

Honors Scholars & Undergraduate Research Poster Symposium

February 26, 2016

2:30-4:00 p.m.
Buller Hall Lobby

Light Refreshments Served



J.N. Andrews
Honors Program
Andrews University



Office of Research &
Creative Scholarship
Andrews University

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, Vanessa Corredera, Jonathan Doram, James Hayward, Shandelle Henson, Viktoria Kolpacoff, Katherine Koudele, John Markovic, Beverly Matiko, Benjamin Navia, L. Monique Pittman, David Randall, Davide Sciarabba, Rodney Summerscales, Tiffany Summerscales, Trina Thompson, and Robert Zdor. We also thank our administrative assistant, Tracia Smith and research staff, Sarah Burton and Mordekai Ongo, as well as our student assistants, Alaryss Bosco and Shanelle Kim, 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

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



Gary Burdick
Associate Dean for Research
Professor of Physics

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

Honors Thesis Poster Presentations

- P-01 *Finding the Concentration of Nitric Oxide in Solvents*
Emily-Jean E. Bankes (David Randall, Chemistry & Biochemistry)
J.N. Andrews Honors Scholar

The body creates nitric oxide (NO) for signaling. Currently researchers have limited ways to deliver precisely known quantities of NO to an experiment. Using UV-Vis spectroscopy it is possible to observe NO binding to cobalt tetraphenylporphyrin (CoTPP), therefore allowing the quantity of NO in the solvent to be measured. Currently we are working to obtain the spectral data curves that will then be analyzed using computer software and a method under development. The analysis of spectral titration data for a variety of solvents will yield a table of values that inform researchers the exact concentration of NO in varying solvents.

- P-02 *Analysis of mammalian carboxypeptidase O expression patterns*
Christian Bardan (Peter Lyons, Biology)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Carboxypeptidase O (CPO) is a protease that cuts acidic amino acids from the carboxy termini of substrate proteins. This study aims to describe the expression patterns of CPO in small mammals. We have sampled tissue from four different species: thirteen-lined ground squirrel, eastern chipmunk, eastern mole, and northern short-tailed shrew. Samples were analyzed via Western blot using two CPO antibodies. Immunoreactive bands likely to be CPO, with molecular weights approximately 42 kDa, were seen predominantly in kidney, liver, and small intestine tissue samples. This suggests CPO could play a specific physiological function in these organs.

- P-03 *Pygmalion*
G. Stephen E. Batchelor (Bruce Closser, English)
J.N. Andrews Honors Scholar

Andrews University Theatre Wing (AUTW) performed a fully adapted version of George Bernard Shaw's play, *Pygmalion*, on both the 28th and 29th of March, 2015. While directing the production, I attempted to highlight the mutual transformation of Eliza Doolittle, and Professor Henry Higgins. In the essay, I will reflect and detail the ways in which the performance either succeeded or failed in achieving interdisciplinary representation, originality, and effectively communicating specific themes, including: class binaries, beauty, and personal growth and transformation by comparing and contrasting the development of the main characters throughout the production.

- P-04 *A Machiavellian Framing of Power Dynamics in Shakespeare's Henry V as adapted by Olivier, Branagh, and the BBC's Hollow Crown*
Alaryss Bosco (L. Monique Pittman, English)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

The principles outlined in Niccolo Machiavelli's *The Prince* (1532) shape the power dynamics in William Shakespeare's *Henry V* (1599), as well as Prince Hal's layered and complicated rise to rule throughout the Henriad. A trio of film adaptations – Laurence Olivier (1944), Kenneth Branagh (1989), and the BBC's *Hollow Crown* (2012) – take related and contrasting approaches to balancing Henry's benevolent morality against his more Machiavellian manipulations. Extra-textual materials including sixteenth-century archival documents, film historic context, director biography, and the means of production especially influence both play text and the more recent presentations of Henry V's character in Branagh and the BBC.

P-05 *Compartmental Models of Animal Behavior*

Saharsh Dass (Shandelle M. Henson¹, James L. Hayward², Brian Dennis³, Laura Foster⁴,

¹Department of Mathematics, Andrews University, ²Department of Biology, Andrews University,

³Department of Fish and Wildlife Resources, ⁴Department of Mathematics, Walla Walla University)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Animal behavior is integral to fitness and arises from complex interactions between internal and external factors. Glaucous-winged gulls (*Larus glaucescens*) at Protection Island, Strait of Juan de Fuca, Washington display a variety of behaviors on the colony during the breeding season. The most common gull behaviors are sleeping, preening, and resting. I used a system of four differential equations to predict numbers of sleeping, preening, and resting gulls on the colony as a function of seven environmental factors. The model explained 75%, 61%, 44%, and 40% of the variability in colony attendance, sleep, preen, and rest dynamics, respectively.

P-06 *Procrastination, Motivation, and Flow*

Reginald Desrosiers (Karl Bailey, Behavioral Sciences)

J.N. Andrews Honors Scholar

This study investigates the relationship between three variables: procrastination, the act of needlessly delaying tasks to the point of experiencing subjective discomfort; motivation as defined by the Self-Determination Theory framework; and flow, the state of total absorption on the task at hand. This study extends an original Korean study; subjects were recruited from the Andrews University Behavioral Sciences Research Participation Pool for a more diverse and robust sample. We hypothesize that procrastination will be positively related with amotivation and inversely related with intrinsic motivation, self-determined extrinsic motivation, and flow. We will also conduct a hierarchical multiple regression with this data.

P-07 *Exposure to Video Media and Its Effects on Attitudes Towards Law Enforcement*

Amante Gonzalez (Harvey Burnett, Behavioral Sciences)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

The purpose of this study is to examine how exposure to video media (specifically media geared toward a social media platform) depicting either negative or positive police interactions with individuals will influence perception of law enforcement officials. This will be measured using a modified version of the Building a Relationship of Trust Community Perception Survey. ANOVA results are expected to show a main effect for both the negative and positive police interaction video in regards to attitudes towards law enforcement. This would suggest that negative interaction videos have a greater effect on attitudes towards law enforcement.

P-08 *Design of a Pressure-Progressing Spray Fitting Apparatus*

Michael Hess (Hyun Kwon, Engineering and Computer Science)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

This project involves the prototyping of a device for cleaning city sewer drains. Several spray fittings are to be placed at intervals along a pipe, which is placed inside a sewer. Pressurized air is then sent through the pipe and sprayed out of each fitting to dislodge blockage. The fitting is designed with a pressure-driven mechanism to regulate flow out a spray nozzle and then through the pipe to the next fitting. This device has been patented, but not yet prototyped. The current project seeks to create a prototype to demonstrate the viability of the concept, and to generate 3D computer models for further research.

P-09 *Chronology of the Events in Zechariah 12-14*

Won Jin Jeon (Rahel Schafer, Religion & Biblical Languages)

J.N. Andrews Honors Scholar

In current scholarship, there is a lack of consensus on the timing of the specific events in Zechariah 12-14, with a focus on eschatological or sequential chronologies. Preliminary exegetical research has revealed many connections between the three chapters. For instance, the phrase *b'yom ha'hu* ("in that day") occurs 17 times (versus four times in the rest of Zechariah). This concentrated usage closely interconnects the three chapters and suggests that the timeliness of all of the events is in close succession, or even concurrent. Further analysis will seek to establish a holistic view on the chronology of the events.

P-10 *"You Think I Look Like Marx?": Tracing Hybridity through the Imagination of God in Marjane Satrapi's Persepolis*

Shanelle Kim (Vanessa Corredera, English)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Set during the turbulent 1980's in Iran, Marjane Satrapi's postcolonial autobiographical graphic narrative *Persepolis* (2003) explores how the clash of ideologies within a country manifest during childhood. Postcolonial literature often features a forceful, physical Western presence dominating a non-Western culture. However, I argue that the simple binary of the oppressive versus the oppressed does not apply here. Instead, East and West come together to form an amalgamation of ideas that cannot be identified as fully "Eastern/Islamic" or "Western." *Persepolis* presents a seemingly Anglicized God who rejects both Western philosophy and Iranian revolution. My project traces Marji's imagined interactions with God in order to put forward the claim that *Persepolis* uses him to demonstrate the difficult, yet ultimately liberating process of cultural hybridization.

P-11 *Exploring Short Stories: The Relationship of Guy de Maupassant's Writing Style and Social Justice Advocacy*

Gielle Kuhn (Sonia Badenas, International Languages & Global Studies)

J.N. Andrews Honors Scholar

This project explores the connection between French author Guy de Maupassant's intentional pessimist writing style and his observations of the harsh life led by 19th century France proletariat. A literary analysis of two of Maupassant's short stories, *La Parure* and *Le Gueux*, determines key elements of pessimism and realism and a historical exploration of the time establishes a very unequal class structure, which discriminates between the peasantry, the working class, and the rich bourgeois. Understanding the purpose and the relationship of Maupassant's writing style and the social issues of the time evidence Maupassant's preoccupation and advocacy for social justice.

P-12 *The Potential of Omega-3 Fatty Acids in Treating Bipolar Disorder through the Metabolic Pathway of Inositol*

Joanne Jee Yeon Lee (Marlene Murray, Biology)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Bipolar disorder is a mental disorder characterized by extreme mood swings. Omega-3-fatty acids have been shown to relieve symptoms of bipolar disorder and are not associated with the negative side effects of lithium and valproate, the two most common treatments of the disorder. However, omega-3-fatty acids' mechanism of action remains unknown. This study examined the effects of omega-3 fatty acid docosahexaenoic acid (DHA) on intracellular inositol levels of *Saccharomyces Cerevisiae*. We show that similar to valproate, DHA decreases the growth of *Saccharomyces Cerevisiae*. We also show that unlike valproate, DHA does not decrease intracellular inositol levels.

P-13 *The Effect of Degrading the Transcription Factor NF- κ B Subunit Proteins on NF- κ B's Oncological Activity*

Seongmin Lee (Denise Smith, Biology)

J.N. Andrews Honors Scholar

Nuclear factor-kappa B (NF- κ B) is a transcription factor that becomes functional when any two of its five component proteins (p50, p52, p65, c-Rel, and RelB) join together. Because of its involvement in oncogenesis, NF- κ B is commonly subjected to modification to curb cancer growth. In this project, each component protein of NF- κ B was degraded using RNAi to see if it would have any influence on glioblastoma, a form of brain cancer. It was found that degradation of p50 and p52 significantly reduced NF- κ B activity while the remaining three failed to produce significant reduction.

P-14 *A Characterization of Rectifying Curves and Sphere Curves in R^3*

Julie Logan (Yun Myung Oh, Mathematics)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Under an extra condition on the constant curvature, Ye Lim and Dr. Yun M. Oh have found the series solution when the ratio of torsion to curvature is a linear function. Furthermore, it is known as a rectifying curve by B.Y. Chen's work. In this project, we will figure out a different approach to characterize the rectifying curve by looking at the unit speed curve with nonzero curvature if every rectifying plane of the curve passes through a fixed point called x_0 in R^3 . Secondly, I will find some conditions on the ratio τ/κ for sphere curves.

P-15 *Nile Blue A Liquid Crystalline Derivatives for Histological Staining*

Adrienne Magsipoc (Desmond Murray, Chemistry & Biochemistry)

J.N. Andrews Honors Scholar

The objectives of this project were to (1) synthetically modify Nile Blue A (NBA), a common biological stain, to create liquid crystalline derivatives and (2) probe into the differences between the common use of the biological dye as opposed to the modified liquid crystalline product. This involved the synthesis of the NBA liquid crystal derivative, characterization of product, and assaying for liquid crystalline properties. To evaluate its histological function, a general staining procedure for NBA was performed with both modified and unmodified NBA to evaluate novel properties that the liquid crystalline derivative of NBA presented.

P-16 *Race Representatives: Why Black Members of Congress Matter*

Shenika K. McDonald (Marcella Myers, History and Political Science)

J.N. Andrews Honors Scholar

The primary goal of this research is to use the concept of race representation to better understand the legislative behavior of Black members of Congress and to suggest that descriptive representation allows for Black political inclusion. My research examines 200 bills sponsored by six Black members of Congress during the Ninety-third Congress. This research emphasizes the importance of Black members of Congress to Blacks nationwide by highlighting the Congressional Black Caucus' purpose, examining the bills' policy issues for racial significance, in consultation with a variety of secondary source material that underscores the importance of descriptive representation for the Black community.

P-17 *Of Mermaids, Metal, and Maine : An Illustrated Memoir*

Mercedes McLean-Wheeler (Beverly Matiko, English)

J.N. Andrews Honors Scholar

This creative literary thesis consists of the first chapters of a memoir, offering readers a glimpse of my childhood world and self in rural Maine. The memoir's overarching theme is the interplay between person and place. The work also explores the ability of memory and imagination to shape perception. Included are several of my own drawings to help illuminate my imaginative and lived experiences, evoking the odd but artful whimsy of childhood. While still rooted firmly in memoir, the project draws from fantasy, magical realism, and graphica, reflecting modern literature's inclination to transcend traditional boundaries of genre and style.

P-18 *Synthesis, Isolation, and Characterization of Potentially Carcinogenic Arginine-Based Heterocyclic Amines*

Zachary M. Reichert (Ryan T. Hayes, Chemistry & Biochemistry)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Previous research demonstrates that meat cooked at high temperatures produces heterocyclic amines (HCAs)—a class of carcinogenic molecules—from burned creatin(in)e and amino acids. However, research performed in our lab, as well as in peer-reviewed literature, suggests that substituting arginine for creatin(in)e may lead to HCA formation. Arginine is structurally similar to creatin(in)e and can be found abundantly in soy-based food products. Therefore, we have burned arginine and phenylalanine to investigate the potential formation of arginine-based HCAs. The present study attempts to isolate and characterize these potential arginine-based HCAs.

P-19 *Distribution and paleobiology of hibernation in fossil ground-dwelling squirrels from the Great Plains, USA*

Randy Sanchez (H. Thomas Goodwin, Biology)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Hibernation is a widespread phenomenon present across mammalian taxa, including the family of ground-dwelling squirrels Sciuridae. Prior work has shown that hibernation can be identified in the ever-growing incisors of these ground squirrels through visual analysis. In this study, we collected specimens, originating from the Great Plains, from the C.W. Hibbard collection at the University of Michigan to be analyzed for hibernation marks. Analysis suggested hibernation mark-like features in several ground squirrel incisors from the genera "*Spermophilus*", *Otospermophilus*, and *Urocitellus*, ranging stratigraphically from the Pliocene to the Late Pleistocene and providing the oldest known hibernation record for ground squirrels.

P-20 *The Effect of Americanization on Latin American Culture: A Comparative Study of Hofstede's Cultural Dimensions and Pop Music*

Jason Shockey (Sonia Badenas and Pedro Navia, International Languages & Global Studies)

J.N. Andrews Honors Scholar

In 1980, Dr. Geert Hofstede published a book outlining his methodology of quantifying and objectively comparing cultures based on six dimensions. However, since Dr. Hofstede's research focused primarily on adult demographics, it may not adequately predict the future's reality. My project aims to determine the Americanization's impact on current Hispanic scores and see if they remain consistent to tradition or shift towards the United States' values. To accomplish this, I developed a scale similar to Hofstede's and analyzed the Billboard Top 40 list for 2014. Based on the data, it appears that Hispanic culture is drifting away from traditional values.

- P-21 *Parameterization of BayesWave for Analysis of Gravitational Waves Caused by Inspiral Black Holes*
Isabel Stafford (Tiffany Summerscales, Physics)
J.N. Andrews Honors Scholar and Issachar Scholar

Gravitational waves are ripples in the fabric of spacetime caused by large gravitational events. LIGO was built to detect gravitational wave signals. Programs such as BayesWave are designed to analyze signals detected by LIGO. By analyzing these signals, it is possible to gain a greater understanding of gravitational waves and their sources, which include binary stars, supernovas, and black holes. However, BayesWave remains unoptimized in many areas. By examining BayesWave's analysis of an injected gravitational wave signal while systematically varying several pre-set parameters, this research aims to optimize BayesWave for the analysis of gravitational waves caused by inspiraling black holes.

- P-22 *An Examination of Control Fraud in Non-Banking Industries*
Kaylie Takahashi (Carmelita Troy, Accounting, Economics, Finance)
J.N. Andrews Honors Scholar

William Black's 2005 control fraud theory suggests accounting fraud initiated by CEOs is more damaging than accounting fraud that is not; however, this theory has only been applied anecdotally to financial institutions. I test Black's theory using a sample of sixty-five nonfinancial firms that engaged in accounting fraud from 2007-2014. I hypothesize that firms which commit CEO-led fraud will exhibit greater growth, leverage, and have higher CEO compensation. If Black's theory applies to nonfinancial firms, then future research on accounting fraud is compelled to include CEO variables. In addition, government regulators, using CEO data, can better determine the firms to investigate for accounting fraud.

- P-23 *Evaluating the efficacy of Black Hole Master and other research awareness promoting games for educational and research awareness merit in high schools*
Jonathan Wheeler (Tiffany Summerscales, Physics)
J.N. Andrews Honors Scholar

The LIGO Scientific Collaboration's Education and Public Outreach group seeks to ameliorate the lack of public understanding of gravitational wave physics. One such effort is Black Hole Pong, a remake of the 1972 arcade classic developed by researchers at University of Birmingham, UK. Black Hole Pong differs from other educational games in that it stretches the laws of physics to make the user experience more exciting. I present the results of a set of pre-tests and post-tests from a public high school which measures Black Hole Pong's effectiveness in teaching the concepts and benefits of gravitational wave astronomy.

- P-24 *Mobile Application for Biosensor Colorimetric Analysis*
Eui Bin You (Rodney Lee Summerscales, Engineering and Computer Science)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Inexpensive paper-based biosensors can be valuable screening tools to test for various illnesses, but it is often challenging to design them to produce a visual change that can easily be identified by untrained users. This research aims to compensate for the lack of distinct visual cues by developing a mobile application that will use machine learning to analyze a picture of a sensor and determine whether it shows a positive or negative result. The machine learning algorithm will be trained on a set of labeled sensor images and its classification accuracy will be calculated and compared to a human expert.

Undergraduate Research Poster Presentations

- P-25 *Screening of Ylidene Rhodanines as Effective Metal Detectors*
Kaydra Bailey (Desmond Murray, Chemistry & Biochemistry)
Undergraduate Research Scholar

In this phase of our project we are conducting broad screens of previously synthesized ylidene rhodanines to explore their metal sensing capabilities. This communication will discuss our results to date. Our long-term goal is development of liquid crystalline ylidene rhodanines for novel applications in histochemistry. Based on ongoing work in Prof Murray's lab, with undergraduates and high school students, a new 'green' approach has been developed for facile synthesis of ylidene rhodanines. This prior synthesis facilitates exploring new applications for arylidene rhodanines in areas of biomedical and material science. Imaging of metals in human tissue is an important area of biomedical research and technology since metal (especially zinc, iron, and copper) imbalance is increasingly found to be critical in a number of diseases, such as, Alzheimer's, Parkinson's and Wilson's. Our working hypothesis for the development of liquid crystalline arylidene rhodanine dyes and stains is that in addition to the visualization of cells and their organelles afforded by stains, more information about cellular organization, structure and dynamics could be captured.

- P-26 *Synthesis of Naked Silver Nanoparticles by reducing Ag_2O with ACAC and eliminating the ACAC by Centrifuging*
Noah Chun (Getahun Merga, Chemistry & Biochemistry)
Undergraduate Research Scholar

Current methods of synthesizing naked silver nanoparticles are time consuming. A paper was published showing that centrifuging an aqueous solution of silver acetylacetonate produced a UV-Vis spectrum similar to that of naked Ag np. We decided to look further into this. A solution of Ag np was prepared by reducing silver oxide with ACAC and then centrifuged as was mentioned in the paper. This solution and a solution of naked Ag np was analyzed by the UV-Vis, IR, ICP, NMR, SEM and AFM to determine if naked Ag np were synthesized by centrifuging the Ag np solution.

- P-27 *Synthesis, Isolation, and Characterization of Potentially Carcinogenic Arginine-Based Heterocyclic Amines*
Michael Plantak (Ryan T. Hayes, Chemistry & Biochemistry)
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-28 *The Stabilization of Aqueous Ascorbic Acid Solutions using PAMAM Dendrimers*
Hyelin You (Ryan T. 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 in aqueous solution and degrades readily upon exposure to air and ultraviolet light. Thus, PAMAM (polyamidoamine) dendrimers were evaluated to stabilize dilute aqueous solutions of ascorbic acid. UV-Vis absorbance spectroscopy was used to measure the degradation over four hours, with and without the dendrimer, at varying pH values. Our data shows that PAMAM G2-Amine dendrimers significantly decrease the rate of ascorbic acid degradation, especially near physiological pH, demonstrating the effectiveness of these nanopolymers as a platform for vitamin C stabilization.

P-29 *Assessing Boronic Acid Substituted Arylidene-Thiobarbiturates as Bifunctional Nanoparticle Linkers*
Dillon Zimmerman (Getahun Merga and Desmond Murray, Chemistry & Biochemistry)
Undergraduate Research Scholar

We wish to assess the efficacy of boronic acid containing arylidene-thiobarbiturates as bifunctional molecule linkers between metal nanoparticles and metal oxides. Organic synthesis of arylidene-thiobarbiturates will occur by Knoevenagel condensation of thiobarbituric acid with formylphenylboronic acids. The chemical literature shows thio functionalities bind to metal nanoparticles while boronic acids bind to metal oxides. However, we have not seen boronic acid substituted arylidene thiobarbiturates synthesized or studied as bifunctional nanoparticle linkers. QCM, among other techniques, will assess the adherence of the bifunctional linkers to both the metal nanoparticles and metal oxides. Our group will synthesize naked silver nanoparticles and arylidene-thiobarbiturates.

P-30 *Development of an Anodized Aluminum Interposer for the test socket industry*
Will Allen¹, Dominique Tan-Ng², Lucas Machado³ (Boon-Chai Ng, Engineering & Computer Science)
¹Undergraduate Research Scholar, ²Andrews Academy, ³University of Brasilia

Anodized Aluminum is being considered for use as an interposer to position (helical springs) pins to analyze the connectivity of the printed circuit board. Pieces of aluminum alloy 6061 were anodized to create a thin oxide layer. The thickness of the oxide layer and the resistivity were measured. The results suggest that aluminum is a potential candidate to be used to spearhead the next generation of interposer with better control of the dimensional accuracy of these test sockets.

P-31 *Adapting Architectural Models for Visualization Using Virtual Reality Headsets*
Bernardo Martinez (Rodney Lee Summerscales, Engineering & Computer Science)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Business contracts represent a main source of income for Architects. Acquiring these contracts requires the latest and most immersive technology that improves their sales against competitors. Virtual reality provides an in-depth experience that allows clients to have a reasonable assurance that the building meets their physical expectations. Videos and photos are detached and mundane; while they provide some visual representation they will not allow the user to compare his physical characteristics (height, length, width) with a 3D model. I describe a procedure for automatically importing 3D models from Revit into Unreal4. I also describe the workflow required which includes constraints and benefits found along the way. As my focus was based on VR, a lot of my work was around the Oculus VR headset which provides an immersive experience into future and current buildings. The software tools I wrote modify 3D models to be compliant with UE4 materials, textures, groupings and it allows developers to split buildings into multiple slices improving performance and polygon counts.

P-32 *Novel fluid channel design for paper based biosensors*
Heaven (Haneul) Shin, (Hyun Kwon and Rodney Lee Summerscales, Engineering & Computer Science)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Microfluidic paper-based analytical devices (uPADs) are diagnostic devices that are inexpensive, bio-friendly, and small in scale. This device requires little training in analyzing the result which shows through simple change in colors. Here we used chromatography paper and nitrocellulose paper as the base of this device and used the wax-printing method to pattern the area of detection. The study demonstrates potential fluid channel designs and simulation results of an oPAD, origami paper analytical device, for simultaneous detection of multiple viral antigens. For the proof of concept, we used prostate specific antigen(PSA) as a model molecule to test for oPAD capability in showing results.

P-33 *Evaluation of anodized aluminum for potential use as interposer for test socket industry*

Christa Spieth (Boon-Chai Ng, Engineering & Computer Science)

Undergraduate Research Scholar

Anodized aluminum displays desirable qualities as an interposer in test sockets, as it is more dimensionally accurate than traditional polymers and less expensive than alternatives. However, the metal must withstand extensive heating and cooling cycles. Using a scanning electron microscope, we can compare the surface of the anodized aluminum before and after cycling to ensure that the difference in thermal expansion rates of the oxide and aluminum is not enough to cause critical defects. Initial observations suggest that the difference in expansion rates does not compromise the oxide layer, making anodized aluminum a strong candidate as a new interposer material.

P-34 *Carboxypeptidase O folding requires a GPI signal peptide*

Hazel Ezeribe (Peter J. Lyons, Biology)

Undergraduate Research Scholar

Carboxypeptidase O (CPO) is a digestive enzyme that is thought to degrade proteins in the intestinal tract. Most related carboxypeptidases have a prodomain, which helps in protein folding. CPO in contrast, does not, but instead has a GPI membrane attachment, which may help in folding. Mutant CPO lacking the GPI anchor was poorly expressed in HEK293T and Sf9 cells when analyzed by western blotting. Experiments to determine the rate of degradation of CPO showed no difference between wild-type and mutant CPO. This suggests that the poor expression of mutant CPO is not due to the rate of degradation but possibly to the rate of production.

P-35 *Using Sea Surface Temperature to Predict the Odds of Egg Cannibalism in a Seabird Colony*

Rashida Smith (James Hayward¹, Shandelle Henson², Lynelle M. Weldon², ¹Biology, ²Mathematics)

Undergraduate Research Scholar

Sea surface temperature (SST) is a primary predictor of egg cannibalism in a large gull colony on Protection Island, Washington. In particular, a 0.1 degree increase in average SST during September-May prior to egg laying increases the odds that an egg is cannibalized by 10% if all other factors are kept constant. This study seeks to answer two main questions: (1) Is September-May the best time interval over which to average SST in order to predict cannibalism? (2) Do any other time intervals (for example, January-April) that are more computationally convenient for field biologists work as well as September-May?

P-36 *Conditions for positive solutions of the general elliptic model*

Timothy Robertson (Joon Hyuk Kang, Mathematics)

Undergraduate Research Scholar

We investigate mathematical conditions to guarantee the existence and uniqueness of positive solutions to a general elliptic mathematical model. This result generalizes the existence and uniqueness of positive steady state solutions to a Lotka-Volterra competition model with homogeneous boundary conditions for two species of animals competing in the same environment. Under what conditions do they coexist peacefully? It is natural to say that they can coexist peacefully if their reproduction rates and self-limitation rates are relatively larger than those of competition rates. In other words, they can survive if they interact strongly among themselves and weakly with others.

P-37 *The Role of Local Flora at the Archeological Site Tall Hisban, Jordan*

Connor Smith (Garth Woodruff, Agriculture)

Undergraduate Research Scholar

This paper analyzes the role of local flora at the archeological site at Tall Hisban Jordan as well as identifies strategies that can be used to document and preserve the plant life. On site research was conducted from May to August at Tall Hisban, and the Temple of the Winged Lions in Petra. By analyzing the sites and plant surveys conducted by Professor Stan Beikman and Doctor Erin Addison, it has been made clear that local flora and archeological sites have a unique and important relationship. This research shows that local flora plays a key role in an archeological site, and conversely archeological sites play a key role in the local flora.

P-38 *Use of the Refractometer to Measure Effects of Preservation Techniques on °Brix; An Indicator of Vegetable Quality*

Hannah Mbungu (Sherine Brown-Fraser, Public Health, Nutrition & Wellness)

Over the years, food preservation techniques have evolved. This study examined the effects of two preservation techniques on vegetable quality represented in °Brix values (soluble sucrose solution). A refractometer was used to measure produce quality for raw, canned and frozen carrots, kale and beets from two local markets. °Brix values were measured over time. Canning had the greatest effect on lowering °Brix values overtime vs freezing (-60% change vs -29.2% change respectively). After three months, frozen beets maintained the highest produce quality and least percent change compared to carrots and kale (11.6 vs. 7.1 vs. 2.6 °Brix respectively). Preservation appears to effect produce quality.

P-39 *Auditory Memory and Figure-Ground Ability Among University ESL Students: A Comparative Study*

Bomi Kim and Candace Neufville (Darah Regal, Speech-language Pathology & Audiology)
Undergraduate Research Scholars

The ability to process spoken English despite classroom distractions, and retain auditory information presented by instructors is imperative at the university level. Research supports the detrimental effects of background noise in English as a Second Language (ESL) students; however, the auditory processing category of tolerance-fading memory is composed of *both* auditory figure-ground and short-term memory. The purpose of the study is to measure tolerance-fading memory in ESL students through a selection of tests (MSTB/AzBio Sentences, CID-W22 and TAPS-3).

P-40 *New Faculty Onboarding*

Fonda Mwangi (Rachel Williams-Smith, Communication)
Undergraduate Research Scholar

This action research project was aimed at discovering how the new faculty onboarding process at Andrews University could be improved. First, following a review of literature, participants were recruited, and a proposal for an improved process was drafted and presented to a focus group. Feedback was collected. The proposal was then revised and emailed to new faculty participants. They were asked to review it, answer three open-ended questions, and submit responses. Eleven responded and the data were analyzed. Preliminary results indicate that the proposal provided an improved approach to new faculty onboarding. However, interviews are being conducted to provide more data.

P-41 *Sequencing eye-movement patterns: An investigation into new analysis methods*

Charles M. Abreu (Karl Bailey and Herb Helm, Behavioral Sciences)
Undergraduate Research Scholar

Humans analyze scenes by making eye-movements between fixations. Historically, visual data has been analyzed using heatmaps, looking at where each fixation was made. We have tested a novel method that sequences these fixations to further analyze the order of fixations when we process a picture. By testing this novel analysis method on data from people viewing paintings we have found that while individuals tend to move between major focal points, the pattern or sequence of movement can be broken into different clusters. These results suggest that this method is useful for seeing sub-patterns in ways that heatmaps do not allow.

P-42 *Moral Reasoning and Judgment About Ending Life Revisited: Influences of Religiosity, Generation, and Resilience*

Christiana D. Atkins (Harvey Burnett, Behavioral Sciences)

Undergraduate Research Scholar

This study examines age, religiosity, and resilience as predictors of moral reasoning and judgments about ending life issues including suicide, physician-assisted suicide, active euthanasia, and mercy-killing. Suicide refers to individuals ending their own life. Physician-assisted suicide refers to medical professionals providing the means to end a life, but not administering the fatal dose. Active euthanasia refers to medical professionals administering a fatal dose. Mercy killing refers to a loved one ending a life in an act of compassion. Multiple regression analysis is expected to show lower age, resilience, and religiosity as predictors of permissive moral reasoning and judgments.

P-43 *Female clergy marital spouses' concept of woman's divine calling*

Josias Flores (Romulus Chelbegean, Behavioral Sciences)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

In this qualitative study conducted at the Andrews University Seventh-day Adventist Theological Seminary, twenty six spouses belonging to female clergy marital couples were asked separately about their perception of the woman's divine calling to ministry. Spouses' individual responses were coded and categorized. Special attention was given to the husbands' perception versus their wives' perception of the concept of a woman being called to serve as a pastor. While women seemed to have a high level of confidence in their unique spiritual experience, particular differences were found between the views of their clergy and non-clergy husbands about their wives' ministerial calling.

P-44 *Hookup Culture: Predictors of Engagement in Casual Sex*

Cooper Hodges (Duane C. McBride, Behavioral Sciences)

Undergraduate Research Scholar

The purpose of this study was to attempt to discover statistical predictors of college student engagement in casual (hookup) sex. A nested multiple regression analysis revealed that religious internalization ($F(199)=6.536$, $p<.000$) and tobacco use ($F(199)=4.0914$, $p<.001$) caused significant changes in the regression model. Alcohol use, marijuana use, parental involvement/conflict, and pornography use were not significant. The β values produced by the regression became significant in model two, specifically for identified regulation ($\beta= -.023$, $t(199)= -3.412$, $p<.000$), remaining significant through the rest of the regression, increasing somewhat in model 4, for tobacco use ($\beta=.193$, $t(199)= 2.50$, $p=.013$) Results show a strong indication that religious internalization is a strong predictor of risk behaviors within a prohibitionist university setting.

P-45 *Do College Students Handle Stress the Same Way as they did in Early Childhood in Relation to Traumatic Experiences*

Camille Nixon (Harvey Burnett, Behavioral Sciences)

This study examines the correlation between early childhood and adulthood traumatic experiences and resilience. Early childhood experiences account for many aspects of our personality as we grow and mature. Using this notion, studying and testing this subject can give us a better perspective of how we can deal with stressful experiences within our adulthood, but first we must look to the past. Previous literature suggests that childhood trauma has something to do with mental as well as physical health later in life. The purpose of this study is to measure resilience and stress in relation to both time periods, early childhood and adulthood, within the subjects and compare the two.

P-46 *Predictors of Racial Attitudes Amongst Students in a Conservative Religious University*

Krystal C. Uzuegbu (Lionel Matthews, Behavioral Sciences)

Undergraduate Research Scholar

Race relations in America are at an all time low. The *New York Times/CBS News* [July 2015] poll confirms this position, indicating that the majority [64%] of Americans felt that race relations have gotten progressively worse between the years of 2010 to 2015. Clearly, this reality constitutes a serious potential setback to national harmony and social progress. Guided by past findings and established theories on race relations, this research examines racial attitude as a function of religious, socio-demographic, and psychosocial predictors. Specific variables include: a number of demographic factors, faith maturity, religiosity, self-esteem, social distance, mindset attribution, and media usage.

P-47 *Jordan Cave Survey Preliminary Report*

Chrystal E. Wedderburn (Øystein LaBianca, Behavioral Sciences and Institute of Archaeology)

Undergraduate Research Scholar

The Hashemite Kingdom of Jordan is a country with a rich history. An important part of its history is its tribes and the caves they used as dwellings. Dr. Øystein LaBianca's 1989 cave survey is an ethnographic study of the caves in Jordan, done by means of interviews and visual observations. I endeavor to organize this data in four ways: transcribing LaBianca's field notes and relevant sections of Frederick G. Peake's *History and Tribes of Jordan* (1958), finding the location of each interview on Google Earth, locating and uploading photos from each interview, and using NVivo for qualitative data analysis.

P-48 *Using Theories of Change for the Education of Social Responsibility: A Theoretical Framework*

Noël Harris (Joel Raveloharimisy, Community and International Development)

Undergraduate Research Scholar

How can social responsibility be taught in schools to better inspire action? Social responsibility is an important theme of education, yet improvement could be made. Thus, Theories of Change were applied to education for social responsibility to identify problems and create goals. Others have previously studied the failings and ameliorations of social responsibility education yet limited literature exists on how to use Theories of Change in relation to social responsibility education. This paper proposes a step-by-step model, using Theories of Change to improve social responsibility education, aiming to actively involve youth in seeking justice, equality, and taking care of others.

P-49 *Remaining Adventist: The Influence of Adventist University Experiences on Denominational Persistence*

Jonathan Doram (Larry Burton, Teaching, Learning, and Curriculum)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Seventh-day Adventists leave the church for various reasons. While researchers have investigated explanations for this exodus, few have investigated individuals' denominational persistence. As this study uses a qualitative grounded theory research design, the purpose is to develop, not test, a theory to explain a person's decision to remain Adventist. I conducted and/or assessed interviews with people who started university as Adventists, attended a North American Division university, and currently self-identify as a Seventh-day Adventist. I am in the process of analyzing these interviews with several types and rounds of coding to identify life experiences that contribute to denominational persistence.

P-50 *An exploratory study in X-ray fluorescence analysis of metal artifacts*

Benjamin Shafer (Robert Bates, Behavioral Sciences and Institute of Archaeology)

Particle spectroscopy plays a significant role in archaeological research. Spectroscopic analysis can help reveal an object's elemental composition and structure. X-ray fluorescence (XRF) spectroscopy is one common method for artifact analysis. We explored the process and potential of XRF spectroscopy for compositional analyses of metal artifacts, particularly from several assemblages never previously involved with spectroscopy. 52 objects were analyzed—47 coins and 5 other pieces, from various backgrounds. The data consistently suggested the presence of certain expected metals (e.g., silver, copper) in many of the coins. The intriguing results and the important archaeological implications of spectroscopy strongly suggest further research.

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