

# Honors Scholars & Undergraduate Research Poster Symposium


**J.N. Andrews Honors Program**  
 Andrews University

**March 3, 2017**  
 2:30-4:00 p.m.  
 Buller Hall Lobby

Light Refreshments Conclusion  
 Office of Research & Creative Scholarship  
 Andrews University

### Finding the Concentration of Nitric Oxide

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#### Abstract

The body creates nitric oxide (NO) for signaling. Currently researchers have limited ways to deliver NO using UV-vis spectroscopy. It is possible to observe NO binding to cobalt tetraporphyrins (CoTPP) by measuring allowing the quantity of NO in the solvent using computer software that will then be analyzed for development. The analysis of spectral emission data for a series of solvents will yield a table of values that then researchers the exact concentration of NO in varying solvents.

#### Synthetic Methodology

**Purifying the Materials**

- 1. Spectroscopy
- 2. Pure CoTPP by chromatography
- 3. Absorbance CoTPP by comparing spectra of a known concentration

**Purifying the Spectrophotometric Titration Experiment**

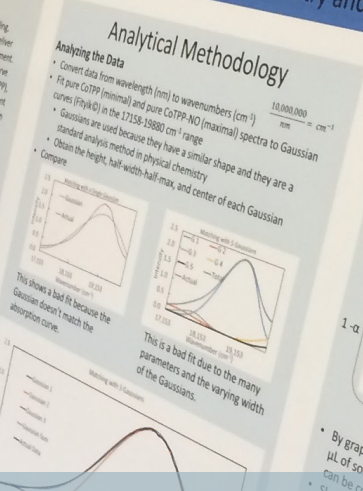
- 1. From available literature
- 2. Use water and hexane as a blank and check to ensure that the absorbance of the blank is zero
- 3. Prepare the solutions by adding known dissolved gases from solvent to the solution and then the "standard" by preparing the stock with NO(g)
- 4. Measure the absorbance of the solutions and then the "standard" by comparing the absorbance of the solutions to the absorbance of the "standard"
- 5. Use the absorbance of the solutions and then the "standard" to determine the concentration of the gas in the solution
- 6. Compare the concentration of the gas in the solution to the concentration of the gas in the standard

#### Analytical Methodology

##### Analyzing the Data

- Convert data from wavelength (nm) to wavenumbers ( $\text{cm}^{-1}$ )
- Fit pure CoTPP (minimal) and pure CoTPP-NO (maximal) spectra to Gaussian curves (Plyyik)
- Gaussians are used because they have a similar shape and they are a standard analysis method in physical chemistry
- Obtain the height, half-width, half-max, and center of each Gaussian
- Compare

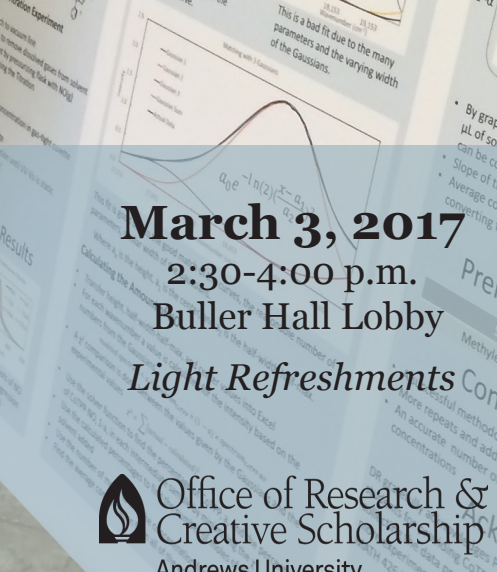
$\frac{10,000,000}{\text{nm}} = \text{cm}^{-1}$



This shows a bad fit because the Gaussian doesn't match the absorption curve.

This is a bad fit due to the many parameters and the varying width of the Gaussians.

#### Synthetic Methodology Results



By graphing the percent of solvent the concentration can be confirmed. Slope of the line is % concentration. Average concentration of the solvent is % concentration.

Conclusion: Successful methodology has been used to determine the concentration of NO in various solvents. An accurate number of significant digits can be determined from the data presented here and for the future.

# Welcome

This symposium celebrates the efforts of undergraduate researchers and their faculty mentors which now culminate in the public presentation of their projects. Many of the students presenting today have worked over the course of several semesters or even years on the research topics they have chosen. We hope that their passion for their field, persistence despite unexpected results, and dedication to in-depth and integrated learning inspires you to be better administrators, educators, mentors, and students.

Since its founding in the 1960s, the J. N. Andrews Honors Program at Andrews University has fostered enthusiastically the challenges and discoveries of undergraduate research. By means of the Honors Thesis, the Honors Program requires its students to engage in substantive primary investigations in which students take an active role in posing research questions, designing and refining methodologies, collecting data and results, and critically analyzing the significance of their conclusions.

The Undergraduate Research Scholar Award was established in 2002 to facilitate more opportunities for students to engage in research and creative scholarship in greater depth than required by their individual programs of study. The Award enables students to work closely with faculty mentors, participate in disciplinary conferences, and develop important professional skills.

The Honors Program gladly joins hands with the Office of Research and Creative Scholarship in sponsoring the annual Honors Scholars and Undergraduate Research Poster Symposium, which recognizes the achievement of Honors Thesis scholars as well as other undergraduate students engaged in substantial research projects. A team of highly engaged faculty research mentors makes possible a rigorous program of undergraduate research.

The J. N. Andrews Honors Program and Office of Research and Creative Scholarship thank heartily the Andrews University faculty members and Honors Council members who give willingly of their time and energy to support and evaluate undergraduate research. The Honors Council Members include: Sonia Badenas, Karl Bailey, Haley Butler, Gabrielle Cook, Vanessa Corredera, James Hayward, Shandelle Henson, Joon Hyuk Kang, Katherine Koudele, Beverly Matiko, Benjamin Navia, L. Monique Pittman, David Randall, Darah Regal, Gisela Schmidt, Davide Sciarabba, Rodney Summerscales, Tiffany Summerscales, Trina Thompson, and Robert Zdor. We also thank our administrative assistant, Maxine Umana and research staff, Jeff Boyd and Mordekai Ongo, as well as our student assistants, Rebecca Keller and Ingrid Radulescu, for their hard work in helping to make this event a success.

Many thanks for working together!



L. Monique Pittman  
Director of the J.N. Andrews Honors Program  
Professor of English



Gary Burdick  
Dean of Research  
Professor of Physics

# Honors Thesis Poster Presentations

- P-01 *Artistic Anarchy in Gregori Kozintsev's Hamlet*  
Alejandra Castillo (L. Monique Pittman, English)  
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Gregori Kozintsev produced his film adaptation of *Hamlet* (1964) in the Soviet Union shortly after Joseph Stalin's death. Kozintsev utilized the political concerns of Shakespeare's play to critique Stalin's regime through the safely distant setting of an English drama. For this purpose he employed two artists who lived through the Russian Revolution and Stalin's rule. Boris Pasternak—screenplay writer—and Dmitri Shostakovich, score composer, helped embed a critique of oppressive authority into Kozintsev's film. The film's portrayal of Hamlet and Ophelia's suffering at the hands of paternalistic power points to the function of art as a means of resistance to political oppression.

- P-02 *The Relationship between Cold Stress Syndrome Mortality and Body Shape in Florida Manatees*  
Purin Chirachevin (Daniel Gonzalez-Socoloske, Biology)  
J.N. Andrews Honors Scholar

West Indian manatees are tropical and subtropical aquatic mammals that can develop cold stress syndrome (CSS) when subjected to water temperatures below 20°C. This study investigates the potential impact that cold winter water temperatures in Florida may have on manatee body shape as a selective force to reduce surface-area-to-volume ratio (SA:Vol; i.e. Bergmann's and Allen's Rule). Morphometric measurements collected from state-mandated necropsies (1974-2014) were used to calculate surface area, volume, and mass. The SA:Vol, controlled by mass, is predicted to be significantly larger for manatees that died of CSS compared to manatees that died from other causes.

- P-03 *Soil Sand Content, But Not Soil Myrosinase Enzyme Activity, Affects MSM Efficacy in Suppressing Weed Growth*  
Warit Chirachevin (Robert Zdor, Biology)  
J.N. Andrews Honors Scholar

Mustard seed meal (MSM) has been shown to control weeds and pests in crop fields. Prior work showed that a sandy loam soil was superior to a silt loam in supporting velvetleaf growth suppression by MSM. To explore this difference, myrosinase enzyme activity was measured in both soils. Results showed no significant difference between the soils. Sand content in Michigan silt loam soil was manipulated in order to test the role of sand content on MSM efficacy in suppressing short-term velvetleaf growth. Results showed that sand enhanced the effect of MSM in suppressing seedling growth and germination.

- P-04 *Synthesis of Cyanostilbenes and Testing of Their Anticancer Properties*  
Gabrielle Cook (Denise Smith and Desmond Murray, Biology)  
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

This research project involves synthesizing cyanostilbenes and testing their anticancer properties. The components of the cyanostilbene hybrids have all been shown to have anti-cancer properties on their own, and we would like to see if we can increase these properties by combining multiple into a single hybrid. Then these cyanostilbene compounds are tested on Her2+ human breast cancer cells. The goal is to assess whether or not the cyanostilbenes have any effect on breast cancer cells. This research is important since, regardless of the outcome, it provides new findings on cancer research.

P-05 *Surviving or Thriving: A Mixed Methods Case Study Investigating Student Thriving in a Racially and Ethnically Diverse High School Choral Classroom*

Jonathan Doram (Anneris Coria-Navia, Teaching, Learning, and Curriculum)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

This project documents the high school student experiences in a diverse choral classroom by exploring what factors contribute to student thriving. Adapted in this project for high school choral students, Dr. Laurie Schreiner's Thriving Quotient survey (2015) quantitatively measured student perceptions. For qualitative descriptions, 35 one-on-one student interviews, interviews with the teacher, and classroom observations were conducted to probe into personal and collective narratives. Geneva Gay's articulation of culturally-responsive teaching guided the theoretical framework of how teaching affects thriving. Results suggest that focusing on a sense of community and family positively impact student thriving in a diverse classroom.

P-06 *Families and God-Human Interactions in Genesis*

Josias Flores (Rahel Schafer, Religion & Biblical Languages)

J.N. Andrews Honors Scholar

As of late, society has experienced a shift in the understanding and definitions of family. This study carefully analyzes the themes found in various interactions between God and humans in the book of Genesis, viewing them through the lens of family. The vast majority of the texts that record direct verbal communication between God and humans reveal that God initiates such encounters in order to develop and define healthy families. This research contributes to the scholarly discussion surrounding families from a theological perspective motivated by insights from the behavioral sciences, and also provides practical implications for modern-day families.

P-07 *"Look at that little macho": Surveillance and Hegemonic Masculinity in Junot Díaz's The Brief and*

Wondrous Life of Oscar Wao

Ludanne Francis (Vanessa Corredera, English)

J.N. Andrews Honors Scholar

Spanning three generations of the Cabral family, Junot Díaz's *The Brief and Wondrous Life of Oscar Wao* (2007) explores the prescriptive nature of Dominican masculinity. Theories about masculinity posited by scholars like R.W. Connell, Michael Kimmel, and M. Cristina Alcade, and Michel Foucault's concept of the panopticon frame my analysis of the surveillance of Oscar de Leon's and his grandfather Abelard Cabral's masculinity. Close reading of the novel demonstrates that while resistance appears at the individual level, ultimately, this resistance is futile unless the cultural system that encourages social surveillance, internalization, and thus self-surveillance of masculinity ultimately changes as well.

P-08 *"How Work Motivation and Support Affect Work Ethic in University Student Employees*

Sarah Henry-Saturné (Karl Bailey, Behavioral Sciences)

J.N. Andrews Honors Scholar

Working college students often face the challenge of being motivated in their activities and having their basic psychological needs met at work, whether they work as readers or campus caretakers. This study seeks to find the relationship between college students' work ethic and perceived performance, and their work motivation and needs support using a survey methodology. I hypothesize that of the types of motivation, the strongest relationship to work ethic will be from the most internalized motivations. I also expect to find that working environments that meet basic psychological needs will be positively related to work ethic and internalized motivation.



P-09 *Hispanic Hallyu: Comparing Boys over Flowers Directed by Jeon Ki-Sang with Latino “Telenovelas”*  
Austin Huh (Pedro Navia, International Languages & Global Studies)  
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

The term Hallyu, “Korean wave,” was originally coined in the 1990s to describe the proliferation of South Korean popular culture throughout the world. This project focuses specifically on Hispanic populations within North and South America where—despite lack of geographical or cultural proximity to South Korea—Korean movies, dramas, and music have obtained widespread popularity. With respect to K-dramas, this project juxtaposes thematic elements between the K-drama *Boys over Flowers* directed by Jeon Ki-Sang and Latino “telenovelas” to determine if K-drama popularity can be ascribed to similarities in motifs between K-dramas and “telenovelas.”

P-10 *Molecular Mass of Potentially Carcinogenic Heterocyclic Amines*  
Irene Hwang (Ryan Hayes, Chemistry and Biochemistry)  
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Investigation of cancer-inducing molecules in cooked foods has led to the discovery of mutagenic heterocyclic amines (HCAs) in meat. The amino acids creatin(in)e and phenylalanine form the precursors for these HCAs. Recent research here at AU has found similar mutagenic HCAs produced from plant-based proteins when arginine, rather than creatin(in)e, is substituted in high temperature reactions (simulated cooking) with phenylalanine. Our research focuses on developing HPLC methods to isolate individual candidates that are then screened for mutagenicity via the Ames test. Mass spectroscopy methods are also being developed to identify the molecular structure of these lead mutagenic arginine-based HCAs.

P-11 *The Relationship between the Prevalence of HIV/AIDS and Associated Socioeconomic and Behavioral Factors*  
Viktoria L. Kolpacoff (Shandelle M. Henson, Mathematics)  
J.N. Andrews Honors Scholar

Human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS) are a global epidemic affecting almost 40 million people. Studies show that the spread of HIV is associated with numerous and complex factors such as poverty, religious beliefs, hygiene practices, and gender inequalities. We analyze the relationship between the prevalence of HIV and four associated socioeconomic and behavioral factors: per capita gross domestic product (GDP), gender inequality (GII), globalization (GLI), and literacy rates (LIT). We use logistic regression to regress the log-odds of becoming infected with HIV against the four associated factors and calculate an odds ratio for each factor.

P-12 *Rectifying Curves in 4-D Minkowski Space*  
Łukasz Krzywón (Yun Myung Oh, Mathematics)  
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

The flat four-dimensional spacetime of relativity, called Minkowski space, distinguishes vectors into three categories: space-like, light-like, and time-like. One way of analyzing smooth, regular curves in this space is through use of the orthonormal Frenet-frame, which assigns a basis for each point along the curve. The four unit vector functions are called the tangent, normal, first binormal, and second binormal. A rectifying curve is a linear combination of the tangent and two binormal vectors. In this presentation I will give the necessary and sufficient conditions for when a time-like curve in Minkowski space is rectifying.

P-13 *The Role of Octopamine in Selective Phonotaxis by Female Cricket Acheta Domesticus*

Darley Magno (Benjamin Navia, Biology)

J.N. Andrews Honors Scholar

Female crickets respond phonotactically to the calls of conspecific males. Females' response has been reported to be variable, ranging from unselective to selective of calls with varying syllable periods (30–90 ms). Octopamine, an invertebrate neurotransmitter, has been reported to increase aggressive behavior in crickets (Stevenson et al. 2005), but the effects of octopamine on behaviors such as phonotaxis have not been investigated. The goal of this study is to determine the effects of octopamine on the syllable-period selective phonotactic response of females. Preliminary data suggests a decrease in phonotactic responsiveness shown by 5-10 day-olds after prothoracic nanoinjection of octopamine.

P-14 *A Deep Learning Approach to Identifying Outcomes*

Steven Mann-Rojas (Rodney Summerscales, Engineering and Computer Science)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Reading through medical abstracts to find key data points can be a time consuming task. The ACRES system, built by Dr. Rodney Summerscales, automatically extracts key information from many abstracts. This allows a large set of results to be compared, the most successful of which can be studied further. This research is focused on the identification and extraction of text containing outcomes measured for each treatment group in a clinical trial using an artificial neural network. The goal is to score a higher degree of accuracy than the previous approach which used trained classifiers built with supervised learning techniques.

P-15 *War Gaming Applications for Achieving Optimum Acquisition of Future Space Systems*

Karel Marshall. Co-Authors: William Black<sup>1</sup>, Paul Viennehage<sup>2</sup>, Heather Barcomb<sup>3</sup>, <sup>1</sup>Lehigh University, <sup>2</sup>Emory University, <sup>3</sup>SUNY Geneseo. (Shandelle Henson, Mathematics)

J.N. Andrews Honors Scholar

In 2014, the federal government spent nearly half a trillion dollars on contractor projects. The Department of Defense wants to develop an algorithm to optimize the acquisition of new technologies. This project makes use of game theory, probability and statistics, non-linear programming and mathematical models to model negotiations between governmental agencies and private contractors. It focuses on generating the optimum solution and its corresponding acquisition strategy for different contract types. This project culminates in a collection of MATLAB (MathWorks) programs and the newly developed strategy shows strong convergence to Nash equilibrium values and successful selection of optimum solutions.

P-16 *You Tell the Tale: Interactive Retellings of the Myth of Orpheus*

Christopher McLean-Wheeler (Bruce Closser, English)

J.N. Andrews Honors Scholar

The author retells the myth of Orpheus and Eurydice in an interactive narrative style. The medium encourages readers of the finished project to take an active role in storytelling by deciding what the protagonist does at key moments in the plot; each decision branches out into alternate story paths, allowing the author to draw from multiple versions of the myth in his adaptation, particularly Ovid's *The Metamorphoses* and Virgil's *The Georgics*. The content chosen for inspiration is based on how it can offer new interpretations of and insight into this retelling of the familiar story.

P-17 *Fluorescence Analysis of PAMAM Dendrimers*

Ansel Nam (Ryan Hayes, Chemistry and Biochemistry)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Despite their lack of conjugation, polyamidoamine (PAMAM) dendrimers are intrinsically fluorescent, and this fluorescent has been previously reported to increase by lowering the solvent's pH. The mechanism of fluorescence from these polymeric, non-conjugated, nanostructures is poorly understood so the goal of this research is to study the role of solvent pH, dendrimer concentration, and dendrimer size on this property. The fluorescent emission efficiency (quantum yield) was also studied and compared to another highly fluorescent molecule, fluorescein. These results will help improve our understanding of dendrimer fluorescence and how it can be used for analysis in biological or chemical systems.

P-18 *The Factors that Affect the Capitalization of Digital Currencies in Developing Countries – An Assessment of Security Risks and their Effects*

Joshua Pazvakawambwa (Roy Villafane, Engineering and Computer Science)

J.N. Andrews Honors Scholar

Digital currency platforms such as Bitcoin, Ethereum, and Ripple are slowly but surely revolutionizing trade and commerce alongside their potential to impact people's economic lifestyles immensely. Digital currencies present a unique medium for humanitarian, mission, and more notoriously arms and terrorism transactions around the globe. Various factors like security, legislature, and infrastructure affect the viability of adopting digital currencies in developing countries such as Zimbabwe. My research assesses whether this technology's shortcomings outweigh the conventional means of exchange: hard cash, gold, and checks. Therefore, aiding stakeholders in making informed decisions concerning interfacing technology with economics in the developing world.

P-19 *Investors' Reaction to the Passing of the Indian Companies Act, 2013*

Melisa Ann Ruhupatty (LeRoy Tim Ruhupatty, Accounting, Economics, and Finance)

J.N. Andrews Honors Scholar

This research seeks to determine whether mandated corporate social responsibility (CSR) is value relevant to investors, specifically investors of Indian companies affected by the Companies Act, 2013 which requires companies meeting specific financial criteria to spend 2% of their three-year average net profits towards social initiatives. Using the event study methodology, this study compares the cumulative abnormal returns (CAR) of companies perceived as environmentally friendly on the Bombay Stock Exchange (BSE) with those not considered environmentally friendly. We found that affected companies considered environmentally friendly have significantly better CAR than other affected companies. This finding suggests that mandating CSR is relevant to investors.

P-20 *Chelerythrine Chloride and Its Effects on Phonotactic Behavior in Female Crickets *Acheta Domesticus**

Heaven Shin (Benjamin Navia, Biology)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Selective phonotaxis by female crickets has been shown to be variable. Mechanisms which underlie such behavioral variability are being studied. Juvenile Hormone III is a neuromodulator that has been shown to increase selectivity in phonotactic behavior of female crickets. In an attempt to further explore its effects on the behavioral responses of our model, experiments have been performed with Chelerythrine Chloride that is known to have an opposite effect of Juvenile Hormone III. This poster reports on the effect of Chelerythrine Chloride on behavioral responses in female crickets *Acheta Domesticus*.

P-21 *Natural Products in Weed Control: Allyl Isothiocyanate Effects on In Vitro Velvetleaf Seedling Growth and the Influence of Mustard Seed Meal on Soil Bacterial Populations*

Stanford Shin (Robert Zdor, Biology)

J.N. Andrews Honors Scholar

Past research has shown that allyl isothiocyanate (AITC) and its sister ITC compounds are effective alternatives to herbicides in reducing growth in weed seedlings. In this project the effects of mustard seed meal (MSM), a source of AITC, on plant-associated soil bacteria populations was assessed along with the effect of AITC on velvetleaf seed in vitro germination. Results show that MSM reduces bacterial levels in the soil. Velvetleaf seed germination was inhibited by micromolar levels of AITC. These results suggest that MSM has the potential to impact velvetleaf growth in the field as well as becoming a weed management tool.

P-22 *Antibacterial Effects of Gold and Silver Naked Nanoparticles*

Andrew Walayat (Denise Smith, Biology)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

The antibacterial effects of gold and silver naked nanoparticles on *E. coli* and *S. aureus* will be assayed through administration of a drug and assessed through a colony count. The antibacterial effects of rhodanine and boronic acid in conjunction with the nanoparticles will also be attempted through this process. The relative effective antibacterial power will also be examined through the administration of multiple porous disks of varying drug concentration to the colony growth disc. Research is currently underway; clearer results anticipated as more work is done.

P-23 *Whom do Adventists Fear? A Comparison of Perceived Threat from Catholics and Muslims*

Maria Wixwat (Duane C. McBride, Behavioral Sciences)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Adventists have a long history of strife with the Catholic Church, but the religion of Islam also has a lot of salience to Christians that live in the states now. This study examines whether Seventh-day Adventists see Catholics or Muslims as a bigger threat. We measure perceived threat with a self-report scale and a reaction time measure. Data collection is in process. T-test analysis is expected to show that Adventists view Catholics as a higher threat. This study could have an impact on our understanding of integration and interactions between different religious groups.

P-24 *The Stabilization of Aqueous Ascorbic Acid Solutions using PAMAM Dendrimers*

Hyelin You (Ryan Hayes, Chemistry & Biochemistry)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Ascorbic acid, also known as vitamin C, is an effective antioxidant and an essential human enzymatic cofactor. However, it is unstable when isolated in aqueous solutions and readily degrades upon exposure to air and ultraviolet light. PAMAM (polyamidoamine) dendrimers were evaluated to stabilize dilute aqueous solutions of ascorbic acid. UV-Vis absorbance spectroscopy was used to measure the degradation and stabilization over four hours with various dendrimers and varying pH values. Our data shows that PAMAM dendrimers can significantly decrease the rate of degradation, especially near physiological pH. These results demonstrate dendrimers as a technology for stabilizing reactive organic molecules.



# Undergraduate Research Poster Presentations

- P-25 *Copper(II) Ion Sequestration by PAMAM-octyl Dendrimers*  
Lauren Bitterman (Ryan Hayes, Chemistry & Biochemistry)  
Undergraduate Research Scholar

Nanomaterials, such as dendrimers, are being evaluated for new products because of their unique properties. Dendrimers can act as nanocontainers to entrap materials within their highly branched polymeric structure. We have seen that Generation 2-PAMAM-octyl surface dendrimers can be used to entrap transition metal ions, like copper(II), and transfer them from an aqueous solution into a non-polar solvent. This project focuses on quantitating the copper(II) sequestration by these dendrimers. We have developed a method to quantify the copper(II) ion binding capacity within the octyl-dendrimers using ICP spectroscopy which shows how nanomaterials could be a valuable tool for heavy metal remediation.

- P-26 *Activity of Carboxypeptidase O in the Secretory Pathway of MDCK Cells*  
Linnea C. Burke (Peter J. Lyons, Chemistry & Biochemistry)

Carboxypeptidase O (CPO), a member of the M14 family of proteolytic enzymes, preferentially cleaves C-terminal acidic amino acids, with weak affinity towards hydrophobic amino acids. We investigated the subcellular localization of CPO, and after immunofluorescent analysis of stably-transfected MDCK cells, we found that CPO co-localized with calnexin, an ER marker. To determine what CPO does in the ER, MDCK cells were transfected with plasmids expressing Gaussia Luciferase (GLuc) containing a C-terminal ER retention signal (KDEL). Previous experiments suggested that CPO cleaves the KDEL sequence of GLuc, causing its secretion. In ongoing experiments, plasmids expressing GLuc tagged with modified KDEL sequences (KDELD, KDELE, and KDELEL) will be transfected, and the intracellular activity of CPO against these substrates will be assessed.

- P-27 *Identification of the Eastern Massasauga Rattlesnake (*Sistrurus catenatus*) through Genetic Analysis of Shed Skin*  
Erika Bauza Nowotny (Peter J. Lyons, Chemistry & Biochemistry)  
Undergraduate Research Scholar

The Eastern Massasauga Rattlesnake (*Sistrurus catenatus*) is considered an endangered species with only 45% of historic populations known to be extant today. This study aims to identify the presence of the Eastern Massasauga through genetic analysis and to determine genetic variability and diversity of populations in Michigan. Digestion of shed skins was performed by collagenase incubation followed by Proteinase K. Intronic regions of the TBP gene within the nuclear genome were amplified using PCR. A total of 7 out of 14 samples presented bands within expected product range (800pb). The purified PCR products will be sequenced and aligned with other sequences obtained from similar studies.

- P-28 *Ames Test Optimization for Evaluating Mutagenicity of Arginine-Based Heterocyclic Amines*  
Rayford Alva (Brian Wong, Biology)  
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Various combinations of burned animal-based amino acids have been documented to show mutagenic characteristics via the Ames test. In our lab, the Ames test was carried out on a compound isolated from a sample of burned phenylalanine and arginine, plant-based amino acids, to test for mutagenicity. The Ames test uses Salmonella TA98, which are dependent on histidine for growth. Mutagenic compounds mutate Salmonella, allowing colonies to grow on nutrient media lacking histidine. Results showed that our isolated compound exhibited mutagenic characteristics similar to a known animal-based heterocyclic amine, PhIP, providing evidence for a new plant-based class of mutagenic heterocyclic amines.

P-29 *Does Exposure to Males Change the Phonotactic Response of Female Crickets A. Domesticus Towards Model Calls?*

Chelsea Kent (Benjamin Navia, Biology)  
Undergraduate Research Scholar

This study investigates phonotaxis in male-exposed females of different ages. Females were tested in a non-compensating treadmill and were exposed to model calls with varying syllable periods (ranging from 30 – 90 ms). It has been proposed the presence of males significantly reduces phonotaxis by females. However, preliminary results suggest this is not the case. There seems to be an age difference in the response of the females. While young crickets demonstrate higher levels of selectivity, favoring the most attractive range of calls, old females are considerably less selective. Additionally, intensity of the call may also affect selectivity of phonotaxis. Implications of these results are discussed.

P-30 *The Effect of “The Blob” on a Seabird Colony in the Salish Sea*

Rashida Smith (James Hayward, Biology; Shandelle Henson, Mathematics)  
Undergraduate Research Scholar

Sea surface temperature (SST) is a primary predictor of egg cannibalism in a large glaucous-winged gull colony on Protection Island, Washington, presumably because high SST is associated with decreased numbers of fish on which gulls feed. During 2006-2011, a 0.1°C increase in average SST during September-May prior to egg laying increased the odds that an egg was cannibalized by 10%, all other factors held constant. In 2016, however, SST was high in the Salish Sea yet egg cannibalism was low. Other strange events occurred during the breeding season of 2016 in the Salish Sea, such as a die-off of rhinoceros auklets. The presence of an unexpected large mass of warm water, called “The Blob”, just off Vancouver Island, may have led to these anomalies. In this project, we are conducting a comprehensive literature search to identify known connections between SST, forage fish dynamics, gull feeding behaviour, and “The Blob.” We have found that SST directly and indirectly influences the distribution and migration patterns of herring fish.

P-31 *Sufficient Conditions for the Existence of Positive Solutions to an Elliptic Model*

Timothy Robertson (Joon Kang, Mathematics)  
Undergraduate Research Scholar

We study the existence of solutions to a general elliptic model. Specifically, we give conditions for the existence and non-existence of steady-state solutions to a general, nonlinear population model of two cooperating species.

P-32 *Interferometry-Based Gravitational Wave Detection*

Zachariah Swerdlow (Tiffany Summerscales, Physics)

The Laser Interferometer Gravitational-Wave Observatory (LIGO) consists of two detectors, one in Hanford, Washington and the other in Livingston, Louisiana. Gravitational waves are “ripples” in the fabric of spacetime. The most powerful gravitational waves are generated by the most cataclysmic events in the universe, such as the merger of two black holes, detected by LIGO in September of 2015. With the construction of more detectors in the future, such as the planned LIGO detector located in India, we will better be able to determine the sky locations of gravitational wave sources and distinguish gravitational wave signals from local noise sources.

P-33 *Optimizing BayesWave*

Jacob Willard (Tiffany Summerscales, Physics)  
Undergraduate Research Scholar

A number of student researchers at Andrews University, lead by Dr Tiffany Summerscales, are members of the Burst Data Analysis Group, which is part of the LIGO Scientific Collaboration. This group uses programs, such as BayesWave, to analyze gravitational wave detector data. BayesWave uses bayesian inference to distinguish between gravitational wave signals and noise in observed LIGO data. To improve the accuracy of Bayeswave, we test BayesWave using varying priors with mock-data injections.

P-34 *Analysis of Electromagnetic Ion Cyclotron Wave Occurrence Using Van Allen Probes*

Jesse Snelling (Jay Johnson, Engineering & Computer Science)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

NASA's dual spacecraft Van Allen probe mission was launched to increase understanding of the radiation belt environment and the role of waves in controlling radiation belt fluxes. It is particularly important to understand the conditions that lead to wave growth. In this study several intervals of electromagnetic ion cyclotron (EMIC) wave activity observed by these spacecraft were analyzed. This study will focus on understanding the role of cold plasma on the growth of EMIC waves. Specifically, I analyzed wave events in the inner magnetosphere and performed linear stability calculations of the dependence of EMIC wave stability of cold plasma populations.

P-35 *Implementing a Gaze Tracking System in Virtual Reality*

Juan Burdick (Rodney Summerscales, Engineering and Computer Science)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

This project is designed to determine where a person is looking in virtual reality. Extensive study has been done on tracking what a person is looking at in two dimensions, and this has taught us tricks utilized in pictures and videos, such as altering focus, lighting, shading, etc. But adding a third dimension invalidates many of those ways of manipulating what a viewer will see, forcing researchers to discover new tricks to influence watchers. Over the past summer, I spent time creating a method for determining the location the user was looking at. Currently, I am creating a heatmap, which changes the color at the location the user is looking.

P-36 *Iago as Moral Other in Jonathan Munby's Production of Othello (2016)*

Emma Magbanua (L. Monique Pittman, English)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Jonathan Munby produced a contemporary adaptation of Shakespeare's *Othello* at the Chicago Shakespeare Theatre in Spring of 2016. While continuing to utilize Shakespeare's language, Munby modernized *Othello* through the use of contemporary military costumes, props, accents, music, and dance. Munby did not limit his adaptation to solely visual and auditory aspects of *Othello*, but also took the liberty of contemporizing the principle of "otherness" in the play. This research explores the identification of Munby's character of Iago as "Moral Other," whose actions led to the fall of his wife, Emilia, a fellow officer, Roderigo, Desdemona, and the protagonist, Othello.

P-37 *Hermeneutics: A Method Applied*

Jennifer Coleman (Rubén Muñoz-Larrondo, Religion & Biblical Languages)

Undergraduate Research Scholar

The purpose of this study is to assist in the ongoing development, expansion, and revision of a consistent, comprehensive method for in-depth hermeneutics and exegesis of Scripture at the undergraduate level. The steps of the method will be applied to an eclectic selection of passages from the Old and New Testaments including historical narrative, prophetic poetry, gospel discourse, and epistolical writings. The samples produced will demonstrate the hermeneutical procedure, highlight areas for modification, and provide students with examples to guide them in their own research. The results of this study will ultimately contribute to a practical manual for biblical hermeneutics.

P-38 *Overcoming Cultural Barriers: Paul's Message of Unity in Eph. 2:11-22*  
Jon Ruhumuliza (Rubén Muñoz-Larrondo, Religion & Biblical Languages)  
Undergraduate Research Scholar

The unifying message of Paul can be seen throughout the NT and especially in the book of Ephesians. The call for unity between two cultures with completely different narratives and experiences is a testament to the power of Jesus Christ. In this presentation, I demonstrate the paradigm of this unity using a variety of hermeneutical methods. This exercise also demonstrates the benefit of using many different hermeneutical methods for finding and confirming a thesis. The methods utilized here were taught to me by Rubén Muñoz-Larrondo, PhD, and my presentation will consist of examples from the portfolio I submitted for RELB245 Hermeneutics.

P-39 *Broken Dishes on a Broken Road: An Example of Tall Jalul's Field B Pottery*  
Alma Nizaye Cortez-Alvarez (Constance E. Gane, Old Testament/Horn Museum)  
J.N. Andrews Honors Scholar and Undergraduate Research Scholars

Ceramic analysis consists of a number of elements including particle analysis (voids and inclusions), Munsell color readings, and measurements, which is crucial in developing archaeological stratigraphy. The find location of diagnostic sherds aids in understanding space usage within a given locus clarifying the context and dating of the material remains. A Matrix sequence chart developed by arranging all loci by phase, further clarifies the stratigraphy for each square. My research has utilized the above methodology focusing on ceramic remains from squares B:11-19 in the Iron Age road system at Tall Jalul, Jordan. I will present the stratigraphic results from one of these.

P-40 *Jordanian Women and Children's Community Involvement through Roof Top Garden: A Feasibility Study*  
Anna Kim (Oystein LaBianca, Archaeology)  
Undergraduate Research Scholars

How might hands-on learning about roof-top gardening impact K-12 students' sense of ownership of their past, present and future? This research will contribute to further understanding of ways that K-12 education in the Middle East can improve local community activism when it comes to caring for past, present and future local cultural and environmental heritage. In addition to reviewing previous research on this topic, this study will report lessons learned through this researcher's personal involvement with developing a curriculum and hands-on learning opportunities for teaching about roof-top gardens in two local public schools in Hisban, Jordan. The project was carried out during a three month period during the summer of 2016 in partnership with two local schools, the Hisban Cultural Association, the Hisban Womens's Association, and the Andrews University sponsored Hisban Cultural Heritage Project. Standard ethnographic procedures were used to carry out this study, including face-to-face informal and formal interviewing, direct participant observation, and recording of field notes. I hypothesized that hands-on learning about roof-top gardening will have a positive impact on K-12 students' sense of ownership of their past, present and future.

P-41 *The Role of Place-making in Community Development: A Case Study at Tall Hisban, Jordan*  
Noël Harris (Joel Raveloharimisy, Community & International Development Program)  
Undergraduate Research Scholars

How does implementing placemaking ideals affect community development initiatives? This study endeavors to test the role of placemaking at Tall Hisban, an archeology site in central Jordan. A socio-economic garden in the archaeological park was re-purposed from a withering garden to a neutral meeting space for the town. This not only sparked interest in the town of Hisban, resulting in community meetings and a cultural festival, but it led to a spike of community ownership of their archaeological site. Importantly, these meetings led active involvement from the local NGO. This case study confirmed that it is important for community development to consider and employ placemaking methods in their projects, as to better reach the targeted population.

P-42 *The Anxiety Strikes Back: A Study on Anxiety Associated with Word Differences in Expressive Writing amongst Men and Women*

Heather M. Moore (Harvey Burnett, Behavioral Sciences)  
Undergraduate Research Scholar

This study will be based off of an on-going broader study examining the efficacy of Psychological First Aid (PFA) on anxiety, mood, resilience, and electrodermal activity compared to an expressive writing condition across time utilizing a randomized controlled trial. The purpose is to examine the differences in anxiety associated word usage across gender produced by the expressive writing task. With IRB approval obtained, we are collecting data from at least 100 subjects from the Behavioral Sciences Research Participation Pool. T-test analysis is expected to show a lower rate of anxiety word usage in men across time compared to women.

P-43 *The Twenty-First Century Professor: An Evaluation of Time Allocation Among University Faculty*

Courtney-Lynn V. Harvey (Karl Bailey, Behavioral Sciences)  
Undergraduate Research Scholar

Though widely studied among college students, time allocation has not been evaluated to the same degree among higher education faculty. We expect to find continued trends of increased time pressure and work avoidance among faculty due to growing workload demands in academia (Link, Swan & Bozeman, 2008; Toews & Yazedjian 2007). We focus on the potential relationships between workload, perceived time control, stress, basic need satisfaction, and procrastination among full time faculty, and describe different profiles of time use. Our results will help us examine how university faculty handle time demands given the myriad of responsibilities facing the twenty-first century professor.

P-44 *Academic Advising as Servant Leadership: Alumni Perceptions of Andrews University Academic Advisor Qualities*

Lukonde Mwinga (Glynis Bradfield, SDEIP)  
Undergraduate Research Scholar

What qualities do students value most in an academic advisor? How do alumni perceptions of advisors change over time? Findings from a mixed-methods 25-item survey of alumni provided answers. Both quantitative and qualitative survey responses were coded using the five constructs identified in Paul, Smith & Dochney's 2012 Servant Leadership model. Participants consistently scored their selected advisor higher on the constructs Altruistic Calling, Holistic Support and Wisdom than the constructs of Organizational Stewardship and Persuasive Mapping. There was no significant difference between responses over the six seven-year periods compared. Findings corroborated a previous study showing Wisdom to be foundational.

P-45 *New Faculty Onboarding*

Fonda Mwangi (Rachel Williams-Smith, VACD)

Onboarding is the process an employee goes through when starting a new job to gain information about their institution and become acclimated to the environment. This action research project was aimed at discovering the new faculty onboarding process at a small, private university could be improved. The primary research question was how the onboarding process could be improved. Following a review of literature, an improvement proposal was drafted and presented to a focus group of faculty and staff, and feedback was collected. A total of 19 participant responses, included 10 in-depth interviews, were collected and analyzed. Results indicated that the proposal itself represented a considerable improvement to the onboarding process but that it did not go far enough in addressing challenges related to the unique culture of the institution. A primary conclusion is that this study outlines a number of important and specific ways in which the new faculty onboarding process could be improved, including through mentoring, additional special training, web-portal access to important information, ongoing adjustment support opportunities, supportive feedback, and periodic tracking of and follow up on adjustment process and progress. Additional conclusions are also drawn.



P-46 *Spectrum Sisters: A Story of Sisterhood and Autism*

Nina Vallado (Paul Kim, VACD)

Undergraduate Research Scholars

A research project about a unique communication method, known as the Rapid-prompt method, for people who are nonverbal autistics. The purpose of this study is to supplement the end goal project as a 30-minute film, in which the realities of RPM are shown in a relationship between two sisters. Research data has been conducted through the means of interviews with professionals in the autism community who use the communication method of RPM. The data will be presented at the Undergraduate Research Poster Symposium on March 3, 2017, and the screening of the film, *Sisterly*, will be on April 16, 2017.

P-47 *Optimization of ECL Biosensor via Microfluidics Channel*

Ester Carrasco, Zach Verhelle, Jisu Choi, Daniel Marsh, Hyun Kwon (Hyun Kwon, Engineering & Computer Science)

Undergraduate Research Scholars

There is a high demand and positive impact in using biosensors within the healthcare system. Biosensors are capable to assist a user with point-of-care diagnostics. The purpose of this research is to provide a portable, user-friendly alternative to commercialized ECL instrumentation using cellphones, cameras and wireless connection. Our overall approach is to incorporate electrochemiluminescence (ECL) biosensor technology into a handheld device that is supplemented by a mobile device and much more feasible for users. The ECL reaction emits visible light which is captured with the mobile device camera, or by a camera within the sensor casing. A microfluidics channel is also incorporated for a user-friendly alternative. Analysis of the image is then executed via a mobile application. A photomultiplier tube is used to configure the mobile application; associating a given intensity with the concentration of the desired substance within the ECL reaction. The configuration process involves determining the optimal concentrations of coreactants, tris(2,2'-bipyridyl) ruthenium II (Ru(bpy)<sub>3</sub><sup>2+</sup>) and 2-(dibutylamino)-ethanol (DBAE), determining the voltage that provides the best ECL signal, and incorporating a solution-flow system.

P-48 *Painted Ceramics at Tall Jalul: A Stratigraphic Evaluation of Field B*

Elizabeth Bates (Randall Younker, Archaeology)

J.N. Andrews Honors Scholar and Undergraduate Research Scholars

Do the different paint designs applied to ceramic vessels in antiquity have any relationship to the type of vessel or its time period? The purpose of this project is to understand the characteristics of painted designs specific to each historical period at Tall Jalul, Jordan in order to draw inferences about trade, wealth, and historical period. Painted ceramic sherds from Field B were documented, recorded, categorized by time period, and compared with similar sherds from nearby sites. The results were compiled and analyzed to showcase the styles that are most common for each type of ceramic vessel and time period.

P-49 *Tall Jalul Ceramic Project*

Jessica Bates (Randall Younker, Archaeology)

J.N. Andrews Honors Scholar and Undergraduate Research Scholars

How did the Ammonite settlement at Tall Jalul interact with the surrounding Moabite community and what material cultures did they share? Analyzing pottery from this site and cross-referencing it with nearby archeological sites highlights the cultural diffusion that took place at Tall Jalul; providing a framework for understanding its historical periods. There were Two Iron Age roads found in Field B Square 2 that created a sealed locus preserving the stratigraphic sequence from contamination. Since some ceramic vessels change over time, this project analyzes the cooking pots found between these roads to clarify the web of cultural influence within its historical transitions.

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