

Honors Scholars & Undergraduate Research Poster Symposium

6 March 2015



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

Thanks to your efforts as student researchers and faculty mentors, undergraduate research is now recognized as one of the distinctive areas of excellence at Andrews University. Every year, students participate in research with faculty mentors, assisting in established projects or beginning new ones. This symposium is dedicated to the exhibition of such research endeavors.

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, Chris Bardan, James Hayward, Ante Jeroncic, Katherine Koudele, John Markovic, Beverly Matiko, Lionel Matthews, Benjamin Navia, L. Monique Pittman, David Randall, Randy Sanchez, Tiffany Summerscales, Trina Thompson, Bruce Wrenn, and Robert Zdor. We also thank our administrative assistants, Maria Sanchez-Martinez and Sarah Burton, 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 *The Art of French Mélodie: A Manual for Recital Preparation*
Kristen Abraham (Charles Reid, Music)
J.N. Andrews Honors Scholar

I document my journey through the research, development and execution of a recital focused on French *mélodie*, a genre of art song classified by its intense lyricism and precision. Moving through three phases: thinking, doing and reflecting, I highlight the important processes required to transition seamlessly through each. While going through the project each step is documented in a journal to maintain the integrity of the process. My end goal is to present a “How To” manual with information on planning, preparing and ultimately presenting a recital to the public.

P-02 *Children in Armed Conflict: A Human Rights Dilemma*
Afia Asamoah (Gary Wood, Political Science)
J.N. Andrews Honors Scholar

Despite the efforts of the United Nations and other international organizations, more than 300,000 children worldwide are currently forced into active combat roles and encouraged to commit crimes against humanity. This paper explores principles of natural justice, human rights, and human dignity through classical political rationalism as it relates to the issue of children in armed conflict. In doing so, this paper aims to provide a rational and objective standard to counter the practice of destroying childhood innocence through forced participation in war crimes and thus encourage the world to no longer turn a blind eye to this human rights dilemma.

P-03 *Multicultural Experiences and Diverse Friend Networks*
Tiffany Bailey (Melissa Ponce-Rodas, Psychology)
J.N. Andrews Honors Scholar

The current study examined the relationship between an individual’s desire for multicultural experiences (MD), lived multicultural experiences (ME) and the diversity of one’s friend networks (DFN). I hypothesized that the more diverse experiences a participant had or desired, the more diverse their friend network would be. 187 undergraduate students participated in this study. Both ME and MD were positively correlated with DFN ($r = 0.25$, $r = 0.32$). ME and MD were also significantly correlated with each other (0.43). Because all variables are positively correlated a mediational relationship will also be tested and the results discussed.

P-04 *Measuring Student Satisfaction in the Andrews University School of Business*
Khelsea Bauer (Jacquelyn Warwick, Management, Marketing & Information Systems)
J.N. Andrews Honors Scholar

The goal of my research is to analyze the students in the Andrews University School of Business Administration (SBA) to determine which factors are most closely correlated with satisfaction and perceived quality. I will study satisfaction as a dependent variable measured in relation to different service factors provided by the SBA, including advising, teaching quality and religion and faith components. Using a survey tool I created based on the Student Satisfaction Inventory™, the Undergraduate Business Exit Assessment, and the AU Senior Survey and Course Survey, I will evaluate the data by combining step-wise statistical analysis and weighted gap score analysis.

P-05 *A Study in Red: The Codification and Practical Application of a Copyediting Procedure*
Nathan Berglund (Beverly Matiko, English)
J.N. Andrews Honors Scholar

Editing is an integral part of publishing professional-level writing, but editing—specifically copyediting—can be very subjective, relying on the copyeditor’s best judgment. For novice editors such as myself, this responsibility can be intimidating. For this research project, I formulated and tested a step-by-step copyediting procedure aimed at alleviating these jitters. By reading copyediting guides and interviewing four active copyeditors, I developed a procedure. I then tested that procedure on Timothy Huck’s 115-page manuscript, *The Lights of the Arno: A Novel*. I conclude that even with a standardized editing methodology, editors will always need to rely on their subjective judgment.

P-06 *The Transgenerational Effect of Substance Use Between Students, Parents & Grandparents*

Subira Brown (Duane McBride, Behavioral Sciences)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Using a survey conducted among college students at Andrews University, this study focused on substance use and sexual behaviors of students and the presence of familial substance use problems. Analysis indicated a significant association between substance use problems of fathers and their children's substance use. There was a stronger statistical association between father's substance use problems and male children's alcohol use. In addition there was a significant relationship between grandparents substance use and youth sexual behavior for both genders. There is a need for further analysis of the study.

P-07 *Exposure to Narratives and Social Reasoning*

Cassandra Chlevin (Karl Bailey, Behavioral Sciences)

J.N. Andrews Honors Scholar, Undergraduate Research Scholar, and Earhart Emerging Scholar

The primary goal of this study is to replicate the work of Mar, Oatley, Hirsh, dela Paz, and Peterson (2006) on the relationships of narrative and non-narrative texts with empathy and social reasoning in a Seventh-day Adventist Christian sample. The second goal is to examine how different types of Biblical texts correlate with the development of social reasoning in Adventists. Results are expected to mirror those of the original study regardless of religious affiliation. An implication of this study is that for an Adventist population, exposure to religious narratives may play a role in how empathy and social reasoning develops.

P-08 *Paper-based Biosensor for Colorimetric Detection of PSA Biomarker*

Alyson E. Drew (Hyun Kwon, Engineering & Computer Science)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Prostate cancer is detected by excess PSA in the bloodstream, a protein the prostate overproduces when tumors are present. In this paper, we designed an origami paper analytical device, specific to PSA using gold nanoparticles which provide a colorimetric, qualitative, inexpensive, disposable design to detect PSA. Our device separates the sample laterally to prevent back-mixing and vertically to enable addition of novel particles. The design was optimized for channel thickness, size, proper heating, type of paper involved, and amount of sample solution needed. We are currently concept-testing of PSA qualitative detection via sandwich assay to target detection levels < 100ng/mL.

P-09 *Imagery, Prayer, and Mind Wandering: Kataphatic Prayer*

Martha M. O. Duah (Karl Bailey, Behavioral Science)

J.N. Andrews Honors Scholar

Mind wandering—reduced attention to external events—during prayer could pose a problem for Christians. However, different types of prayer make different cognitive demands. *Kataphatic prayer*, a common type of evangelical Christian prayer, makes use of mental imagery in hopes of experiencing God in a richer sense. Because both mind wandering and kataphatic prayer require imagery, tying up imagery resources in kataphatic prayer should block mind wandering thereby improving focus. Participants in this study will either pray as they normally do, view a visual task, or engage in kataphatic prayer while self-monitoring for mind wandering.

P-10 *The relationship between equine temperament and behavior as affected over time by the skill level of the riders*

Taylor Huffman (Katherine Koudele, Agriculture)

J.N. Andrews Honors Scholar

The goal in this study is to observe the incidence of undesirable behaviors by horses at summer camp and determine if it could possibly be explained by the stress of being ridden by riders with varying ability during the course of a camp season. It is hypothesized that incidence and severity of undesirable behavior will be related to the temperament of the horse. Each horse was evaluated for temperament at the beginning of the summer camp season, every rider received an evaluation for riding skill level, and all incidents and lengths of trail were recorded. Results analysis is in progress.

- P-11 *Determining Social Preference of Holstein Cows Based on Stall Selection*
Yoona Kang (Katherine Koudele, Agriculture and Jerome Thayer, Institutional Effectiveness)
J.N. Andrews Honors Scholar

Cows, like other animals, have dominance hierarchies but there is anecdotal evidence that cows also have preferred herd mates with whom they spend more time. This research project sought to gain more detail about cow social groups at the Andrews University Dairy by determining the relative social ranking of cows within two different lots and the social groupings within each lot. The dominance ranking was inferred by observing which cows occupy the more desirable stalls. The social groupings were then determined by which cows lie near each other more often over the course of the observations.

- P-12 *The Role of the Gift-Giving Spirit in Numbers 11*
Jeanmark Kessler (Rahel Schafer, Religion & Biblical Languages)
J.N. Andrews Honors Scholar

Current scholarship analyzes spiritual gifts predominantly from Acts 2, Romans 12, 1 Corinthians 12, and Ephesians 4. With the assumption that the Holy Spirit belongs to the Godhead and His actions are constant and persistent throughout Scripture, this study develops an Old Testament perspective on the Holy Spirit's role as gift-giver. This exegetical research investigates Numbers 11:16-29 as the key passage, where the Holy Spirit bestows His gifts upon Israel's leaders. In addition, the valid connections between Numbers 11 and 2 Kings 2 provide a broader and more consistent contextual interpretation of spiritual gifts within the Old Testament.

- P-13 *The Effect of Omega-3 Fatty Acids on Concentration of Myo-Inositol*
Patrick D. Knighton Jr. (Marlene Murray, Biology)
J.N. Andrews Honors Scholar

Bipolar affective disorder is a mental illness that affects 1-2% of the population. One hypothesis for the effectiveness of current treatments of bipolar disorder is the reduction of cellular myo-inositol. Lithium and valproate are known to reduce cellular inositol levels, however these treatments often have notable side effects. Currently, there is a need to find a treatment for bipolar disorder that reduces the adverse side effects of these drugs. Previous studies, have found success in using omega-3 fatty acids for the treatment of bipolar affective disorder. The long-term purpose of this study is to determine what effect omega-3 fatty acids have on myo-inositol concentration. This study has worked toward this purpose by comparing the growth effects of 0.8mM DHA to 2.5mM VPA. We have found that similar to VPA, cell growth is reduced at 0.8mM.

- P-14 *Discourse and Narrative: Creating Gender Control in Junot Diaz's The Brief Wondrous Life of Oscar Wao*
Charles Lee (Vanessa Corredera, English)
J.N. Andrews Honors Scholar

Junot Diaz's Pulitzer-Prize-Winning 2007 novel *The Brief Wondrous Life of Oscar Wao* explores Dominican masculinity through narrator Yunior de Las Casas's portrayal of protagonist Oscar de León's family history. Yunior's perceived virility shapes his understanding of masculinity, which he stresses through the novel's plot and structure. This analysis considers how Yunior constructs Dominican masculinity through his narrative by marginalizing and emasculating passive characters such as Oscar. I argue that Yunior's narrative closely links definitions of masculinity and power as he strives to dominate passive characters in order to assert his virility as the "best" method for being a Dominican man.

- P-15 *The Design of a Thermoplastic Enclosure for an OBD-II Reader*
James Magbanua (Boon-Chai Ng, Engineering & Computer Science)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

An enclosure is required for the complete design of an OBD-II (On-Board Diagnostics) system, to be mounted on the dashboard of a car. To meet design specifications, this enclosure must house the electronic components of the system, as well as pass safety requirements. Such a design was created through design software, SOLIDWORKS, and tested by Finite Element Analysis for critical points of deflection using an estimated load that simulates a car accident. The design was then prototyped through 3D printing and physically tested on the deflection points by a load impact test. This design can therefore be passed for assembly.

P-16 *Extracting Gravitational Waves from Noisy Data Using a Maximum Entropy Method Approach*
Michael McMearty (Tiffany Summerscales, Physics)
J.N. Andrews Honors Scholar

Gravitational waves are virtually undetectable ripples in the fabric of space and time. The LIGO Scientific Collaboration aims to achieve the first direct detection of these waves with the LIGO detectors. LIGO is currently being updated to Advanced LIGO, which will be ten times more sensitive than previous levels. To prepare for this next generation in gravitational wave detection, we develop and test methods for extracting gravitational wave signals and their parameters. We test the MaxEnt method's extraction ability by injecting fake signals into noise and extracting a signal. We then estimate the extracted signal's parameters and evaluate MaxEnt's effectiveness by comparing said parameters with the parameters of the original injected signal.

P-17 *My Plea: A Musical Portrait of a Japanese Internment Poem by Mary T. Matsuzawa*
Michael M. Momohara (Kenneth Logan, Music)
J.N. Andrews Honors Scholar

The internment of Japanese-Americans during World War II caused the suffering and fragmentation of many families. One internee, Mary T. Matsuzawa, authored a prayerful poem entitled "My Plea" that I see as expressing her thoughts on freedom, equality, and servitude as a "cross-bearer" for the Japanese-American people. Musical imagery, text painting, and historical context are used to craft a choral setting of Matsuzawa's poem, scored for SATB mixed choir and cello. The purpose of this work is both to deumbrate the Japanese-American internment and to portray Matsuzawa's suffering and longing while displaying the hope and comfort she had as a result of her faith in God.

P-18 *Narcissism and the Selfie: Investigating Millennial Narcissism on Instagram*
Megan Reed (Bruce Wrenn, Management, Marketing & Information Systems)
J.N. Andrews Honors Scholar

Recent research shows a correlation between self-promoting images on social media and higher levels of narcissism. This research will further demonstrate the positive correlation between the proportion of selfies an individual posts on Instagram and Millennial narcissism. The proportion of pictures that are selfies is measured in two ways: in the subject's past 4-weeks of picture posting and in the last 30 pictures the subject posted. The standard Narcissistic Personality Inventory is used to measure the subject's level of narcissism. The subject's proportion of selfies and narcissistic score is then analyzed for any possible correlation.

P-19 *The Behavior of Glaucous-winged Gull Egg Cannibals*
Ashley A. Reichert (James Hayward, Biology and Shandelle Henson, Mathematics)
J.N. Andrews Honors Scholar

Cannibalism leads to a variety of behavioral and demographic consequences among numerous taxa. Although multiple studies have linked cannibalism to egg and chick failure in gull populations, few characterizations of gull cannibal behavior exist. During the 2014 breeding season, we observed territories of 16 Glaucous-winged Gull (*Larus glaucescens*) egg cannibal specialists on Protection Island, Washington, USA. We also monitored cannibal foraging behavior, reproductive success, and colony-wide egg loss. Cannibals employed a variety of foraging behaviors and exhibited significantly lower reproductive success than non-cannibals. Future study of the Protection Island gull colony will monitor trends in cannibalism relative to environmental change.

P-20 *"The story which he never stops telling himself": Autobiography, Narrative Community, and the Deconstruction of Selfhood in Virginia Woolf's The Waves*
Melodie Roschman (Beverly Matiko, English)
J.N. Andrews Honors Scholar, Undergraduate Research Scholar, and Earhart Emerging Scholar

This paper examines narrative, biography, and selfhood in Virginia Woolf's *The Waves* (1931). The novel, a "play-poem," follows six friends' monologues from childhood to death. I analyze aspiring writer Bernard from his childhood of telling stories about companions to his inability to narrate his autobiography, arguing that he fails because he has no self to narrate. Referencing Jacques Derrida's *Of Grammatology's* (1974) theory of the deconstructed self identifiable only in conversation, I argue that Bernard destroys his identity by silencing his friends and becoming the sole speaker; Woolf's biographical theory thereby establishes the communal self, prefiguring tenets of postmodern philosophy.

- P-21 *C. S. Lewis's The Great Divorce: An Adaptation for Reader's Theater*
Olivia Ruiz-Knott (Beverly Matiko, Communication and Ante Jeronic, Religion & Biblical Languages)
J.N. Andrews Honors Scholar

This project—a Reader's Theater production of C. S. Lewis's short allegorical novel *The Great Divorce* (1946)—pursues the values of truth and beauty by relating the rich theological realities of Lewis's work through drama and voice. Reader's Theater differs from traditional theater in that the voice, rather than blocking and costuming, carries the drama. The script is read rather than memorized, resulting in a directed, well-rehearsed dramatic presentation of a script. This project requires the creation of an abridged script with a substantial introduction detailing the process of production, and all elements of production from inception to a final stage performance of approximately 90 minutes.

- P-22 *Hydroxyl Functional Group Number Determination of PAMAM Dendrimers with NIR-spectroscopy*
Seth Stacey (Ryan Hayes, Chemistry & Biochemistry)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

The goal of this project is to investigate the use of NIR-spectroscopy to quantify the number of OH functional groups attached to poly (amido amine) or PAMAM dendrimers in a manner that is quick, cost effective and easily reproducible. Obtaining the approximate number of hydroxyl functional groups (OH#) in a dendrimer is crucial in determining what role it can play in bonding and reactivity to other molecules. NIR-spectroscopy has the potential to allow for the recovery of the sample or at least to minimize the amount needed for analysis while providing an accurate determination of the OH# of a dendrimer.

- P-23 *Variations in Microbiota of Culex (Melanoconion) ocosa and Culex (Culex) declarator Across Periurban and Rural Environments*
M. Nelson Starkey (Kanya Long, Biology)
J.N. Andrews Honors Scholar

Mosquitoes serve as the primary mode of transmission for many tropical infections such as Venezuelan equine encephalitis virus, dengue virus, and malaria. Therefore, mosquitoes are an important area of study for disease control. This study examined the differences in gut microbiota of *Culex melanoconion* species across two different habitats: periurban and rural. Mosquitoes were collected from locations around Iquitos, Peru and their gut bacterial DNA was extracted and analyzed. Based on previous studies it is believed that the bacterial flora will differ among mosquitoes reared in different locations.

- P-24 *Synthesis of Arginine-Based Heterocyclic Amines*
Andrew Stewart (Ryan Hayes, Chemistry & Biochemistry)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Heterocyclic Amines (HCAs) are a group of mutagenic and carcinogenic chemicals found in muscle meat after grilling, frying, or broiling. Research studies show that very low amounts of HCAs are created from creatinine reacting with another amino acid at temperatures greater than 200 °C. Other studies show that plant-based arginine can substitute for creatine forming a new class of mutagenic HCAs, but also in low yields. We sought to develop a direct, higher yielding method of producing these arginine-HCAs based on a procedure previously used to synthesize creatine-HCAs. Greater amounts of arginine-HCA speeds analysis, chemical characterization, and toxicity assessment.

- P-25 *Synthesis of Isoxazoline Derivatives as Potential Anti-Cancer Agents*
Rosanne Thornhill (Lisa Ahlberg, Chemistry & Biochemistry)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Isoxazolines are organic molecules known for their diverse functionality in medicinal chemistry, including their anti-cancer activity. In a study on dibenzoazepine tethered isoxazoline (DBI) derivatives as possible anti-cancer agents, combining the potential DNA-damaging effects of dibenzoazepines and isoxazolines, results showed increased inhibition of invasion, migration and proliferation of some cancer cells. PK11195, a benzodiazepine derivative, also has known anti-cancer activity through alternative mechanisms still actively studied. My research aims to design and synthesize an organic molecule exhibiting key structural qualities of both DBI and PK11195, hopefully combining the individual functionalities of both, to form a molecule with greater anti-cancer activity.

- P-26 *Taphanomic Degradation of Chicken Feathers by Bacteria and Fungus in Varying Sediments*
Douglas Van Putten (Denise Smith, Biology)
J.N. Andrews Honors Scholar

The purpose of this study is to identify the relationships between the early taphanomic degradation of chicken feathers and the environmental/biological variables that affect the feather's physical characteristics. The variables tested include sediment type, length of burial, bacteria, and fungi and their interaction on Rooster Chinchilla Rounds from the bird species *Gallus gallus*. The results of this analysis can be used to determine what variables correlate with specific feather properties such as barb count, color and size. The anticipated outcome of this lab is the identification of which environmental/biological variables cause the most degradation. The findings may be useful for further paleontology research and waste removal.

- P-27 *Changing Attitudes Towards Sexual Orientation and the Effect of Documentary Film*
Michael VanderWaal (Harvey Burnett, Behavioral Sciences)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Attitudes towards LGBT are shifting, with over half (51%) of the US population now favoring same-sex marriage. LGBT issues are also being hotly debated in the Seventh-day Adventist (SDA) church. The purpose of this research is to examine how the film, 'Seventh-Gay Adventist' (SGA) influences SDA college students' attitudes regarding homosexuality. My study will compare attitude scores of students using an experimental design with random assignment. Both the experimental group and the control group will complete a commonly used Homosexuality Attitude Scale and modified version of Fulton's Adventists and LGB's survey (2013) at pre-test and post-test. The control and primary experimental subjects will be randomly assigned to watch either SGA or The Adventist (a documentary film about SDA health practices). Analyses will include within-group and between-group t-tests as well as cross-tabulations and chi-square analyses.

- P-28 *Musical borrowing in Las Cuatro Estaciones Porteñas: Piazzolla, Desyatnikov, Vivaldi*
WayAnne Watson (Trina Thompson, Music)
J.N. Andrews Honors Scholar, Undergraduate Research Scholar, and Earhart Emerging Scholar

Leonid Desyatnikov arranged Astor Piazzolla's *Las Cuatro Estaciones Porteñas* for violin and string orchestra, interspersing quotations from Vivaldi's *Four Seasons* throughout the new work. My score-based analysis of the arrangement investigates Desyatnikov's borrowing techniques by locating the Vivaldi quotations, examining Desyatnikov's alterations to their original content and context, and determining whether the quotations' identities are maintained or transformed. My research shows that, generally, Desyatnikov minimizes drastic alterations to content, but usually makes changes to context. Overall, this leads to transformation of the quotations' identities. By examining these compositional procedures, my analysis provides a more nuanced exploration of musical dominance and irony.

- P-29 *Ovulation Synchrony as an Adaptive Response to Egg Cannibalism in a Seabird Colony*
Sumiko Weir (James Hayward, Biology and Shandelle Henson, Mathematics)
J.N. Andrews Honors Scholar

Every-other-day egg-laying synchrony has been demonstrated in the Glaucous-winged gull (*Larus glaucescens*) colony at Protection Island National Wildlife Refuge, where cannibalism is the predominant cause of egg loss. Here we show that (1) eggs are most likely to be cannibalized within the first 24 hours after they are laid, and (2) the odds that an egg is cannibalized within the first 24 hours decreases with an increase in the number of eggs laid on that day. This suggests that egg-laying synchrony functions as an adaptive response to cannibalism by maximizing an egg's chance of survival during its most vulnerable period.

- P-30 *Edward Snowden, Criminal or Patriot: Media coverage of National Security Agency document leaks*
Joyce M. Yoon (Desrene Vernon-Brebner, Communication)
J.N. Andrews Honors Scholar

Kenneth Burke's dramatic pentad was used to analyze Edward Snowden's National Security Agency (NSA) document leaks from June 5, 2013 through October 1, 2013 as published in the *New York Times* (NYT) and the *Guardian*. The articles were coded by newspaper, headline, reporting journalist, page prominence, word count, publication date, and tone of stories. Content analysis revealed that the *Guardian* utilized the word "whistleblower" extensively in a positive way while the *NYT* most often used the term "leaker" in a negative way. Both papers overlap in their identification of Snowden's actions as one of the most significant intelligence disclosures since the Pentagon Papers.

Undergraduate Research Poster Presentations

P-31 *Preliminary Study of the Effect of PAMAM Dendrimers on Mushroom Tyrosinase Activity*

Andrew Hong (D. David Nowack, Chemistry & Biochemistry)

Traditional polymer chemistry has focused widely on the use of linear polymers; however, the unique properties of highly branched polymers, called dendrimers, exhibit different functional uses as opposed to their linear counterparts. A well characterized enzyme, mushroom tyrosinase, was chosen to investigate the biological function changes, if any, by dendrimers. Our study first evaluated the kinetics of mushroom tyrosinase, then observed and tested its function in the presence of PAMAMs (polyamidodiamines) dendrimers. Tyrosinase assays showed distinct inhibition as the concentration of the dendrimer (PAMAM G1) increased from 0.2 mM to 5 mM. From the analysis of the Lineweaver-Burk plots, the dendrimer had a mixed inhibitory effect on the enzyme, in which it is binding to the enzyme and to the enzyme-substrate complex to inhibit both species simultaneously. Mushroom tyrosinase and dendrimer interactions can be extensively studied as models for other enzymes and allow for further study of the biological applications of dendrimers.

P-32 *Mutagenicity Assessment of Potentially Carcinogenic Arginine-Based Heterocyclic Amines*

Michael Plantak (Ryan 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 heterocyclic amines.

P-33 *Enhanced isolation and recovery of potentially carcinogenic arginine-based heterocyclic amines*

Zachary Reichert (Ryan 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 creatin(in)e and amino acids. However, research performed in our lab, as well as in peer-reviewed literature, suggests that HCAs may be formed in the absence of creatin(in)e using arginine. 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 produce arginine-HCAs in low quantities that require isolation, molecular characterization, and mutagenicity assessment. We now report on how to improve the arginine-HCA recovery from these low-yielding reactions.

P-34 *Mechanism Analysis of Copper(II) Ions Interacting with Dimethylaminocyanostilbene*

Eui Bin You (Ryan Hayes, Chemistry & Biochemistry)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Previous research had suggested that the fluorescence of dimethylaminocyanostilbene (DCS) is selectively quenched by copper(II) ions. This study aimed to elucidate the fluorescence quenching mechanism and to explore its potential application to screen for copper ions in water samples. A spectroscopic Job Plot analysis was used to find the ratio of DCS and copper(II) ion binding. Additionally, DCS was mixed with various buffered metal ion solutions to reveal any ion-dependent and/or pH-dependent fluorescence response. NMR analysis of DCS and various buffered copper(II) solutions was also performed to further study the interaction between copper(II) ions and DCS.

P-35 *Locating Gravitational Waves with BayesWave*
Belinda Cheeseboro (Tiffany Summerscales, Physics)
Undergraduate Research Scholar

LIGO is the Laser Interferometer Gravitational Wave Observatory. Its mission is to detect gravitational waves that could be caused by the interaction of massive gravitating bodies such as coalescing black holes, in-spiraling neutron stars, etc. BayesWave is an algorithm that can analyze possible gravitational wave event data and determine the properties of candidate events such as sky location. This algorithm uses a combination of Bayesian probability theory and the Reverse Jump Markov Chain Monte Carlo (RJMcMC) method to accomplish this goal. BayesWave is able to simultaneously model the gravitational wave signal and the noise by using multi-component models. It uses the RJMcMC to simultaneously perform model selection and fully sample the posterior, to estimate model parameters. This study applies BayesWave to mock events in order to measure its efficacy and compare it with other parameter estimation methods.

P-36 *The Theological Motivation of Isaac Newton*
Isabel Stafford (Gary Burdick, Physics)
J.N. Andrews Honors Scholar and Issachar Scholar

Isaac Newton, known for his advances in physics, is remembered as a scientist. The lack of religious references in his scientific publications is often seen as a conscientious separation of science from religion. However, Newton was a theologian first and a scientist second, and his motivation for pursuing science came from his religious convictions. The Principia Mathematica was written primarily because of Newton's theological motivation, not out of a desire to study science for the sake of science. Despite the apparent lack of religion in the Principia Mathematica, it is a deeply religious book that grew out of the theological motivation of its author.

P-37 *Nanoparticle Optical Trapping*
Rufaro Musvosvi (Hyun Kwon, Engineering & Computer Science)
Undergraduate Research Scholar

Optical trapping is the use of a laser beam, to trap small particles, similarly to using tweezers. A straight beam of light, focused correctly, can provide a force strong enough to control a nanoparticle. The objective of this project is to set up a Modular Optical Trapping Kit for the purposes of research and teaching. The project is split into two main parts. Part one is assembling the Trapping Kit, which includes building a Printed Circuit Board (PCB). Part two is measuring the necessary laser-force for different particles. This is an on-going project.

P-38 *The Effect of Stress-Relaxation Cycles on the Electrical Resistance and the Capacitance of Dielectric Electro Active Polymers*
Cody Rieger (Boon-Chai Ng, Engineering & Computer Science)
Undergraduate Research Scholar

Dielectric Electro Active Polymers (DEAP) has the potential of converting mechanical energy into useful electrical energy. This material consists of a silicone dielectric film material with a special corrugated surface and a very thin layer of metallic electrodes on both sides of the surface. As these materials allow large mechanical deformations with low operating forces, potential applications include using this material to convert the energy from the ocean waves, and wind. This work examined the capacitance and the electrical resistance to provide useful information in optimizing the electrical properties for specific applications, and to investigate how the electrical properties are affected by electrical and/or mechanical breakdown.

P-39 *Modeling mammalian carboxypeptidase O expression patterns with the thirteen-lined ground squirrel*
(*Ictidomys tridecemlineatus*)
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 carboxyl terminus of a substrate protein. Besides its potential digestive application, not much else is known about its other activities in the body. This study aims to describe the expression pattern of CPO using the thirteen-lined ground squirrel as a model mammalian system. Thus far we have sampled tissue from one ground squirrel and analyzed those samples via Western blot. Immunoreactive bands likely to be CPO (molecular weight approximately 42 kDa) were seen in kidney, liver, and small intestine tissue samples. Further investigation will include immunohistochemical analysis.

P-40 *Carboxypeptidase folding mechanisms in the absence of a chaperone-like prodomain*

Hazel O. Ezeribe (Peter Lyons, Biology)

Undergraduate Research Scholar

Most carboxypeptidases contain a second domain that functions as an intramolecular chaperone to aid in protein folding. Carboxypeptidase O (CPO), however, is composed of only an enzymatic domain with a short N-terminal extension and a C-terminal signal peptide necessary for membrane attachment via a GPI anchor. To investigate the role of these segments in folding, site-directed mutagenesis was performed. Mutants lacking the GPI signal peptide were expressed at lower levels in HEK293T cells, suggesting a function of this segment as intramolecular chaperone. In order to confirm this role, expression was performed in Sf9 insect cells. Purification and characterization of CPO mutants is ongoing.

P-41 *The effect of varying sound intensities on phonotactic selectivity in Female Acheta domesticus*

Re'Jeanne Greene (Benjamin Navia, Biology)

Undergraduate Research Scholar

The intensity of the calling songs to which a female cricket *Acheta domesticus* is most likely to start responding phonotactically has been reported to be around 55dB at a carrier frequency of 4 – 5 kHz. These reports, however, have not shown selective phonotaxis to occur at such low intensities. Preliminary data from behavioral experiments have demonstrated that i) in response to calling songs with intensities above 75dB, females are more likely to exhibit selective phonotaxis in response to a full sequence of calling songs with varying syllable periods (30 – 90 ms); ii) in response to calling songs with intensities below 75 dB the same females are less likely to respond selectively to identical stimuli. By testing all three intensities, 85dB, 75dB, and 60dB, at various syllable periods, we intend to find the threshold intensity at which a female cricket will exhibit selectivity in their phonotactic choices.

P-42 *The Effects of Omega-3-Fatty Acids on Intracellular Inositol Levels in Saccharomyces Cerevisiae*

Jee Yeon Lee (Marlene Murray, Biology)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Bipolar disorder is a severe and chronic debilitating mental disorder affecting 1-3% of the population. It is ranked sixth worldwide among all medical disorders in years of life lost to death or disability. 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- two drugs commonly used for treating the disorder. However, the mechanism of action of omega-3-fatty acids remains unknown. In this study, the effects of the omega-3-fatty acid docosahexaenoic acid on growth and intracellular inositol levels were examined. We show that similar to valproate and lithium, docosahexaenoic acid decreases growth of the yeast *Saccharomyces Cerevisiae*. We also showed that unlike valproate, DHA does not decrease intracellular inositol.

P-43 *Spatial analysis of Mayaro virus antibody prevalence outside of Iquitos, Peru*

Viktoria Kolpacoff (Kanya Long, Biology)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Mayaro virus (MAYV) is an endemic disease, similar to dengue, found in tropical areas of South America. Risk of infection with MAYV is dependent on exposure to the mosquito vector. In 2008, blood samples were collected from voluntary participants from two rural villages outside Iquitos, Peru, and the sera tested for IgG antibody to MAYV. GPS points were plotted for the houses, and using ArcGIS (version 10.2), we conducted a hotspot analysis using the Getis-Ord G_i^* statistic, with positive and negative indicating presence or absence of MAYV antibody. We expect that positive values will be clustered near more established forest.

P-44 *The Possible Effects of Deleterious Rhizobacterial Combinations on the Growth of the Weed Velvetleaf*

Athena Smith (Rob Zdor, Biology)

Undergraduate Research Scholar

The use of biological agents in the control of the invasive weed velvetleaf *Abutilon theophrasti* is attractive due to this weeds development of herbicide resistance. One option is the utilization of deleterious rhizobacteria with amendments to optimize their effectiveness. Indole acetic acid (IAA)-producing *Rhizobium rubi* AT3-4RS/6 (RS) and cyanogenic *Pseudomonas putida* ATH2-1RI/9 (RI) were used to inoculate soil with and without amino acid amendments. RS & tryptophan (a precursor of IAA synthesis) caused the least shoot growth, but there was less root growth with RI than with RS. All roots were colonized by rhizobacteria, on average, $1.40E+10$ CFU/gram dry root.

P-45 *Man's search for meaning: The case of Legos revisited*
Michael Choi (Harvey Burnett, Behavioral Sciences)
Undergraduate Research Scholar

How do perceived meaning, levels of resilience, and job-rotation affect productivity and labor supply? Answering this question will provide further insight on how manipulating tasks can influence labor supply, motivation, and productivity in almost any field of labor, such as school and the workplace. Further, this study will explore motivation and the “least-common-denominator of meaningfulness that is shared by virtually all compensated activities” (Ariely et. al., 2008). This study is a replication and extension upon *Man's search for meaning: The case of Legos* (Ariely et. al., 2008).

P-46 *The relationship between health-maintenance preferences and health*
Kiara Dillard (Harvey Burnett, Behavioral Sciences)

This study examines the relationship between people's general health and their health-maintenance practices, specifically, the use of over-the-counter medications (OTCs) and home remedies. These practices are used by many; however, there is still much uncertainty about how these impact one's health. Subjects for this study are drawn from the Behavioral Sciences Research Participation Pool and will complete an adapted questionnaire taken from the Questionnaire to Document Self-Medicating Behaviours and the SF-36 Health Survey. My hypothesis is that one of these health-maintenance practices will have a stronger relationship with health than the other.

P-47 *Adventist Female Clergy Families and Gender Related Biblical Passages*
Josias Augusto Flores (Romulus Chelbegean, Behavioral Sciences)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Based on both religious prescriptions and cultural norms, for centuries the role of clergy in Christian churches was traditionally assigned to males only. However, following the 1970's feminist movement, the last few decades allowed room in Adventism for considerably more female pastors. By interviewing separately spouses from marital couples in which the wife is a present or future Adventist clergy, this qualitative study explored participants' knowledge and interpretation of gender related biblical passages.

P-48 *Spousal Distribution of Domestic Chores in Adventist Female Clergy Families*
Amante Gonzales (Romulus Chelbegean, Behavioral Sciences)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Based on both religious prescriptions and cultural norms, the role of clergy in Christian churches was traditionally assigned exclusively to males. However, following the 1970's feminist movement, the last few decades allowed room in Adventism for considerably more female pastors. By interviewing separately each one of the spouses, this qualitative study explores the distribution of the domestic chores in marital couples in which the wife is a present or future Adventist clergy.

P-49 *Religiosity and Perceived Stress among Conservative Christian College Students*
Cooper B. Hodges (Duane McBride and Karl Bailey, Behavioral Sciences)
Undergraduate Research Scholar and Earhart Emerging Scholar

What is the relationship between religiosity and perceived stress among college students? Previous research has suggested that religiosity is a buffer against outside stressors. Our study specifically focused on two forms of religiosity internalization: identified regulation and introjected regulation. Seventy-nine undergraduate students, in attendance at Andrews University, self-reported their perceived stress and religiosity levels as participants in a subject pool. Multiple linear regression analysis revealed that identified regulation was a significant predictor of stress perception levels compared to introjected regulation. We conclude that students who have a more internalized religious belief system are more likely to exhibit lower stress levels.

P-50 *Demographic, Psycho-Social, and Religious Predictors of Suicide Attempts Among Adolescents of a Conservative Religious Denomination*
Isaac Suh (Lionel Matthews and Harvey Burnett, Behavioral Sciences)
Undergraduate Research Scholar

Recent research indicates that suicide is a growing cause of death in our country (CDC, 2010). Over the twelve year period (1999 to 2012), suicide rates increased by a staggering 40%. This is especially evident among adolescents (13-17 years). In spite of this trend, much remains to be known about the variability of this phenomenon across various subcultures. This study examines suicidal ideation and the effect of various demographic, psycho-social, and religious predictors among adolescents of a conservative religious denomination.

P-51 *Perforated Tripod Vessels: What they are not, and what they could be*
Emily Cancel (Robert Bates, Behavioral Sciences)

Many perforated tripod vessels have been found in the Middle East since the nineteenth century, but their purpose is still unknown. Their unique construction is somewhat characteristic of incense burners, but I disagree with this common conclusion. I acquired two perforated tripod vessels found at Jerusalem from La Sierra University in California, and examined them. The original vessels bear no signs of charring, or other markings that would distinguish it as such. I tested replicas of the vessels in an attempt to recreate them as incense burners, to no avail. Currently, I am testing other hypotheses as to the use of these vessels.

P-52 *Historical Function and Origin of the Eye of Horus Amulet Discovered at Tal Hisban*
Chris Jenkins (Robert Bates, Behavioral Sciences)

What is the historical function and origin of the Eye of Horus Amulet discovered at Tal Hisban? In the 2014 Excavation of Tal Hisban, an ancient Egyptian Artifact was discovered down in the reservoir that was once used for water. The artifact was later identified to be an Eye of Horus amulet. This was a big find for the season but unfortunately the artifact was found out of context and could not properly be dated. In this study we will be studying multiple sources from different Archaeological works on Egyptian Mythology, religion and jewelry. In the process of dating the artifact we will be looking at color and style in our comparative analysis, to compare our artifact with others that have been discovered in the past, so we can properly date our artifact. I expect to find that the artifact will fall into the time period of the Iron Age.

P-53 *Understanding Jalul through Ceramic Analysis*
Krystal C. Uzuegbu (Randall Younker, Institute of Archaeology)
Undergraduate Research Scholar

Three-dimensional ceramic scans provide many advantages for research and publication. These 3-D scans can be shared with distant scholars for examination. Using special software, we can convert the 3-D color scans into 2-D computer drawings that represent the cross section of the pottery sherd, which is the standard way in which pottery sherds are presented in publication. Using the program, features that may be overlooked with the naked eye are highlighted, allowing for a more accurate analysis. My presentation will explain how ceramic analysis has aided our overall understanding of the ancient Iron Age site of Jalul, Jordan thus far.

P-55 *Gender, Family, and Morality in Ben Jonson's Volpone*
Shanelle Kim (L. Monique Pittman, English)
J.N. Andrews Honors Scholar, Undergraduate Research Scholar, and Earhart Emerging Scholar

Ben Jonson's *Volpone* (1606) diagnoses social ills arising from the proto-capitalist culture of his time. The two distinct embodiments of moral good in Jonson's play, Celia and Bonario, prove ineffective in battling emerging value transformations associated with money; in part, their failure derives from systemic fissures in Early Modern understandings of the family unit and gender roles. My project combines a close reading of Celia and Bonario as dramatized in Jonson's play alongside a careful analysis of sixteenth-century conduct books that articulate understandings of the family unit and gender roles during a time of proto-capitalist transition.

P-56 *New Faculty Onboarding Process*
Fonda Mwangi (Rachel Williams-Smith, Communication)
Undergraduate Research Scholar

This action research study seeks to discover how to improve the new faculty onboarding process at Andrews University. Based on a review of the current process and literature, a proposal outlining a revised process was developed and presented to a focus group for review. The feedback collected is being used for revising the proposal, which will then be presented to new faculty participants. Data will be collected and subjected to content and thematic data analysis to answer the research question: "How can the current onboarding process for new faculty be improved for future incoming faculty?" Results will be written up and published.

P-57 *Forgiveness Measures within Seventh-day Adventist Interpersonal Relationships*
Lindsay White (Patrice Jones and Rachel Williams-Smith, Communication)
Undergraduate Research Scholar

The Forgiveness Measurements within the Seventh-day Adventist interpersonal relationships is researching and describing the forgiveness levels of them, and how they (SDA's) perceive those around them to be. We have been reading existing articles on forgiveness between genders, age, and people's relationships between others. Also, the levels of forgiveness depending on situations and past issues/memories of a situation that arise after a certain time. Our expected results for this research will be to see what the forgiveness level is for the Seventh-day Adventists, how forgiving they are and how they perceive others around them to be, based on our survey and readings.

P-58 *Calculating Musical Perfection: the Golden Section in J.S Bach's Violin Sonatas*
Richard Clark (Lilianne Doukhan, Music)

The purpose of this research project is to explore the extent to which the golden section appears in Bach's sonatas for solo violin, BWV 1001 – 1006, and to use statistical analysis to attempt to shed light on whether any such relationships were intentional on the part of the composer. The ideal focal point of each piece will be found by applying period appropriate approximations of the Golden section to the total number of measures. The music in and around the focal point will then be analyzed for climactic or noteworthy occurrences, with any deviations measured and further analyzed for patterns.

P-59 *The Seven Liberal Arts and their Relevancy in Music Education Today*
Jonathan Doram (Lilianne Doukhan, Music)
J.N. Andrews Honors Scholar

Since Greek and Roman ideas and thought laid the foundation for many disciplines in Western civilization, I decided to explore their philosophies on education and music. The seven liberal arts, founded by the Greeks and Romans, set the standard of education for many centuries. Much of Western music theory, language, vocabulary, and techniques are indebted to discoveries made by the Ancients and the monasteries in the Middle Ages. Using primary and secondary sources, I propose to explore possible modern implications of these learning systems. As a music education major, I hope to use this information in innovative and creative ways in a classroom setting.

P-60 *Let All the People Praise Thee: Early Lutheran Chorales and the Priesthood of All Believers*
WayAnne Watson (Lilianne Doukhan, Music)
J.N. Andrews Honors Scholar, Undergraduate Research Scholar, and Earhart Emerging Scholar

Martin Luther articulated his belief in the priesthood of all believers through both word and music. His chorales reflect his desire for direct congregational participation in the worship service, leading to personal experiences of justification by faith when people met their true High Priest without an earthly mediator. Luther used the chorale as a tool for teaching theology and an occasion of an individual encounter with God. I demonstrate the chorale's role as a tool for understanding and experiencing justification by faith, by studying the theme of joy in selected examples from the hymnody of Luther and his contemporaries.

P-61 *The Dual Legacy of Jonathan Edwards's Conception of the "Union with Christ" Motif*
Aldar Nommik (Ante Jeroncic, Religion & Biblical Languages)
Undergraduate Research Scholar

In his treatise "Justification by Faith Alone" (1738), Jonathan Edwards posits the concept of "union with Christ" as a central theological motif in his conceptualization of salvation. What is absent from this treatise, but present in his other writings however, is a clear delineation of the *nature* of such integral union of the believer with Christ. This research presents that Jonathan Edwards's overall understanding of the nature of the union with Christ seems to be incompatible with the Reformed understanding of justification by faith that he set out to defend in "Justification by Faith Alone".

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