**Dr. Andrew Markoe**) **PSTR**

Gugeshashvili, Tatia and Varga, Hailey

The Effect of Instruction on the Imitation and Transmission of Information

Our study inspects imitation, the way children intake information about novel objects, and how they transfer that new information to others. The recruited participants watch a video of a model (either

an undergraduate student, or a child) who uses a specific language cue to evoke the kids reaction. The model's gender also varies in each experiment. The videos have three different language conditions where the model either says, "We always ____ like this," "I am going to ____, or "People like me always ____ like this." This helps us understand if the "we" language is more influential in compelling the children to mimic the demonstrated behavior. We are also interested in seeing who the child considers "like" them. In the videos they demonstrate how to complete the task by using a clearly inefficient tool. After, it is the child's turn to decide which tool to use to complete the task (i.e., fuzzy pom-poms, or firm handle with a solid bottom to crush a cookie). Lastly, the child teaches "Sam" the puppet how to complete the given task. We are currently in the process of data collection and expect to have half the desired sample size collected and analyzed for ISCAP. (**Dr. Cara DiYanni**) **PSTR**

Gulliver, John

The Illuminating Science of Photochemistry: The Formation of Disubstituted Aniline Derivatives Via Photoinitiation

N-cyclopropylanilines and n-cyclobutylanilines are highly useful building blocks for synthesizing lipophilic amines. Dr. Nan Zheng and his team have created a novel method which photocatalytically disubstituted strained cyclopropyl and cyclobutyl anilines. However, it has problems regarding the limited scope of the nucleophile because it competitively quenches the excited photocatalyst. Here I explore the possibility of eliminating the need for a photocatalyst via taking advantage of a donor-acceptor complex (DAC), which theoretically can greatly expand the number of compatible nucleophiles and radical traps. It was found that it is possible to open a strained cyclic ring and substitute with a nucleophile, but the subsequent radical was terminated by a hydrogen atom rather than coupled with the targeted radical. Future work will deal with trapping the radical by adjusting both the reactivity of the acceptor via the addition of chlorine substituents and the quality of the acceptor's radical species. (**Dr. Danielle Jacobs**) **PNL**

Hauck, Emmaleigh

Measuring Rotation Periods of Nearby, Co-moving Stars

As stars age, they rotate more slowly. For most stars, we can measure the rotation period by tracking dark spots on the surface of the star. These spots cause the star's light output to vary periodically. We have assembled a catalog of nearby stars that are moving with one or more companions, and have attempted to measure rotation periods for these stars. Our data is mainly derived from the All-Sky Automated Survey for Supernovae, or ASASSN. We attempted to measure the rotation period for each star in the sample using open-source python software. We report on our measured stellar rotation periods, ranging from less than a day to over 100 days, and we plan to use this data to estimate the ages of the stars with measured rotation periods. (**Dr. John Bochanski**) **PSTR**

Lincoln, Kate

Poe's Fallen Angels: How Maternal Abandonment Led to Oedipal Fantasies in "Ligeia," "Berenice," and "The Fall of the House of Usher"

The goal of this project is to write a 30–40 page psychoanalytic essay on Edgar Allan Poe. Previous psychoanalysis of Poe has been insufficient and incomplete. Poe retained Oedipal aggression from his childhood that was eventually aimed toward women both in his life and in his stories. His maternal idealization conflicted directly with his societally ingrained expectation for

women to act like “Angels in the House.” He attempted to resolve his internal conflict by writing stories in which women who resembled his maternal figures were punished for not conforming to societal standards. (**Dr. Kelly Ross**) **URSA 2019-2020**

Livesey, Alexandra

High School Students’ Perspectives of their Language Learning Process

High school students in the United States are often required to take only one full year of a foreign language. However, this one year of language study isn’t enough time to develop a proficient level of communicative competence; this means that world language teachers must work diligently during the brief mandated language study to engage students and motivate them to continue their language study beyond their requirement. This study explores the questions: 1. What are the high school students’ perspectives of their language learning process? 2. What are the challenges that high school students face in their process of learning a language? 3. What are the most effective and least effective strategies for learning a language according to the students? Fourteen high school students completed an open- ended survey. The qualitative analysis of their responses shows that students motivations to further their language learning process support Dornyei’s (2009) L2 Motivational Self System, and the students who are motivated by an ideal L2 self-claim to feel more motivated than those who pursue their language study while motivated by an ought-to self. The study concludes by making recommendations for the field about how teachers can enhance the language learning process for secondary students. (**Dr. María Villalobos-Buehner**) **PNL**

Long, Thomas and Pavicic, Peri

Identification of Risk Factors for Running Related Injuries Using Field Based Data Collection

Ninety percent (90%) of competitive runners sustain a running-related injury (RRI) during the course of training. The development of RRIs are multifactorial, with running kinematics and training load variables often associated with their development. There is not a single running-related variable linked to all RRIs. Traditionally, running kinematic data is collected in a laboratory environment with specialized equipment, not allowing monitoring of runners in their natural environment. Utilizing a prospective cohort design, we will identify the RRI epidemiology, training, and running kinematic variables associated with RRI in collegiate cross-country runners, and determine the validity and reliability of wearable sensors. (**Dr. Drue Stapleton**) **URSA 2019-2020**

Long, Thomas and Pavicic, Peri

Assessment of Running Dynamics in NCAA Division I Distance Runners

Many aspects of running form in distance runners influences injury rate and type. We observed running metrics including impact force, stride length, breaking force, overall impact (Gs), and cadence to identify relationships between these aspects of running form. Data were collected using wearable sensors (Runscribe®) mounted to the laces of running shoes of NCAA Division I distance runners (n=13) during team or individual training sessions during a one-week period. After data collection, Pearson R tests were calculated to examine relationships between metrics. Analysis revealed a negative correlation (r=-.588, p=0.03) between average cadence and impact force. Stride length (r=-.541, p=.056), breaking force (r=.042, p=.891), and average G force (r=-.467, p=.107) were not significantly correlated. Excessive impact forces cause strain on the musculoskeletal system contributing to the development of injury. From a training perspective, increasing cadence may decrease impact force and therefore, reduce the likelihood of injury. (**Dr. Drue Stapleton**) **PSTR**

Mammon, Steven

Voting Participants Among Young Adults: Factors Driving the Lack of Youth Political Engagement

Voting engagement is defined as dedication and expressed importance towards the voting process, which help to gain trust in the process of voting. To gather a better understanding of voting participation, observing voter turnout can be a good indicator on the measures of voting. Pew Research has shown that 17% of the population aged 18-29 are "bystanders" in the political landscape, meaning they do not cast a vote. Demographics of ages 50-64 years prove the number drops significantly to only 6%, highlighting a gap in active voting from the older generations to the younger generations (Pew Research, 2014). This study looks to use regression analysis to observe the developmental factors that could attribute toward lack of political engagement, by observing parental socio-political nurturing, involvement in youth social and civic groups, and personality trait factors. Results for anticipated voting participation, and past (2016 presidential election) participation are difficult to conclude results based off of the factors examined in the survey, because of bias, and limited sample size of participants eligible to vote in 2016. Linear regression shows that positive parental engagement, as well as in class civics engagement, leads to greater political engagement as an adult, despite still being unclear for voting turnout. (**Dr. Nadia Ansary**) **PSTR**

Marin, Jonnathan

Exploration and Optimization of 13Carbon Isotopic Labeling Methods for Identifying New Biocatalyzed Transformations of Aryl Halides

Organic chemists build complex molecules to be used in a variety of applications including pharmaceutical and materials. As the demand for increasingly complex molecules increases, the ability to make a single or specific synthetic transformation becomes more difficult. Often the solutions are not competitive at an industrial level. Many of these common solutions employ the use of expensive, environmentally unfriendly, and often dangerous reagents. In contrast, nature provides solutions that are environmentally friendly and easy to generate. These natural catalysts, biocatalysts are therefore a popular alternative. On top of their abundance, safety, and green applications, their specificity and efficiency in making and breaking bonds in large complex molecules remains unmatched by other methods. Admittedly, biocatalysts are limited by the research towards their discovery and the isolation of these catalysts from their microorganism host. Our lab has proposed the use of isotopic (carbon-13) labeling to overcome this challenge. Carbon-13 labeling strategies provide an important tool for organic chemists. Through enrichment of the carbon-13 isotope, organic substrates are easily traceable via nuclear magnetic resonance (NMR). This provides a method for evaluating reaction mechanisms, metabolic transformations and more. Although such methods are limited by access to affordable and reactive reagents, our lab was able to successfully label six different aromatic compounds. We are now searching for biocatalyzed transformations, but with the use of labeled compounds we have found a selective hydrolysis biocatalyst and continue to mine for more discoveries. (**Dr. Jamie Ludwig**) **URSA 2018-2019**

Maslanka, Jeffrey

B Cell Subset Changes During Ovarian Cancer

Early biomarkers of ovarian cancer (OvCa) are needed for timely disease detection. Monitoring alterations in the immune system might be informative in this regard. To study humoral immunity during OvCa, we transplant murine epithelial carcinoma cells (ID8) into the peritoneal cavity (PerC). As the PerC is enriched for B1 cells, we assessed B cell subset composition via flow cytometry. As OvCa developed, PerC B1 cells were lost while B2 cells persisted in the PerC and spleen (SP). This difference might reflect that self-reactive B1 cells have a role in housekeeping and lack progenitors in adult mice. We tested the latter hypothesis by monitoring transitional (T) B cells, and found the T1, T2, and T3 subsets were markedly reduced in late stage disease, suggesting depletion of B1 B cells, as opposed to

expansion of B2 B cells. Intriguingly, marginal zone B cells (MZB) expanded early then contracted as OvCa progressed. We speculate that housekeeping burden grows with OvCa progression and the cells most associated with this vital homeostatic process, notably B1 and MZB cells, are most at risk. These findings highlight the disruption of B cell biology in mice challenged with OvCa, and may help to inform strategies to develop biomarkers for the disease. (**Dr. James Riggs**) **PSTR**

Moore, Carissa

Using tree ring analysis to determine if the Canadian Hemlock on the West Lawn at Mount Vernon was the original planted during Washington's era.

In addition to his well-known accomplishments including being the first President of the United States, George Washington also enjoyed planting various native and exotic tree species. He was interested in emulating and adapting British landscape gardening to show that equivalent status could also be achieved in the New World. In order to do this, he used his contacts across the sea to send him different seeds and partially grown trees. In his free time, he would plant these trees, keeping a detailed journal on their growth and death. In March of 2018, a violent storm passed through Mount Vernon and tore down a mature Canadian Hemlock on the West Lawn. This tree was supposedly planted by Washington, and the center-point of this project was to find the true age of the tree and make sure it matched with the records that Washington kept in his diary. By carefully measuring ring widths to match regional climate records, the Hemlock was dated to 1790 at a height of 2.5 to 3 feet when it fell. This suggests the tree could date to approximately 1783, matching a tree that Washington had mentioned and allowing it to be planted before his death in 1799. (**Dr. Daniel Druckenbrod**) **PNL**

Opoku, Annabella

Voices from the Field - Can Doulas Help Address Rising Maternal Mortality Rates in New Jersey?

The burden of maternal mortality is not distributed equally amongst races. African-American women are 3-4 times more likely to die from pregnancy-related deaths compared to white women, but the health disparities that cause this gap are still unknown. However, the poor communication between an African-American patient and their primary healthcare provider may be a possible explanation. In this present study, I examined the role of a doula in impacting the doctor/patient relationship between African-American women and their healthcare provider as well as investigated doula intervention to determine whether doulas can improve the relationship between a pregnant woman and her healthcare provider. (**Dr. Kristin McCarthy**) **PSTR**

Peterson, Amanda

Models of Socialization: Effects of Child-Parent Attachment Style on Forming Adult Relationships

Early childhood models of socialization suggest that the manner in which people learn to socialize is largely influenced by parenting and attachment style. For example, Baumrind's theory of parenting (1966) states that there are three types of parenting: Authoritative, Authoritarian, and Permissive each of which, contribute to the development of an adult who forms unique relationships. Maccoby and Martin revised this original hypothesis, and in 1991, introduced the neglectful parent as the fourth component to the theory (Power, 2013). The notion that early socialization creates a lens through which the adult-child later forms relationships is the topic of this independent study. More specifically, the purpose is to understand how early relationships with parents can influence romantic relationships in adulthood. A survey measuring childhood experiences and current relationship patterns was created using PsychData. 113 participants responded (Female, n = 95, Male, n = 17, Non-Binary, n= 1) who all willingly took the survey. Results indicate that people who experience an

authoritarian style of parenting, have very high levels of anxiety, and very high fear of abandonment when compared to those with permissive parenting, who subsequently experience lower levels of anxiety and lower levels of fear of abandonment. (**Dr. Nadia Ansary**) **PSTR**

Rollefson, Patrik

Problem Solving Capabilities of Coati Mundis in Captivity

For Coati Mundis, previous research has primarily focused on their social behavior and relationships, neglecting to investigate their problem-solving abilities and logical intelligence. However, assessing the problem-solving capabilities of these animals is important for understanding their responses to captivity, and predicting how easily they might escape. In this study, two adult Coati Mundis at Six Flags Safari Park, one female and one male, were presented with a locked food filled wooden box. Over the course of the study as the animals solved the locks, the box was fitted with a series of seven increasingly difficult locks. They were given a time limit of 1 hour or a 6 trial maximum. This study found that the animals were capable of solving all seven locks to varying degrees of success, as well as combinations of two locks. It was primarily the female that solved the complex locks, while the male the locks that only required brute force. In addition, overtime their attention span and work time on the locks did wane. Thus, though these animals are highly capable of problem solving, especially the female, it is not likely due to their social nature and they are unlikely to escape their enclosure. (**Dr. Gabriela Smalley**) **PSTR**

Roy, Hayley

The Fate of Liberalism in Germany during the Bismarckian Era (1848-1880): A Study of Cause and Effect

This project explores the birth of liberalism in Germany with a primary focus on the years 1848 to 1880, when Germany was transformed from a multiplicity of principalities into an empire. My study serves as Rider University's contribution to bridging the gap in scholarship about the history of modern Germany. Most research in the failure of German liberalism during the mid to late 1800s was conducted during or immediately after the Cold War, creating a need for a contemporary synthesis. Based on extensive primary research in German and English-language sources, my study sets the basis for my BHP capstone, and further studies in German history. (**Dr. Lucien Frary**) **URSA 2019-2020**

Savarino, Tara

Rehabilitating the Singing Voice Post Vocal Injury and Speech Therapy

High school students are prone to vocal misuse and injury. Activities such as cheerleading, yelling at sporting events, and over-singing during choir and musical rehearsals can cause vocal problems. Undiagnosed medical conditions such as frequent laryngitis, laryngopharyngeal reflux (LPR), and gastroesophageal reflux disease (GERD) can also lead to vocal issues if not treated properly. McCoy (2012), an expert in voice science and pedagogy, states that certain vocal pathologies can occur from abuse, overuse, trauma, or medical illness. This study focuses on vocal nodules, or "callous-like lesions located along the vibrating margin of the vocal folds" (McCoy, p. 135). The first part of the study includes a brief description of nodules, how they are diagnosed, and ways in which to treat them. The evolution of these treatments as well as their methods are assessed. This study also tests a vocal therapy plan for a female high school student who was diagnosed with both vocal nodules and dysphonia. The participant undergoes several months of voice lessons, focusing on rehabilitation post vocal injury diagnosis, vocal rest, and speech therapy. Voice lessons are developed using speech therapy exercises as a model. The purpose of this study is to work collaboratively with other voice professionals in the rehabilitation of a participant diagnosed with vocal nodules, as well as to determine the level of the participant's vocal improvement throughout the process. Pedagogical

considerations are discussed in light of these findings and in anticipation of future work in this field. (**Dr. Kathy Price**) **PNL**

Thompson, Shanoy

Implicit Stereotype Threat and Riddle Solutions

The marginalization of minorities and embedded stereotype threat (Steele & Aronson, 1995) inspired the current research, which integrated the riddles study of Bar-Hillel, Noah, and Frederick (2018). Riddles were used to activate implicit racial stereotypes across three studies. Participants were adults recruited from MTurk. Studies 1 and 2 randomly assigned individuals to a condition (Themed: African-American, Asian) to read and answer a series of riddles. Study 3 was similar, but added video-recorded riddle readers (Reader: African-American male, Asian male). Results indicated no differences across the riddles, but 22.6% reported knowing the purpose of the study during the African-American condition, contrary to the 7.6% in the Asian condition. Though the participants were more mindful of race and stereotyping in the African- American condition, it did not impact the thought process of generating unbiased riddle responses. Thus, the findings do not support the claim that race-based thoughts increase the probability of generating discriminatory solutions to varying problems. (**Dr. Michael Carlin**) **URSA 2018-2019**

Varga, Hailey

Piloting a Role Playing Intervention for Aggression in a Translational Study

There is research to support that games can lead to emotional development with their players. Prior research has suggested that video games where the player is more involved within the story, like creating their own character, can lead to stronger emotional ties as they move through the story of that game. Other studies indicate that live role-playing can work the same way, with some studies finding live role-playing to be beneficial in the reduction of certain behaviors. The research presented here aims to fill the missing pieces in the literature, if using a response cost procedure can decrease the amount of aggressive options picked within a live role-playing scenario. Participants are those who have experience with Dungeons & Dragons or other role- playing games. Participants will create their own character and be led through a role-playing campaign in which aggressive actions made will trigger the response cost procedure in a multiple baseline design. (**Dr. Mack Costello**) **PSTR**

Warker, Joseph

Deicing salts impact on sodium concentrations in the Centennial Lake Watershed: Soil Retention and Vertical Translocation of Sodium and Chloride.

There was an apparent increase of salt level in the water of the Centennial Lake watershed after each snowstorm for samples we collected between 2018 and 2019 (about a year and half period). The pre- and post-storm conductance can range from 112 µS/cm (pre-storm 2/6/2019) to 1496 µS/cm (post-storm 2/25/2019). This indicates primary sources of salt in the stream are related to the winter deicing salt. Salt level was also higher in water of downstream (lake) than in water of upstream. Downstream conductance was as much as 4 times of upstream. Their sodium concentration difference can be as much as 8 times (13 ppm upstream vs. 102 ppm downstream on 4/3/2018). These up- and downstream differences indicate significant salt contributions to runoff water from Rider campus (downstream site). Salt leaching experiments for soil samples we collected from Rider in early falls (Sept 2018, 2017) indicate that an increase of salt concentration down soil profile as well. The increase of sodium and chloride with depth implies salt storage in soil organic matter and soil clay minerals. Salt storage in soil can helps explain the persistent elevation of sodium and chloride in the Delaware River where respective retentions of 30% to 40% and 20% to 30% for sodium and chloride were reported. Because of the sodium retention in the soil, the implication is that there will be continuing

increase of salt level in the Delaware River for a long period even when the salt application can be reduced in the future. (**Dr. Hongbing Sun**) **PSTR**

Warker, Joseph

Effect of Scents as a Form of Enrichment on Movement and Behavior of American Alligators

In the wild, American alligators occupy a large area of land. In captivity, however, they are often kept in small enclosures, which can create a stressful living environment. Enrichment is one possible solution for increasing the quality of life and reducing stress for captive animals. Unlike in mammals, little research has been done on enrichment in reptiles. The focus of this study was to determine the effect of different scents on the behavior of two American Alligators at Six Flags Great Adventure Safari Park. Scent preference experiments were conducted twice a week, exposing the alligators to four different scent combinations of meat/fish, cinnamon, and unscented control. The alligators' behavior during the different scent combinations was observed and recorded using an ethogram. Overall, there was limited movement by the alligators due to the cooler temperatures during months when the trials took place. It was expected that the meat/fish scents would have the greatest impact on behavior. However, there was an apparent increase in the frequency of certain behaviors (such as position adjustment) in the trials where cinnamon was present. This increase in movement suggests that the cinnamon scent could potentially be used as an enrichment stimulus. (**Dr. Gabriela Smalley**) **PSTR**

Wurmbrand, Skye

The Microbial Diversity of Rider University's Campus via Culture-dependent and -independent Methods

The analysis of 16S ribosomal RNA (rRNA) by culture-dependent and culture-independent methods has expanded our understanding of microbial diversity on Rider University's campus. Culture-dependent methods identify cultivated bacteria while culture-independent assays help identify bacteria that cannot be cultured. Many studies conducting both of these methods are useful in order to evaluate a whole community of microorganisms in cities, beaches, lakes and the human body show that any environment can be analyzed. In this study five distinctive sites were used on the Rider campus. Two samples were taken from the soil near a rock and a tree; one sample was taken from a lake, one sample from a computer located in a twenty-four-hour lounge, and one from a garbage can close to where the dining hall is. A Phylogenetic tree was constructed as a visual representation of Genetic specializations among these organisms explaining where they are found and why, while showing similarities and differences among species of bacteria. The results show bacteria from Firmicutes and Proteobacteria classes with sub genuses such as enterics, alpha/beta/gamma proteobacteria, Staphylococci, and bacillus species. (**Dr. Kelly Bidle**) **PSTR**