

Honors Scholars and Undergraduate Research Poster Symposium

March 1, 2024, 2:30–3:30 p.m. | Buller Hall

5: 11am-2pm
6: 10am-11am, 12pm-1pm
7: 11am-2pm



WELCOME

Thank you for joining us for the 2024 Honors Thesis Poster Symposium. We feel grateful and blessed to be able to gather in person to celebrate the creativity and curiosity of this year's Honors Thesis researchers. Since its founding in the 1960s, the J. N. Andrews Honors Program at Andrews University has fostered enthusiastically the transformative experiences 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 Office of Research and Creative Scholarship, led by Dr. Gary Burdick, serves a vital role across campus in supporting and funding quality undergraduate research. 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 URS Award enables students to work closely with faculty mentors, participate in disciplinary conferences, and develop important professional skills. Many Honors Scholars have benefited from the URS funding and have noted that support on their poster boards.

A team of highly engaged faculty research mentors makes possible a rigorous program of undergraduate research. We thank each mentor for the commitment of time and energy invested in Andrews University's young scholars. The J. N. Andrews Honors Program and Office of Research and Creative Scholarship thank 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, Anthony Bosman, Kylene Cave, Vanessa Corredera, Ryan Hayes, Yoel Kim, Katherine Koudele, Benjamin Navia, Alexander Navarro, L. Monique Pittman, Davide Sciarabba, Karin Thompson, Rhonda Tomenko and Robert Zdor. We also thank our Honors Program administrative assistant and recruiter, Maxine Umaña, and the ORCS staff, Carlisle Sutton and Mordekai Ongo, as well as our student assistant, Anna Pak, for their hard work in helping to make this event a success.

Many thanks for working together!



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

A handwritten signature in black ink, appearing to read "L. Monique Pittman".



Gary Burdick
Dean of Research
Professor of Physics

A handwritten signature in black ink, appearing to read "Gary W. Burdick".

HONORS THESIS POSTER PRESENTATIONS

P-01 Sandrine Adap (Ackley Will, Computing)
Developing a Computer Vision-Based Mobile-Assisted Learning App for ASL Recognition
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Several machine learning researchers have developed algorithms recognizing American Sign Language (ASL), but few have applied the algorithms to real-world situations with a large-scale vocabulary. This project develops a beta version of a mobile application designed to give beginner ASL learners opportunities to practice basic ASL vocabulary and receive feedback about their signing accuracy. Building on Dongxu Li et al.'s I3D sign language recognition algorithm and 2000-word dataset, the app seeks to determine whether the I3D algorithm can sufficiently recognize a user's motions when recorded from a mobile device and accurately classify whether or not the user signed correctly.

P-02 Zachary Alignay (Melissa Poua, Medical Laboratory Sciences, Daniel Gonzalez-Socoloske, Biology, Michael Gayle, School of Education)
Andrews University Pre-Professional Students Preparedness for A Future With Artificial Intelligence
J.N. Andrews Honors Scholar

Artificial Intelligence technology has advanced considerably over the past four years. With such rapid technological development, the question has to be asked if students are adequately educated on the implications and abilities of artificial intelligence. Are Andrews University pre-professional students prepared for future careers with artificial intelligence? To approach this question, a survey of students across multiple perspectives was conducted to sample if there was a consensus or lack thereof on the perception of ethics regarding artificial intelligence, to ask students how using artificial intelligence has changed their education, what purposes it can be used or cannot be used, personal expectations for themselves, and expectations for their future education, careers, and workplaces.

P-03 Erin Beers (Karl Bailey, Behavioral Sciences)
The Dark Triad, Creativity, and Morality
J.N. Andrews Honors Scholar

The Dark Triad of personality is the combination of narcissism, Machiavellianism and psychopathy. Dark Triad traits include inhibitory control and imagination, two elements of the associative theory of creativity (Beaty, 2023), therefore observed alterations in these processes could be linked to dark creativity patterns. With creativity not being limited to positive outcomes, aspects of morality are also part of the creative decision making processes and could be used to predict some of the expressions of this personality (Hao et al., 2016). This study will examine whether personality and morality predict traditional and dark creativity patterns using an online survey.

P-04 M. Bruggemann (Ackley Will, Computing)
Flat Occlusion Removal for 2D Image to Hand Mesh Models
J.N. Andrews Honors Scholar

Occlusion is a significant problem in hand recognition models, particularly when attempting to reconstruct the full 3D hand mesh from a single 2D image. I attempt to overcome occlusions in 3D mesh recognition by designing a Generative Adversarial Network (GAN) that will take in a dataset of RGB hand images and generate a new dataset where 2D images of the hands are overlaid atop any occlusions. I predict that a dataset processed by my GAN in this way will perform more accurately than the original, non-processed dataset when inputted into a 3D mesh recognition model. I use the FreiHAND dataset for training my GAN and the HAMR framework for 3D mesh recognition. Results are pending.

P-05 Lily Burke (Stacie Hatfield, Behavioral Sciences, Kristin Denslow, English)
An Ethnography of Permaculture in Southwest Michigan
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Permaculture is a holistic design system for meeting human and environmental needs in a sustainable way, using local conditions and circumstances to shape land use and food production practices. My project questions what it means to practice permaculture in southwest Michigan, and how environmental ideological commitments can translate into action and practice. Ethnographically investigating these questions through semi-structured interviews and participant observation with individuals in the permaculture community, along with extensive reading of permaculture materials, my study will add to research on alternative agriculture in Michigan, and shed light on how ecological ideological commitments can translate into actions.

P-06 Solana Campbell (Daniel Weber, Visual Art, Communication & Design, Lucile Sabas, Accounting, Economics, & Finance)
The Making of a Short Film: Lessons Learned
J.N. Andrews Honors Scholar

The process of making a short film is a much more complex process than the average viewer may have initially thought. This project seeks to explore the process of making an independent short film and determining what kind of contributions short films make to society. Other than being a platform for aspiring filmmakers, short films can also build community around festivals and the communal experience of watching and interacting with a film. *Shondra on the Hike*, a short film produced by Diana Densmore and myself, was an incredible learning experience. This project will take readers through the complex process of making a short film and offer guidance and lessons learned from the process.

P-07 Suvan Campbell (Ryan Hayes, Chemistry & Biochemistry)
Towards a novel technique for isotope harvesting at the Facility for Rare Isotope Beams
J.N. Andrews Honors Scholar

At the Facility for Rare Isotope Beams (FRIB) secondary, rare-isotope beams are generated for nuclear physics experiments. In this process, the unreacted portion of the primary beam is directed into a water-cooling beam dump system by which radionuclides are created. The radionuclides can be collected using collector materials in a process termed 'isotope harvesting' and separated using a mass separator. Metal oxides are considered a viable collector material due to their high temperature resistance which enables the direct combination of isotope collection and mass separation. The project aims to catalog potential metal oxides in the isotope harvesting project at FRIB.

P-08 Ruben Colón (Paul Smith, Accounting, Economics, & Finance)
More of the Same: The Tax Cuts and Jobs Act Confirms the Myth of Trickle-Down Economics
J.N. Andrews Honors Scholar

This study examines the effects of the 2017 Tax Cuts and Jobs Act (TCJA), which lowered the corporate tax rate from 35% to 21%. The TCJA also imposed a one-time tax on liquid and fixed assets held off-shore at 15.5% and 8% over 8 years. Research investigates the impact on governmental corporate tax revenue, corporate use of tax savings, and whether repatriation correlated with increased stock buybacks. By tracking tax revenue and projections from 2017-2022, the study observes pre-TCJA corporate income taxes, the TCJA's impact on government revenue, and any subsequent rise in stock buybacks.

P-09 Josiah Deonarine (Brendan Cross, Physics)
Synthesis and Characterization of Hexagonal Boron Nitride Nanosheets
J.N. Andrews Honors Scholar

Certain defects within the hexagonal boron nitride (hBN) lattice are a promising source of quantum mechanical states for quantum computing. It is difficult to produce layers of hBN that are thin enough for these quantum states to be studied. We investigate ultrasonic liquid exfoliation and hydrothermal synthesis as methods of synthesizing hBN nanosheets. Samples were analyzed through light scattering spectroscopy and atomic force microscopy. Our results show that liquid exfoliation can produce hBN nanosheets that range in between 0.35nm - 20nm in thickness. We also show hydrothermal synthesis reactions, between boric acid and nitrogen sources, that can produce hBN nanosheets.

P-10 Elizabeth Dovich (Heather Thompson Day, Visual Art, Communication & Design)
Bone Marrow Donor Recruitment Drive and Registry Awareness at Andrews University
J.N. Andrews Honors Scholar

Bone marrow transplants are vital for those with blood cancers and disorders, but not every ethnic group has an equal chance of finding a match. Some of the human leukocyte antigen (HLA) cell markers used to match donors and recipients are unique to certain ethnic groups, making it harder for members of those groups to find a match. This project attempts to address this inequality by organizing a bone marrow registry recruitment drive on the campus of Andrews University in partnership with the NMDP registry. It encompasses the planning, promotion, and execution of the drive which will take place March 5-7, 2024.

P-11 Chris Inae (Gunnar Lovhoiden, Engineering)
Skidmore Air Vent: Understanding Vent Properties to Propose Redesign Solutions
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Skidmore Pump is a company that manufactures air vents for the purpose of automatically relieving air from steam main lines. Recently, Skidmore was notified of a significant price increase and tooling cost that would affect parts of the latter two vent models of their Main Vent production line: #35, #75, and #77. Skidmore has proposed a low cost option of reconfiguring the design of Main Vent #35, where slight design modifications will be done to alter performance characteristics. Thus, Main Vent #75 and Main Vent #77 will have their corresponding performance characteristics met within the body of Main Vent #35.

P-12 Rekha Isaac (Brian Wong, Biology)
Induction and Modulation of Apoptosis in Breast Cancer Cells MDA-MB-157 and 93A by Chinese Medicinal Herbs Oldenlandia diffusa and Bryophyllum pinnatum
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Chinese medicinal herbs, such as *Oldenlandia diffusa*, contain phytochemicals that exhibit antitumor, chemopreventive, and antiangiogenic effects in cancer. In this study, both *Oldenlandia diffusa* and *Bryophyllum pinnatum* (a lesser studied herb) were tested on breast cancer cell lines MDA-MB-157 and 93A by administering an aqueous extract. Effectiveness between cell lines were also compared. The apoptotic effect both herbs showed were quantified by the levels of pro and anti-apoptotic proteins expressed in each cell line. Both cell lines treated with *Oldenlandia diffusa* and *Bryophyllum pinnatum* showed significant differences in their levels of both pro and anti-apoptotic proteins when compared to no treatment.

P-13 Katrina Johnson (Lionel Johnson, Architecture)
Atlanta Beltline Mixed Use Project
J.N. Andrews Honors Scholar

The Atlanta Beltline Mixed-Use Development is a vibrant, sustainable public space within the urban fabric of Krog Street, Atlanta. The project encourages neighborhood rejuvenation and reconciles interests of developers and locals, while examining the neighborhood context and zoning ordinances. Fall 2023 marked completion of the initial design, spearheaded by the theme “rejuvenate”, achieved by including natural elements, places for holistic wellbeing, and inclusive social spaces. Spring 2024 is dedicated to design refinement, specifically sizing structural elements and designing wall assemblies. This development ensures sustained vitality within Krog Street and contributes to the long-term success and resilience of the entire neighborhood.

P-14 Sion Kim (Denise Smith, Biology, Desmond Murray, Chemistry & Biochemistry)
Synthesis of Novel Temozolomide Amides as Potential Anti-Glioblastoma Agents
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Glioblastoma multiforme (GBM) is an aggressive brain cancer that originates in neuroglial cells. Its treatment involves Temozolomide (TMZ), an FDA-approved small lipophilic drug that crosses the brain-blood barrier and interferes with DNA replication of cancer cells, slowing the progression of cancer. In this research, novel TMZ amide hybrid compounds were synthesized using the Acid Chloride Method to enhance the drug's bioavailability and anticancer properties and to help restore TMZ sensitivity in GBM patients who have developed resistance to it. The novel compounds were tested on glioblastoma cells and statistical analysis was performed to evaluate the effectiveness of the compounds as anticancer agents.

P-15 Alexander Navarro (Yun Oh, Mathematics)
Extending Natural Mates and Successors of Curves in Euclidean 3-space
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

We study curves in three dimensional Euclidean space. We extend the previous work on natural mates by looking at properties of co-successors, their relations to natural mates, to each other, and various classifications of these curves. This culminates in a result relating all of the co-successors of a curve to each other, which is then developed into several results stemming from this relationship. We then describe several extensions of the natural mate, the relationships generated from them, and possible directions for generalization of the natural mate to a larger class of curves.

P-16 Ian Neidigh (Lisa Ahlberg, Chemistry & Biochemistry)
Understanding the Mechanism for Separation of Phosphorothioate Oligonucleotides
J.N. Andrews Honors Scholar

Drug development within the pharmaceutical industry requires pure compounds and purity methods to procure pure drugs. Ion-pair reverse phase chromatography, the most common purity method for oligonucleotide (DNA-like molecule) based drugs, fails to work when a phosphorothioate group is attached to the oligonucleotide. The phosphorothioate is needed because it increases the oligonucleotide's stability. Within the pharmaceutical industry, a magic bullet is used: HFIP. This strange molecule fixes the purity assay problem, but its mechanism is poorly understood. This research aims to better understand the mechanism behind HFIP's effect on diastereomeric separation of oligonucleotides using IPRP chromatography.

P-17 Grace No (L. Monique Pittman, English)
Reading Resistance into the Transformed Hero: An excavation of race and gender identity in The Aeneid and its adaptations
J.N. Andrews Honors Scholar

This project seeks to interrogate the racial and gender dynamics of a key classical Roman text, Virgil's *The Aeneid*, and its utility for alt-right and white supremacist political agenda in the contemporary era. Utilizing a critical reading of *The Aeneid*, we can interpret its implications for our conceptions of Otherness today and how to best defy them. By reading resistantly and excavating the constructions of race present in the original Aeneas' journey, I hope to highlight the importance of language and literature in human relations and use it to foster community, fighting the co-opted stories of the past.

P-18 Talitha Ramirez (Boon-Chai Ng and Gunnar Lovhoiden, Engineering)
Prototyping a Device to Soothe Newborn Infants
J.N. Andrews Honors Scholar

To solve the problem of overworked nurses in hospitals, I and my project partner are working on a prototype of a solution of a blanket that can provide stimulation resembling patting as well as being compatible with chemical heating and cooling and phototherapy to keep the baby stimulated in hopes that this will ease some of the burden on nurses working with babies. Our patting mechanism which is the main focus of our project works by pumping air in and out of a bag quickly to resemble the sensation of patting and fits in a blanket compatible with the other desired features.

P-19 Jenae Rogers (Lynelle Weldon, Mathematics)
Analyzing the effect of targeted activities on linear concept understanding
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Despite previously showing mastery of all test topics in ALEKS, Andrews' remedial math students continue to struggle with some of them on the paper tests. After previous research, additional teaching activities, including one targeting word problems, were implemented to address student misconceptions about linear equations. My current research compares student performance on the paper tests before and after these activities on questions regarding linear relationship word problems. My findings show no statistically significant difference in student performance after these activities. These results will lead to further curriculum changes, in an attempt to increase students' long-term conceptual understanding and problem-solving skills.

P-20 Flavia Sciarabba Badenas (Paul Smith, Accounting, Economics, & Finance, Karl Bailey, Behavioral Sciences)
On-Shore teams vs. Off-Shore teams: Productivity analysis of US Accounting firm
J.N. Andrews Honors Scholar

In an accounting firm productivity and efficiency levels are monitored closely as productivity impacts revenue for the firm, and efficiency speaks to how quickly a firm gets tasks completed. In addition to their US teams, firms have offshored part of their respective audit teams in order to have more cost-efficient labor. My research looks at the productivity and efficiency of a large US based accounting firm's offshored India team, compared to their onshore US team. The hypothesis—that the U.S. team is more efficient and productive than the India team—has been proven false by preliminary data analysis.

P-21 Jamie Shepard (Anthony Bosman, Mathematics)
The Solvability and Difficulty of the Snake Puzzle in the Cube and its Topological Variants
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

A snake cube is a puzzle made by a sequence of n^3 straight and turn pieces that can fold into a $n \times n \times n$ cube. Solving the puzzle is comparable to the problem of finding a Hamiltonian path in the grid space of the cube. By using computer algorithms, we find and count all sequences that are solutions. Furthermore, we can count the unique folding configurations of each sequence giving us an idea of its difficulty. Finally, we expand on this by exploring the problem in other topological spaces of the cube, which sheds insight into the problem as we compare results from the different spaces.

P-22 Joseph Shiu (Hyun Kwon, Engineering, Roy Villafane, Computing)
Improving Ethanol Fermentation Estimation with Generative Data Augmentation in a Machine Learning-driven Soft Sensor
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

While the use of Machine Learning through autoencoders and adversarial networks to augment data for computer vision (CV) applications is well known in industry and literature, its use in tabular time-series data for regression problems has only recently gained traction. This project aims to employ deep learning techniques to generate synthetic data. Given the expensive analytical processes to measure the concentrations of ethanol and sugar substrate in fermentation, this data is used to augment the existing training data for a regression model which predicts the ethanol and substrate from variables easier to measure. Ultimately, we hope to develop a more robust model to serve as a soft sensor to monitor the fermentation process.

P-23 Carolina Smith (Katherine Koudele, Sustainable Agriculture)
A retrospective, multi-case study on the effect of vincristine administration and subsequent platelet recovery time as treatment for immune-mediated thrombocytopenia in canines.
J.N. Andrews Honors Scholar

Canine immune-mediated thrombocytopenia (ITP) results when the dog's immune system malfunctions and attacks the blood's platelets, which leads to clotting issues. Patients can present with bruising, bleeding, lethargy, and more. The immune system must be suppressed so the platelet count can return to normal, and vincristine is commonly introduced as a secondary treatment to steroids to accomplish this. This study analyzes data from 8 canines with ITP that had been treated with vincristine at an emergency clinic and compares their platelet recovery time and variation in treatment protocol.

P-24 Anneliese Tessalee (Ryan Hayes, Chemistry & Biochemistry, Melissa Poua, Medical Laboratory Sciences)
PAMAM Dendrimer in Acne Treatment
J.N. Andrews Honors Scholar

This project focuses on the study of the G2 polyamidoamine dendrimer (PAMAM) as a potential antimicrobial in the treatment of the chronic skin disorder Acne vulgaris. This project aims to better elucidate the nature of the PAMAM dendrimer in regards to its antimicrobial activity, the dose dependency of its efficacy, its target specificity, and its interaction with collective skin commensals. This project studies the antimicrobial effect of the G2 PAMAM dendrimer on *Cutibacterium acnes* and *Staphylococcus epidermidis* and investigates the interaction of the G2 PAMAM dendrimer with antibiotic resistant strains as well as the synergistic effect of antibiotics and the dendrimer on skin commensals.

P-25 Shania Watts (Marianne Kordas, Music, Vanessa Corredera, English)
Avenues of Influence: The Significance of the Musicians Club of Women in the Careers of Florence Price and Blythe Owen
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

In twentieth-century Chicago, Florence Price and Blythe Owen participated in various musical clubs in order to shoehorn their way into prestigious musical arenas. The Musicians Club of Women provided Price and Owen an avenue for advancement in an otherwise male-dominated profession. Price was the first African-American woman to have her music performed by a major orchestra, while Owen was an educator and composer in the Midwest and Pacific Northwest in various institutions of higher learning. This research analyzes their friendship through the lens of intersectionality, contributing a better-rounded understanding of how social politics and networking advanced their careers.

P-26 Carly Weems (Katherine Koudele, Sustainable Agriculture, Karl Bailey, Behavioral Sciences)
The Effects of Age and Type of Rearing on Contrafreeloading in Female Goats
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

This study continues the 2022 pilot study and investigates whether there is any correlation between type of rearing in female goats and contrafreeloading behavior, which is the willingness of an animal to work for food. Eighteen female goats, representing three age groups and three types of rearing, were put in a testing area containing a bin of freely-available hay and a contrafreeloading apparatus. Each goat was tested individually four times over four weeks to see whether they contrafreeloaded or not. The preliminary results suggest that type of rearing does have an effect on contrafreeloading and further suggests that previous exposure to contrafreeloading opportunities may have an even greater impact on a goat's choice to contrafreeload.

P-27

Sarah Wolf (Brian Wong, Biology)

Induction and Modulation of Apoptosis in Breast Cancer Cells MDA-MB-157 and 93B by Chinese Medicinal Herbs Oldenlandia diffusa and Bryophyllum pinnatum

J.N. Andrews Honors Scholar

Chinese medicinal herbs have been found to contain bioactive phytochemicals with anti-cancer properties. Herbal extracts induce apoptosis in cancer cells by modulating levels of pro- and anti-apoptotic proteins. A previous study showed that a commonly used herb, *Scutellaria barbata*, significantly induced apoptosis on the therapy-resistant breast cancer cell lines MDA-MB-157 and 93B. However, the effects of two different Chinese herbs, *Oldenlandia diffusa* (OD) and *Bryophyllum pinnatum* (BP) on these breast cancer cells are not known. This project indicates the influence of the herbs OD and BP on apoptosis of breast cancer cell line MDA-MB-157 in comparison to 93B through modulating the levels of pro- and anti-apoptotic proteins.

P-28

Robert Zhang (Karl Bailey, Behavioral Sciences)

Chatting with Online Agents

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

This study explores how language fluency and perceived source identity (human or AI) affect information accuracy perception. Prior research shows a preference for fluent information, but trust in AI like ChatGPT is less studied. This gap matters as fluent yet inaccurate AI content could mislead. Participants will interact with systems identified as AI or human, evaluating fluent or disfluent dialogues. They'll judge fluency, trustworthiness, and misinformation detection. Expected results suggest higher trust in fluent human conversations than AI, highlighting the importance of fluency in AI interactions and informing strategies to address AI-generated misinformation.

P-29

Andy Zhao (Peter Lyons, Biology)

Investigating a family of fungal pseudo-peptidases using bioinformatics tools

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Enzymes catalyze chemical reactions; however, some proteins related to enzymes lack enzyme activity. To investigate changes that occur as enzymes become pseudoenzymes, I studied a unique family of fungal carboxypeptidases. I identified all fungal carboxypeptidase protein sequences in the NCBI database, constructed an alignment and phylogenetic tree for sequence comparison, and used AlphaFold2 for 3D modeling of representative proteins. Fourteen unique groups were identified. Proteins predicted to be pseudoenzymes contained additional loops in mutation hotspots not found in predicted active enzymes. This research integrates modern bioinformatics tools for analyzing enzyme function and contributes to understanding the evolution of enzymes.

UNDERGRADUATE RESEARCH POSTER PRESENTATIONS

P-30 Zack Adema (Boon-Chai Ng, Engineering)
Surgical Camera Design Project
Undergraduate Research Scholar

Dr. Steve Lee, a surgeon at the Loma Linda University School of Medicine, determined that a head mounted surgical recording system would be beneficial to record his surgeries and present them to his students. Commercial recording systems are currently on the market, however knowing that there is a large markup on technology used in the medical field, Dr. Lee wanted a way to create a cheaper surgical recording system. In this research project, specifications were determined. From there, a suggested consumer grade camera was tested. Several mounting adapters were also designed and tested. This research will aid in the future development of the surgical recording system during senior design.

P-31 Ariana Coast Dice (Daniel Gonzalez-Socoloske, Biology)
*Characterization of reproductive behavior of the freshwater dolphin Tucuxi (*Sotalia fluviatilis*) in Amanã Lake, Brazil*
Undergraduate Research Scholar

The Tucuxi is a freshwater dolphin in the Amazon River. Both Tucuxi and the closely related Guiana dolphin exhibit a high testes-to-body mass ratio, commonly found in species that exhibit sperm competition. Rosas and Monteiro-Filho (2002) suggested Tucuxi exhibit a promiscuous mating system, similar to Guiana dolphins, however, Best and da Silva (1984) suggested Tucuxi exhibit a rare polyandry mating system. A Tucuxi mating event, captured in 2022 via drone footage, was analyzed using BORIS, a behavioral observation coding software. Analyses revealed sequential matings with minimal aggression between males, lending support for a promiscuous mating system with sperm competition.

P-32 Daena Holbrook (Boon-Chai Ng, Engineering)
Observing the Limitations of the Craform Academia 50 Scanner
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

The Craform Academia 50 Scanner uses structured light technology to scan 3D objects. These scans can allow for many practical applications, aiding the engineering process through 3D printing replicas, editing a 3D scan, or analyzing a 3D scan. However, structured light 3D scanning has a range of limitations. These limitations were tested through the scanning of objects with various properties. The ability of the Craform Academia 50 to scan varying sizes, reflectiveness, transparency, color, texture, and object uniformity was tested, and the most important characteristics for a good scan were documented.

P-33 Erica Howell (Marileda Tomé, Communication Sciences & Disorders)
Lingual Frenulum Characteristics in People with and without Speech Sound Disorders
Undergraduate Research Scholar

This research project is focused on examining lingual frenulum characteristics in school-aged children with speech sound disorders. This will include learning how to use an ultrasound and its related software to allow real-time visualization of tongue movement during speech, which will be achieved by placing a probe under the client's chin to create images of tongue posture during articulation. This procedure will be conducted on an age-matched control group for the population of school-aged students with speech sound disorders already evaluated during the first phase of this study. Data will be compiled, analyzed, and reported.

P-34 Darien Jung (Desmond Murray, Chemistry & Biochemistry)
Green Methods for Novel Organic Carbonate Synthesis
Undergraduate Research Scholar

The focus of this research was the unprecedented 'green' synthesis of organic carbonates via electrophilic carbonyl addition (ECA) chemistry. This involved reacting an aldehyde with a chloroformate electrophile catalyzed by a Lewis acid. At this point it appears that using 20% zinc carbonate in refluxing hydrocarbon solvent holds some promise for finding optimized conditions for these reactions. Other variables that can be studied for reaction optimization include catalysts, %catalysts, additives, reaction temperature and reaction time.

P-35 Joey Kim (Peter Lyons, Biology)
Exploring Leucoplast Clustering and Identification in Tradescantia genus: Insights from T. zebrina, T. pallida, and T. spathacea
Undergraduate Research Scholar

Leucoplasts, colorless plastids typically found in non-photosynthetic plant tissues, play a crucial role in synthesizing and storing various essential compounds. In *Tradescantia zebrina* leaf margin cells, leucoplasts of unknown function were observed clustering around nuclei. An average of 10 to 12 leucoplasts appeared on every nucleus observed in *T. zebrina*. An Iodine-Potassium Iodide (IKI) stain, staining starch granules purple, was used to identify these leucoplasts as amyloplasts. Similar nuclear clustering of amyloplasts was observed in two related species, *T. pallida* and *T. spathacea*. Research is ongoing to determine the function of these amyloplasts and the cause of their nuclear clustering.

P-36 Lauren Kim (Benjamin Navia and David Mbungu, Biology)
*Protein kinase modulation of the neurocircuitry underlying phonotaxis in female cricket *Acheta domesticus**
Undergraduate Research Scholar

Juvenile hormone (JH) plays a crucial role in insect development and behavior, yet its mechanisms in crickets, specifically *Acheta domesticus*, remain unclear. Elevated JH levels in young virgin female crickets correlate with selective responses to male-like computer-generated calls. As these females age, JH III levels increase, broadening their call responsiveness. Drawing parallels with mosquitoes, where JH III acts through a protein kinase C (PKC) pathway, the hypothesis is proposed that inhibiting PKC in crickets using the chemical 1-(5-isoquinolylsulfonyl)-2-methylpiperazine (H7) would mitigate JH effects on the phonotactic selectivity network. Experimental results indicate that intra-ganglionic H7 injection reduces phonotactic responsiveness in selective crickets across the full range of syllable periods presented, which contrasted with the control group.

P-37 Seonghyun Kim (Ryan Hayes, Chemistry & Biochemistry)
Detecting antimony from plastic bottled water
Undergraduate Research Scholar

The research was conducted using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) to detect antimony in water that could be leached off plastic bottles. Plastic is one of the most commonly materials used for liquid containers in our daily life. More specifically, bottled water and beverages are sold in polyethylene terephthalate (PET) bottles, which is a common type of plastic. In the production stage of PET, antimony is being used as a catalyst. Exposure to antimony at high levels can result in a variety of adverse effects such as breathing issues, stomach pain, diarrhea, and vomiting. The Environmental Protection Agency (EPA) allows 0.006ppm of antimony in drinking water as a guideline. Therefore, this research was performed to detect any hazardous amounts of antimony in drinking water when the plastic bottles were put into distressed conditions like being exposed to direct sunlight for a long period of time or to high heat.

P-38 Yoel Kim (Brendan Cross, Physics)
Constructing and Confirming the Viability of Nested Helmholtz Coils as an Education Model for Clinical MRI Systems
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Utilizing a nested helmholtz coil system, our goal was to confirm the viability of an experimental setup to visually and experimentally demonstrate the physical concepts behind a clinical MR setup. Utilizing perpendicularly nested helmholtz coils to model the main coils and the RF coils of an MR system, compasses to model protons, and a permanent magnet to mimic the function of the gradient coil of a clinical MR system, our goal was to construct an easy-to-replicate experiment that demonstrates physics analogous to localized resonance in a clinical MR system by causing specific compasses in our experimental setup to oscillate.

P-39 Christen Li (Sonia Badenas, International Languages & Global Studies, Stacie Hatfield, Behavioral Sciences)
Heritage Language Speakers and Language Ideologies
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

What role do language ideologies play in the experiences of heritage language speakers? In this qualitative study, I will interview speakers of heritage languages, which are languages spoken at home that are different from the dominant language in a community. Correlations between language ideologies and language proficiency have established the relevance of language ideologies to heritage language research. I seek to contribute to existing scholarship by investigating language ideologies' impact on experiences of heritage language speakers. I hypothesize that themes of identity, belonging, positionality, education, and community will be highly relevant to heritage language speakers' experiences.

P-40 Carlos Lugo (Marianne Kordas, Music)
Towards a Theological Understanding of J.S. Bach's Well Tempered Clavier
Undergraduate Research Scholar

This project covered learning systematic research skills such as creating a literature review, searching the library catalog and related databases, selecting the scope of a project/thesis, drafting and revising research writing in a professional tone, and creating a bibliography with correct citations. The focus of the research was narrowed from looking at all of J.S. Bach's Well Tempered Clavier to a concentrated understanding of its C# minor prelude and fugue via the frameworks of music history, music theory analysis and theology.

P-41 Natalie McArthur (Desmond Murray, Chemistry & Biochemistry)
Optimization and Synthesis of Novel Carbamates
Undergraduate Research Scholar

The original purpose of this research focused on synthesizing carbamates via electrophilic carbonyl additions (ECA). This meant optimizing the process regarding solvent, temperature, catalyst type, percent catalyst, and aldehyde substrate diversity. Due to difficulty in synthesizing the product consistently, we shifted to first optimizing the reaction with acyl halides in lieu of carbamoyl chlorides. This was accomplished by using refluxing heptane for 90 minutes with 10% zinc carbonate as catalyst. Our method of analysis uses FTIR and NMR spectroscopy. Once optimized for acyl halides, our research shifted back to ECA reactions of carbamoyl halides as an unprecedented method for synthesis of organic carbamates. Organic carbamates are very important agricultural chemicals, particularly as insecticides. Our work can be of significance to this and other areas of carbamate applications.

P-42

Chris Ngugi (Stacie Hatfield and Karl Bailey, Behavioral Sciences)
How Queer Identity Shapes Relationships with One's God
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

How do queer-identifying individuals process, understand, and make sense of their religiosity or relationship with religion? Being 'queer' (or LGBT+) works as a description of sexual orientation or gender, but also acts as a socially significant identity. Religiosity is another valued aspect of identity. At times, these identities appear at odds with each other. Nevertheless, some individuals may identify as being both 'queer' and religious. Research at Andrews University shows that if 'queer' students maintain their personal religiosity, they will feel it necessary to adapt it to quell cognitive dissonance and remain comfortable with both identities.

P-43

Kamila Oster (Marlene Murray, Biology, Desmond Murray, Chemistry & Biochemistry)
Investigating the Effects of Valproate on Intracellular Myo-Inositol Levels in Bipolar Patient Cell Lines
Undergraduate Research Scholar

Bipolar affective disorder, impacting 1-2% of the population, is a chronic mood disorder. Valproate, a common mood stabilizer for bipolar patients, is thought to exert therapeutic effects by depleting myo-inositol levels in cells. While studies in yeast suggest valproate lowers myo-inositol, the mechanism in mammalian cells remains unknown. Understanding this process is crucial due to inositol's role as a key regulator in various cellular processes, offering insights into the treatment of bipolar disorder.

P-44

Hae-Lyn Park (Benjamin Navia and David Mbungu, Biology)
*Evaluating a possible role of cGMP in the phonotactic response of virgin female cricket *Acheta domestica**
Undergraduate Research Scholar

Female crickets locate potential mates through the process of phonotaxis. In *Acheta domestica*, females are more likely to become less selective to calling songs as they age. Juvenile Hormone III (JH III) is a naturally occurring neuromodulator in crickets and higher levels of it have been demonstrated to parallel with phonotactic selectivity. Previous studies with insect models suggest that JH III works through a protein kinase signaling pathway. Consequently, cGMP, a known activator of the cGMP-dependent protein kinase is a subject of interest. We hypothesize that prothoracic nano-injection of cGMP into unselective females will make them more phonotactically selective.

P-45

Katherine Pierre (Marlene Murray, Biology)
The Effect of DHA On Myo-inositol Levels in Cell Lines Derived From Patients with Bipolar Disorder
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Bipolar disorder's current treatments (lithium and valproic acid) are hypothesized to exert their therapeutic effects by lowering intracellular myo-inositol levels, but they can cause harmful side effects. Seeking safer options, previous research investigated the omega-3 fatty acid DHA, which increased myo-inositol in yeast cells, suggesting the potential for reducing depression. This study explores DHA's effect on myo-inositol levels in cell lines derived from patients with bipolar I, bipolar II, and a non-affected cell line to assess its impact on mammalian cells compared to controls.

P-46

Ronald David Sandoval Suñe (Harvey Burnett, Behavioral Sciences)
The impact of COVID-19 on world assumptions: Weighing the importance of resilience, spiritual well-being, affect, and psychological needs
Undergraduate Research Scholar

World assumptions and their vulnerability to negative life experiences (NLEs) have been well-studied, nevertheless, world assumptions have protectant factors that help against the effects of NLEs. However, if these factors are overcome, NLEs could alter our worldview (Kauffman, 2014). This study will elaborate on the relationship between NLEs and World Assumptions, and how protective factors correlate with NLEs and World Assumptions. I will use a survey of college students and will analyse the correlations using Pearson's r. This study will provide insight into the effect of NLEs on world assumptions, as well as how protectant factors may mediate its impact.

P-47

Sara Santana (Stacie Hatfield and Jen Logan, Behavioral Sciences)
Generational Eschatological Anxiety
Undergraduate Research Scholar

This study investigates the differences in eschatological anxiety (EA) among four generational groups within the Seventh-Day Adventist (SDA) church. The purpose is to understand how individuals of different age groups perceive eschatological matters and measure their generalized anxiety (GA) regarding the end times. The study utilizes a mixed-methods research design, including interviews and surveys, to collect data from individuals from the baby boomer era, generation X, millennials, and Generation Z. Two people from each generational group will be interviewed. The findings of this study could inform interventions to help individuals cope with eschatological anxiety and improve their mental well-being.

P-48

Konstantin Zubkov (Peter Lyons, Biology)
Expression and purification of human carboxypeptidase O
Undergraduate Research Scholar

Carboxypeptidases are enzymes that modify proteins and peptides. Human carboxypeptidase O (hCPO) is a recently discovered enzyme with a rare preference for acidic residues. Although hCPO presents an interest in biochemistry and cellular biology, it is not commercially available. Here, we developed a system for a stable and reliable production of hCPO. First, the enzyme is expressed in Sf9 insect cells using a recombinant plasmid and a baculoviral vector. After this, the expressed enzyme is purified from the cell culture using immobilized metal affinity chromatography. The purified enzyme will be used for further research on its unique biochemistry.

P-49

Jacob Kim (Thomas Goodwin, Biology)
High-quality photographic documentation of tooth corrosion in fossils
Undergraduate Research Scholar

Prior students have studied tooth corrosion of fossils in the Goodwin lab to find out what happened to the ancient organisms after death. However, these studies were based on a single perspective of the tooth (occlusal or chewing surface) and were not documented by high-resolution photography. In this study, I developed a method to document tooth corrosion at high resolution using focus stacking in Photoshop and am developing a library of images taken from multiple perspectives. These images allow for more precise and accurate documentation of corrosion of these fossils.

P-50

Robert Zhang (Kristen Witzel, Behavioral Sciences)
Bookings on Felony Charges in the Berrien County Jail, 2017-2019
J.N. Andrews Scholar and Undergraduate Research Scholar

This is a multi-stage research study. In the first phase, the aim was to explore the felony jail data of one county to understand how racial disparities are affected by agents' implicit bias. We conducted a non-experimental, descriptive, and correlational research design with a random probability sample of felony jail data files provided by the Berrien County Sheriff's Department (target N = 300). At this stage, our task is to statistically analyze and organize the obtained data and visualize it for future use.

DECEMBER 2023 HONORS THESIS POSTER PRESENTATIONS

D-01 Juan Burdick (Roy Villafane and Ackley Will, Computing)
Error Detection in Wire Arc Additive Manufacturing Using Simple Machine Vision Algorithms
J.N. Andrews Honors Scholar

Aimed at developing integrated error identification in tandem with the creation of a wire-arc additive manufacturing system (WAAM), a laser profile sensor was used to generate top-down depth map images of ongoing prints. These images were then calibrated and compared with a generated top-down depth map image representing the predicted print at the stage the laser profile was taken. Canny edge detection was applied to a difference image to extract potential error contours, then a series of algorithms were applied to efficiently generate candidate error regions to mark for repair by the control system.

D-02 Devaney Ross (Harvey Burnett, Social & Behavioral Sciences)
Exploring the Effect of Resilience Training on the Effectiveness of Psychological Body Armor in College Students
J.N. Andrews Honors Scholar

“Psychological Body Armor” (PBA) refers to a unique form of human resilience that individuals can use in order to cope with stress and adversity. Given the importance of resilience for a college student, it is important to identify effective ways in which to promote resilience among this demographic. Despite the potential benefits of PBA, there is limited research that has been done on the effectiveness of interventions aimed at promoting PBA and resilience among college students. This study aimed to investigate whether a brief, one-hour PBA training session can improve the resilience levels of college students.

D-03 Ashlee-Rose Wilson (Rahel Wells, Religion & Biblical Languages, L. Monique Pittman, English)
Tested, Tempted, Triumphant: An Analysis on the Temptations of Eve and Jesus through Exegesis and Medieval Art
J.N. Andrews Honors Scholar

Often, Eve is depicted as vain, a destroyer. In contrast, artists depict Christ as humble, a supernatural overcomer. Yet, their stories say differently. In Genesis 3:1-7, Eve is neither tempted by vanity nor sexual desire, but by the aspiration to become like God. Christ's temptation, found in Matthew 4:1-11, focused on His divinity and connection with God. Through exegeses of both passages, I provide a greater understanding of the relation of temptation to humanity. Comparing this with some Medieval religious artwork, I hope to examine the differing reactions to temptation, thus creating greater empathy towards all who deal with it.

INDEX

Student Presenters

Adap, Sandrine P-01
Adema, Zack P-30
Alignay, Zachary P-02
Beers, Erin P-03
Bruggemann, M. P-04
Burdick, Juan D-01
Burke, Lily P-05
Campbell, Solana P-06
Campbell, Suvan P-07
Coast Dice, Ariana P-31
Colón, Ruben P-08
Deonarine, Josiah P-09
Dovich, Elizabeth P-10
Holbrook, Daena P-32
Howell, Erica P-33
Inae, Chris P-11
Isaac, Rekha P-12
Johnson, Katrina P-13
Jung, Darien P-34
Kim, Jacob P-49
Kim, Joey P-35
Kim, Lauren P-36
Kim, Seonghyun P-37
Kim, Sion P-14
Kim, Yoel P-38
Li, Christen P-39
Lugo, Carlos P-40
McArthur, Natalie P-41
Navarro, Alexander P-15
Neidigh, Ian P-16
Ngugi, Chris P-42
No, Grace P-17
Oster, Kamila P-43
Park, Hae-Lyn P-44
Pierre, Katherine P-45
Ramirez, Talitha P-18
Rogers, Jenae P-19
Ross, Devaney D-02
Sandoval Suñe, Ronald David P-46
Santana, Sara P-47
Sciarabba Badenas, Flavia P-20
Shepard, Jamie P-21
Shiu, Joseph P-22
Smith, Carolina P-23
Tessalee, Annaliese P-24
Watts, Shania P-25
Weems, Carly P-26
Wilson, Ashlee-Rose D-03
Wolf, Sarah P-27
Zhang, Robert P-28, P-50
Zhao, Andy P-29
Zubkov, Konstantin P-48

INDEX

Faculty Advisors

Ahlberg, Lisa P-16
Badenas, Sonia P-39
Bailey, Karl P-03, P-26, P-28, P-42
Bosman, Anthony P-21
Burnett, Harvey D-02, P-46
Corredera, Vanessa P-25
Cross, Brendan P-09, P-38
Denslow, Kristin P-05
Gayle, Michael P-02
Gonzalez-Socoloske, Daniel P-02, P-31
Goodwin, Thomas P-49
Hatfield, Stacie P-05, P-40, P-42, P-47
Hayes, Ryan P-24, P-37
Johnson, Lionel P-13
Koudele, Katherine P-23, P-26
Kordas, Marianne P-25, P-40
Kwon, Hyun P-22
Logan, Jen P-47
Lovhoiden, Gunnar P-11, P-18
Lyons, Peter P-29, P-35, P-48
Mbungu, David P-36, P-44
Murray, Desmond P-14, P-34, P-41, P-43
Murray, Marlene P-43, P-45
Navia, Benjamin P-36, P-44
Ng, Boon-Chai P-18, P-30, P-32
Oh, Yun Myung P-15
Pittman, L. Monique P-17, D-03
Poua, Melissa P-02, P-24
Sabas, Lucile, P-06
Smith, Denise P-14
Smith, Paul P-08, P-20
Thompson Day, Heather P-10
Tomé, Marileda P-33
Weber, Daniel P-06
Weldon, Lynelle P-19
Wells, Rahel D-03
Will, Ackley P-01, P-04, D-01
Witzel, Kristen P-50
Wong, Brian P-12, P-27
Villafane, Roy P-22, D-01

SPONSORED BY:



L. Monique Pittman, PhD
Director of Honors, Professor of English

Maxine Umaña, MA
Administrative Assistant and Recruiter

Anna Pak
Student Assistant

J.N. Andrews Honors Program
4141 Administration Drive
Nethery Hall 108
Berrien Springs, MI 49104-0075

Phone: (269) 471-3297
Email: honors@andrews.edu
URL: <http://www.andrews.edu/honors>



Gary W. Burdick, PhD
Dean of Research, Professor of Physics

Mordekai Ongo, PhD
Research Integrity and Compliance Officer

Carlisle Sutton, M.Div., MSCID
Sponsored Research Officer

Office of Research and Creative Scholarship
8488 E Campus Circle Drive
Buller Hall 234
Berrien Springs, MI 49104-0355

Phone: (269) 471-3042
Email: research@andrews.edu
URL: <http://www.andrews.edu/research>



Cover image: Elizabeth Dovich & Heather Thompson Day, Associate Professor of Communication (Photo Credit: Maxine Umaña)
Back image: 2023 AU Honors Scholars (Photo Credit: Mrs. Rappette)