

Honors Scholars & Undergraduate Research Poster Symposium



March 2, 2018

2:30-4:00 p.m.

Buller Hall Lobby



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, Carol Burtnack, Vanessa Corredera, Bernadette Flores, James Hayward, Shandelle Henson, Haley Kang, Joon Hyuk Kang, Katherine Koudele, Beverly Matiko, Benjamin Navia, L. Monique Pittman, David Randall, Darah Regal, Davide Sciarabba, Rodney Summerscales, Tiffany Summerscales, Karin Thompson, and Robert Zdor. We also thank our administrative assistant, Maxine Umana and research staff, Jeff Boyd and Mordekai Ongo, as well as our student assistants, Rebecca Keller and Ingrid Radulescu, for their hard work in helping to make this event a success.

Many thanks for working together!



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

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



Gary Burdick
Dean of Research
Professor of Physics

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

Honors Thesis Poster Presentations

P-01 *Test Optimization for Evaluating Mutagenicity of Burned Arginine-based Heterocyclic Amines and the Anti-mutagenic Effect of Chinese Medicinal Herbs*

Rayford Alva (Ryan T. Hayes, Chemistry & Biochemistry; Brian Y. Y. Wong, Biology)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

From the unexpected finding that cooked grains and meat substitutes elicit a mutagenic response in *Salmonella typhimurium* TA98, our work has been aimed at deconstructing this finding via a survey of heated binary amino acid combinations, involving arginine, a plant-based amino acid. Secondly, our work has looked for possible substances, such as traditional Chinese medicinal herbs, that can inhibit the mutagenic activity of heterocyclic amines (HCAs, the main culprit for mutagenicity in meat). Our findings indicate that mutagenic activity exists with HCA-like products from heated amino acids and that the tested Chinese herbs effectively inhibit a known HCA, PhIP.

P-02 *Three Syrian Voices: Dismantling “Otherness” Perceptions by Collecting and Crafting Works of Creative Nonfiction*

Hannah Choi (Sonia Badenas, International Languages & Global Studies; Beverly Matiko, English)

J.N. Andrews Honors Scholar

The proliferation of anti-refugee rhetoric through repeated use of “Islamic State,” “terrorism,” and similar language reinforces perceptions of “otherness” toward marginalized, asylum-seeking Syrians, whose individual voices are rarely if ever heard by Western populations. In the fall of 2017 while working for 8 weeks in a school for Syrian refugees in the SDA Middle East North Africa Union, I interviewed three young Syrian volunteers. The resulting works of creative nonfiction grew out of an effort to understand, appreciate, and share experiences of individual Syrians with an audience socially predisposed to ascribe an overarching identity to all people of this demographic.

P-03 *An Evaluation of Foot-washing as Practiced in the Seventh-Day Adventist Church*

Hadid Cortez (Erhard Gallos, Religion & Biblical Languages)

J.N. Andrews Honors Scholar

This project studies theological and historical connections and correlations between foot-washing and the Lord’s Supper. The goal is to explore the biblical basis for the Seventh-Day Adventist practice of the communion ceremony. It is hard to infer an obvious connection because both events are never presented together. However, upon a thorough exegesis of the text, theological connections involving symbolism of Christ’s death, a clear mandate to perform foot-washing, as well as a consistency in the timeline unite both events. So far this study has proven that foot-washing is a practice based upon biblical mandate rather than Christian tradition.

P-04 *“Hollywood Dreams:” Gender Oppression and Postcolonial Resistance in Jessica Hagedorn’s Dogeaters*

Andrei Wayne Kyrk Defino (Vanessa Corredera, English)

J.N. Andrews Honors Scholar

This paper addresses how gender, sexuality, and resistance affect personal and national identity construction in *Dogeaters*, a novel tracing the lives of Filipino characters during President Ferdinand Marcos’s dictatorial regime—a period that reshaped the Philippines’s national identity. Using gender theory and nationhood studies, I highlight how women and queer individuals who challenge masculine norms attempt subversion by creating communities outside of patriarchal constructs but ultimately fail. Specifically, I read Joey Sands’s and Daisy Avila’s marginality, failure to comply with societal expectations, and acts of defiance as helpful modes for self-actualization and self-identification that nevertheless prove futile against the larger system.

P-05 *HPLC Analysis of Amino Acids in Glaucous-winged Gull Eggshells*

Alexandria Edge (Lisa Ahlberg, Chemistry & Biochemistry)

J.N. Andrews Honors Scholar

We are developing a reliable method of analyzing amino acid contents of eggshells using High Pressure Liquid Chromatography (HPLC). The closed-system nature of eggshells allows for accurate analysis. The method of analysis requires dissolution, derivatization, and an HPLC running method, which includes a column cleaning routine. The amino acids are derivatized with o-phthaldialdehyde (OPA) and N-isobutryl-L-cysteine (IBLC) to add fluorescence capability and improve D- and L-isomer separation. The derivatized amino acid solution is injected into the HPLC with a low pH buffer using methanol/water, and then analyzed with fluorescence spectroscopy. This methodology can be used for further analysis, like racemization dating.

P-06 *An Examination of Resilience Over Time Between Men and Women in Psychological First Aid*

Leiali'i Edwards (Harvey Burnett, Behavioral Sciences)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Research has shown that Psychological First Aid (PFA) helps to promote resilience in individuals affected by traumatic events (Everly, 2012). The purpose of this study is to examine differences in resilience levels between gender over time by comparing PFA with a Social Acknowledgment condition. The Response to Stressful Events Scale is used to assess resilience (Johnson et al. 2011). Using a mixed between-within subjects ANOVA, it is hypothesized that there will be a significant interaction between time and gender. Women will exhibit increasing resilience levels over time, however, men will exhibit no change.

P-07 *Religious Liberty and Conflict*

Daniel Fults (Marcella Myers, History & Political Science)

J.N. Andrews Honors Scholar

Since the inception of the United States, Americans have held religious freedom in the highest reverence. Concurrently, with a plurality of faiths and non-faith, conflict has continually transpired between secular society and personal faith. At times, these conflicts are adjudicated in the courtroom and not in the church sanctuary. The deciding rationale in the courts has been informed by various factors as the arguments of conflicting parties have evolved over time. The purpose of this research is to help inform the discourse of religious liberty by charting both legal arguments and public opinion in their development over time.

P-08 *Bifurcations in an Animal Behavior Model for Synchronous Egg Laying in a Seabird Colony*

Christiane Gallos (Shandelle M. Henson, Mathematics)

J.N. Andrews Honors Scholar

Glaucous-winged gulls (*Larus glaucescens*) breed on Protection Island, Washington. During years with high sea surface temperature (and hence low food resource), they exhibit egg cannibalism and every-other-day egg-laying synchrony in dense areas of the colony. Here we present a bifurcation analysis of a discrete-time model of egg-laying behavior. We use the Jury Conditions to find the stability criteria of the system as a function of the crowding factor. The equilibrium loses stability in a synchronous two-cycle bifurcation as the crowding factor increases beyond a critical value. We show that in the presence of egg cannibalism synchrony can increase population size.

P-09 *Bifurcation Analysis of a Discrete-time Model for Seabird Reproduction*

Dorothea Gallos (Shandelle M. Henson, Mathematics)

J.N. Andrews Honors Scholar

Glaucous-winged gulls (*Larus glaucescens*) breed in a large colony on Protection Island, Washington, and are known to exhibit every-other-day egg-laying synchrony in dense areas of the colony. We present a discrete-time model for egg-laying synchrony and use Jury Conditions to find the stability of the system as a function of the crowding factor. The equilibrium loses stability when the crowding factor exceeds a critical value, and the system begins synchronous stable oscillations. We also explore the effects of synchrony in the presence of egg predation and show that synchrony can be advantageous for individuals.

P-10 *The Colored Dendrimer Synthesis Project*

Jesse Gray (Ryan T. Hayes, Chemistry & Biochemistry)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

PAMAM dendrimers are nanosized spherical, highly-branched polymers that are being developed for drug solubilization, targeted drug delivery, DNA/siRNA transfection, MRI contrast agents, and tracking biochemical processes. Commercially available dendrimers are colorless and require additional synthesis to attach chromophores. The research demonstrates how to build a PAMAM dendrimer around colored core molecule. Perylenetetra-carboxylic dianhydride is a stable, red, fluorescent chromophore that was transformed into a diamine then into the traditional PAMAM structure using methyl acrylate followed by ethylenediamine. The resulting G0 dendrimer is studied by NMR, mass spectroscopy, and optical spectroscopy to characterize this new red PAMAM dendrimer.

P-11 *Effects of Eggshell Coloration on Egg Cannibalism Among Glaucous-Winged Gulls*

Isabelle Hwang (James Hayward, Biology; Shandelle M. Henson, Mathematics; Robert Polski, Physics, Cal Tech)

J.N. Andrews Honors Scholar

Egg cannibalism by gulls during the breeding season is a common source of reproductive loss for these birds. Fifty-five percent of egg loss on the Protection Island Glaucous-Winged Gull colony is due to cannibalism. Gulls commonly use their excellent eyesight to search for food, including eggs. We hypothesized that gull eggs with more typical coloration should have a smaller risk of cannibalism by neighboring gulls. In contrast to our hypothesis, ImageJ color analysis of 674 cannibalized and non-cannibalized eggs during the summer of 2015 demonstrated that unusually colored eggs were most likely to avoid cannibalism.

P-12 *In the House of God: Divine Authority and the Collectivity of Spiritual Experience in George Herbert's The Temple and Ralph Vaughan Williams' Five Mystical Songs*

Nicole Hwang (L. Monique Pittman, English)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

George Herbert's poem collection, *The Temple* (1633), portrays a reciprocal relationship between the human and divine, suggesting that we are to house the glory of God and abide in Him. In "Love (III)" from *The Temple*, Herbert illustrates this, showing that just as God dwells in our hearts, we receive sustenance from Him. "Love bade me welcome" from Ralph Vaughan Williams' *Five Mystical Songs* (1911), places "Love (III)" in conversation with a musical score. Interdisciplinary analysis of Herbert's poem and William's song demonstrates how the musical composition enlarges Herbert's dyadic approach, evoking the individual's participation in a wider holy community.

P-13 *"But a Woman Who Feels the Lord is to Be Praised": A Practical Vision in Proverbs 31*

Ye Jin Jeon (Rahel Wells, Religion & Biblical Languages)

J.N. Andrews Honors Scholar

Proverbs begins with an exposition on what the "fear of the Lord" entails and ends with the description of the woman of noble character who fears the Lord (Proverbs 31:30). As few scholars have considered the woman of Proverbs 31 in connection to the "fear of the Lord," this project overviews aspects of the "fear of the Lord" in the Old Testament, including all specific verses containing the phrase, and examines the significance of their connections with Proverbs 31. The contributions of this study include theological and practical implications of what it means to live a life fearing the Lord.

- P-14 *Synthesis and Antibacterial Activity of Oxygenated Boronic Acid Substituted α -Cyanostilbenes*
Yewon Kim (Desmond Murray, Chemistry & Biochemistry)
J.N. Andrews Honors Scholar

Stilbenes are naturally occurring compounds that have exhibited antibacterial activity, although the biological effect of various stilbenes is different for Gram-positive and Gram-negative strains of bacteria. In prior research, cyanostilbenes have shown “slight” antibacterial activity (Brownlee, et al., 1943). This project aims to explore whether hybrid oxygenated α -cyanostilbenes possessing a boronic acid pharmacophore exhibits significant antibacterial activity (Das, et al., 2013). The biological activity against both Gram-positive and Gram-negative strains will be tested.

- P-15 *Critical Amino Acids for the Folding of Carboxypeptidase O*
Donn LaTour (Peter Lyons, Biology)
J.N. Andrews Honors Scholar

Enzymes must fold properly to function. For carboxypeptidases, a prodomain usually assists in this process. However, carboxypeptidase O (CPO) can fold without one. We hypothesized that this prodigious ability could arise from an amino acid whose fortunate positioning stabilizes its neighbors during folding. We identified four unique, conserved amino acids and mutated them to their equivalent counterpart in CPA, a cousin of CPO, which requires a prodomain. We expressed the mutated genes in mammalian cells and checked for expression by western blotting. Our results indicate that three of four mutations were not expressed, hinting at the possible importance of these sites in the folding of CPO.

- P-16 *Creating a Textile Museum Exhibit: Conservation and Accessibility*
Kelly Lorenz (Stefanie Elkins, Visual Arts, Communication & Design; Constance Gane, Old Testament, Horn Museum)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

This two-fold study engages a collection of early-to-mid-20th century Levantine textiles currently held by the Institute of Archaeology and Siegfried H. Horn Museum. The first part of the study involves identifying the potential causes of physical deterioration posed to the collection, which will contribute to a proposal for storing and displaying these textile artifacts. Keeping the museum’s resources in mind, the storage plan emphasizes preventive conservation, focusing on minimizing risk factors for potential future damage. The second part of the study provides written interpretive material for the museum exhibit that informs visitors of the textiles’ geographical, physical, and cultural origins.

- P-17 *Iago as Moral Other in Jonathan Munby’s Production of Othello (2016)*
Emma Magbanua (L. Monique Pittman, English)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

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

P-18 *Business and Plurilingualism: The Advantage of a Foreign Language in the Business Environment*
Anabelis Martinez (Sonia Badenas, International Languages & Global Studies)
J.N. Andrews Honors Scholar

The current global economy has implications that suggest the need for an adaptation in order to operate efficiently in this new environment. Is bilingualism a skill that professionals should be acquiring? To investigate this question, I am researching the frequency with which online job postings across three different business specialties (i.e., accounting, management and marketing) ask for language proficiency. My project seeks to answer the following questions: How often do job openings require bilingualism? Which states have a higher demand for bilingual candidates? And which languages are the most sought after?

P-19 *Crawling Tor Hidden Services and Depicting Interconnectivity*
John-Luke Navarro (Rodney Summerscales, Engineering & Computer Science)
J.N. Andrews Honors Scholar

The Tor Network is a popular internet platform that automatically encrypts user data and obfuscates identifiable browsing patterns. Hidden services—websites hosted on Tor—have similar security benefits to Tor users. Bulk data on hidden service content and interconnections could benefit law-enforcement agencies performing cyber-crime investigations involving the Tor network. Towards this end, I developed two software solutions. The first, a specialized web crawler, explores Tor from an initial list of hidden services and discovers new ones, downloading HTML page-content from each. The second, a link-aggregation graph script, generates renderable directed graphs depicting discovered links between hidden services.

P-20 *Effect of Omega-3-DHA on Myo-inositol Level and Gene Expression of INO1*
Taejun Ok (Marlene Murray, Biology)
J.N. Andrews Honors Scholar

Bipolar disorder is a mental disorder characterized by repeated episodes of mania and depression. Its current treatment often entails inefficacy and side effects. Omega-3-fatty acids have been found to improve bipolar disorder symptoms without significant aftereffects, and it is hypothetically attributed for its ability to alter the level of *myo*-inositol. Thus, the goal of this study is to determine the effects of the omega-3-decosahexaenoic acid (DHA) on intracellular *myo*-inositol levels and the expression of the *myo*-inositol synthase gene, *INO1*. Extracts of cells grown in the presence of DHA were assayed for *myo*-inositol results support the hypothesis that DHA can ameliorate bipolar disorder by increasing *myo*-inositol levels, which probably leads to a decrease in *myo*-inositol *INO1*.

P-21 *Salud Sin Barreras/Health Without Borders*
Alyssa Royster (Pedro Navia, International Languages & Global Studies)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

This experiential narrative seeks to acknowledge the voices of non-English fluent Spanish speakers by documenting their past experiences with healthcare service and accessibility in the United States. The interviews will elicit personal stories, challenges, and thoughts regarding language barriers. My findings will reveal whether healthcare service providers are equipped and prepared for Spanish speakers, not leaving them with their essential needs unmet due to the reparable yet not acted upon setback of a language barrier.

P-22 *The Role of Cold Plasma and Its Composition on the Growth of Electromagnetic Ion Cyclotron Waves in the Inner Magnetosphere*

Jesse Snelling (Jay Johnson, Physics)

J.N. Andrews Honors Scholar

While it is currently well accepted that the free energy for growth of electromagnetic ion cyclotron (EMIC) waves in Earth's magnetosphere comes from unstable configurations of hot anisotropic ions injected into the ring current, in some cases the measured anisotropy is not adequate to explain local instability. Additionally, the relative importance of the density and composition of a cold plasma population is uncertain. In this study, several intervals of observed EMIC wave activity are analyzed using WHAMP stability code with fitted plasma distributions to determine the role of a cold population in driving instability on each of the wave branches.

P-23 *Experience with Diversity: Microaggressions, Religiosity, and Psychological Wellbeing in a Diverse College Sample*

Jessica Stelfox (Karl G. D. Bailey, Behavioral Sciences)

J.N. Andrews Honors Scholar

This project seeks to measure students' beliefs about the existence of racial discrimination on the Andrews campus and how often they experience behaviors classified as microaggressions. This study includes multiple racial groups in order to expand the examination of the relationship between microaggressions and religiosity, diversity, social dominance, and psychological wellbeing. The Correlation Analysis and Qualitative Comparative Analysis (Thiem, 2016) found that no individual type of microaggression accounts for inferiority. Generally, there was a smaller range of scores for whites than blacks. Overall, there are low levels of microaggressions on this campus.

P-24 *Prosocial Effects of Perspective-Taking through LEGO Play*

Carlyle Tagalog (Karl G. D. Bailey, Behavioral Sciences)

J.N. Andrews Honors Scholar

This study seeks to examine the claims in the LEGO Six Bricks Booklet regarding perspective-taking outcomes related to prosocial behaviors intended to benefit others (the LEGO Foundation, 2015; Dunfield, 2014). In helping situations, trait kindness predicts prosocial behaviors (Lefevor, et al., 2017). One hundred twenty subjects will be randomly assigned to one of three conditions that involve LEGO Six Bricks task and a prosocial task. One-way ANOVA and a Bonferroni-Holm post-hoc will be conducted to compare performance on the prosocial measure in the three conditions. We posit that LEGO perspective-taking tasks increase prosocial behaviors beyond individual trait predispositions.

P-25 *Efficacy of a Three-week Intervention Program for School-aged Children in the Areas of Language, Literacy, Phonological Awareness, and Auditory Processing*

Nicole Weis (Darah Regal and Lara Scheidler-Smith, Speech-Language, Pathology & Audiology)

J.N. Andrews Honors Scholar

Research demonstrates that competency in the areas of language, literacy, phonological awareness, and auditory processing is vital to academic success in children, as well as in navigating adult life. The study's purpose is to measure the efficacy of an intensive, three-week therapy summer camp program in improving children's skills in these four areas. Additional goals include identifying strengths and weaknesses of the program in order to improve intervention strategies for future camps. Evidence-based therapy programs were utilized during the summer camp, as well as science experiments, and snack and crafts time.

P-26 *AZBIO Sentence Accuracy of English as a Second Language (ESL) Adults in Quiet and Noisy Environments*
Alexandra Wiist (Darah Regal, Speech-Language, Pathology & Audiology)
J.N. Andrews Honors Scholar

The objective of this study is to examine indications of a significant difference between native English speakers and ESL students' listening ability in quiet and noisy environments, specifically on the AZBIO Sentence test. Three Language groups were analyzed: Korean, Portuguese, and Spanish. AZBIO lists were used to assess ESL students' ability to repeat sentences. An analysis of errors was completed to determine variance and similarities between the four Language groups. Native English speakers had no difficulty repeating sentences in either condition, while ESL students' data suggested more difficulty with longer sentences and the need for extra time to complete the tasks.

Undergraduate Research Poster Presentations

P-27 *Nailed to the Cross: Col. 2:14 as a Means for Inclusive Church Ministry*
Jon-Philippe Ruhumuliza (Rubén Muñoz-Larrondo, Religion & Biblical Languages)
Undergraduate Research Scholar

I suggest Col. 2:11 is directly parallel to 2:14, which points to an integrated church, fully forgiven and empowered through Christ, and not to a Pauline negation of Torah observance. The study begins broadly with intra-textual considerations in Col. 1:15-20 and 2:10-15, followed by analysis of Col. 2:10-15 and an exegetical comparison between 2:11 and 14. Then applicable insights that impact the Christian community today are explored. I used multiple hermeneutical methods, namely: logical, semantical, syntactical/ exegetical, and theological interpretation. My study demonstrates the potential for strong exegesis balanced with a strong theology to benefit church praxis.

P-28 *A Trifold Approach to Biblical Intertextuality*
Jennifer Coleman (Rubén Muñoz-Larrondo, Religion & Biblical Languages)
Undergraduate Research Scholar

Due to the many and varied styles of literature represented in the Bible, the intertextual method—a hermeneutical method which compares Scripture with Scripture, within both a single book and the entire canon—cannot be reduced to a single approach without glossing over certain technical and literary characteristics of the text. I propose three different, yet compatible, approaches to intertextuality: Word-based, theme- or concept-based, and passage-based. Each approach is tailored for application to a particular type of passage in order to maximize the efficiency of the intertextual method and minimize the threat of damaging the original meaning of the text.

P-29 *Choice and Free Will Beliefs*
Nathanael Tchamba (Karl G. D. Bailey, Behavioral Sciences)
Undergraduate Research Scholar

Do people know when they have made a conscious choice? Postdictive illusions (Bear & Bloom, 2016) occur when people believe that a decision is independent of an event that actually has biased that decision. We will examine whether individual variability in experiencing postdictive illusions is related to beliefs about either free will (Nadelhoffer, Shepard, Nahmias, Sripada, & Ross, 2014) or self-reported delusional thoughts (Peters, Joseph, & Garety, 1999) as suggested by Bear and Bloom (2016). In this study, we will provide information about the underlying cognitive sources of postdictive effects.

P-30 *Using ArcGIS and CityEngine to Tell the Story of Tell Hisban*

Paul Roschman (Øystein LaBianca, Behavioral Sciences)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

The focus of this research is the animation and presentation of the architectural and agricultural use of land surrounding Tell Hisban by various cultures over the last few millennia. This has been achieved by taking data from previous publications and surveys of the region, as well as standard forms exhibited in this area, and using software such as ArcGIS, CityEngine, and SketchUp to recreate the landscape of the past. This research and presentation is currently in progress and is being conducted by a team consisting of Øystein LaBianca, Stanley LeBrun, Jared Wilson, and myself.

P-31 *Effects of Verbal Fluency and Common Ground on Eye Movements and Pupillometry*

Ye Lim Kim (Karl G. D. Bailey, Behavioral Sciences)

Undergraduate Research Scholar

Processing language directs the time course of eye fixations based on both words being processed and the context. One contextual factor that may influence eye movement patterns is *common ground*, which refers to the information that speakers assume they have in common with listeners. This study uses pupillometry and eye movements elicited during a word generation task under different language fluency and common ground conditions. We predict that high fluency speakers will show effects of imagined common ground, but that low fluency speakers will not show those effects.

P-32 *The Effects of Age on Reactive and Proactive Resilience*

Rachelle Pichot (Harvey Burnett and Karl G. D. Bailey, Behavioral Sciences)

Undergraduate Research Scholar

This study examined age as a predictor of resilience based on the Psychological Body Armor (Everly, 2000) theoretical framework, which defines overall resilience as a combination of proactive (resistance/immunity) and reactive (ability to bounce back) resilience pathways. Data was collected from 202 participants through Amazon's MTurk. The M_{age} of participants was 37.7 years ($SD = 11.6$), ranging between 22 and 76 years. After controlling for age, hierarchical regressions revealed that while variables measuring innate well-being traits contributed significantly to predicting resilience for both pathways ($R^2 = .40-.46$ across models), age (maturation) did not ($R^2 = 0.016$ for the full model).

P-33 *Gender Differences in Mate Selection*

Abigail Hall (Herbert Helm, Behavioral Sciences)

Undergraduate Research Scholar

This replication study examines what college-aged men and women desire most in mates. Undergraduate students ranked 18 characteristics commonly considered when choosing mates by assigning a personally appropriate rating (4=indispensable, 3=important, 2=desirable 1=irrelevant) to each, completed a 12-question religiosity scale to determine how they internalized religion, and provided a set of demographics. Means for each mate selection characteristic were calculated and ranked (1-18) for both sexes and an ordinal regression was conducted for each variable based on values of religious internalization. We predict support for evolutionary psychology and that internalized values will consistently represent rankings.

- P-34 *The Procrastination Game: Understanding the Relationship between Procrastination, Stress, Resilience, Rumination, and Academic Performance*
Torian Hill (Karl Bailey and Harvey Burnett, Behavioral Sciences)

This study examined how stress, resilience, rumination and procrastination predict academic success within a Temporal Motivation Theory (TMT) framework. Data was collected from 353 subjects, who completed a demographic questionnaire, Perceived Stress Scale, 14-item Resilience Scale, Response Styles Questionnaire, and three measures of procrastination (Irrational, General and Decisional Procrastination Scales). A nested linear regression analysis revealed that irrational procrastination was the only significant predictor of academic success ($B = 0.11$, $p = .08$). Results would suggest that those engaging in irrational behaviors that delay completing important academic tasks are more likely to have poor academic outcomes.

- P-35 *Does Chiropractic Treatment Help Reduce Headaches?*
Ivy Cooper (Harvey Burnett, Behavioral Sciences)

This study examines whether manual manipulation or mechanical activator chiropractic treatment is more effective in reducing subluxations associated with headache pain. Research has shown that manual manipulation is more effective in reducing headache pain (Hass, 2004). Data associated with effective treatment outcomes for each treatment modality will be collected from medical records of 68 participants from two chiropractic centers. Using a within-subjects repeated measures design, ANOVA analysis is expected to show that subjects who receive manual manipulation will report decreases in headache pain. This study will provide further confirmatory evidence for using manual manipulation to treat headache pain.

- P-36 *Prevalence of Co-Infection of Human Immunodeficiency Virus and Hepatitis B and Hepatitis C*
Taemin Yoon (Joel Raveloharimisy, Behavioral Sciences)
Undergraduate Research Scholar

The human immunodeficiency virus (HIV) remains a major global public health problem, and about a third of those infected with HIV are co-infected with hepatotropic viruses. This study endeavors to raise awareness, find better methods, and design public health policies to address the diseases in more effective ways. The country of focus is Madagascar because it is considered a highly endemic area for hepatitis B (HBC) with the prevalence of it shown as 23% in the general population. The goal is to determine the prevalence of co-infection with HIV and HBC and hepatitis C (HCV) in five hospitals.

- P-37 *A Comparative Analysis of the Incidence in Voice Disorders among Black and Non-Black Seventh-day Adventist Preachers*
Nia Darville (Tammy Shilling, Speech-Language, Pathology & Audiology)
Undergraduate Research Scholar

Preachers of all cultural backgrounds are considered occupational voice users. Research demonstrates that all preachers are at risk of developing voice disorders; however, it's unknown if voice disorders are more prevalent in the Black community. Black preaching is characterized by longer average sermons, a melodic intensifying voice, and the need for enhanced projection over a more participatory congregation. The purpose of this study was to determine if cultural preaching styles influence the prevalence of voice disorders among preachers. Participants in the study completed eligibility questions, the Glottal Function Index, and an acoustic protocol using the Sona Match Computerized Speech Lab.

P-38 *Development of a Wrist Physical Therapy and Exercise Machine*
Daniel Bronakowski (Boon-Chai Ng, Engineering & Computer Science)
Undergraduate Research Scholar

Physical therapy is a method of exercise treatment that promotes healing and rehabilitation for an injured area of the body. Wrist injuries, while commonly benefit from physical therapy, have few exercise machines dedicated towards improving mobility of the wrist while also strengthening it. We wish to research and design an exercise machine that improves on existing designs as well as adds additional features, such as progress tracking and a real time rep weigh display. Using existing designs, we will determine their disadvantages and develop a more complete solution to aid in physical therapy wrist rehabilitation.

P-39 *Wrist Flexion/Extension Device*
Samuel Dronen (Boon-Chai Ng, Engineering & Computer Science)
Undergraduate Research Scholar

In this research project, the mechanics of the wrist are examined and a machine designed for use in Physical Therapy to strengthen the wrist through repeated flexion and extension. To accomplish this, a machine is to be designed and built that will give the user and Physical Therapist the ability to monitor and use the machine to achieve strength and range of motion in the wrist. In the design of this machine, the materials used to provide the resistance have to be thoughtfully calculated, chosen, and tested to provide the right amount of resistance and range of motion for the user.

P-40 *Numerical Simulation of Electrochemiluminescence Generation on a Screen Printed Electrode*
Jaymes Carson (Hyun Kwon, Engineering & Computer Science)
Undergraduate Research Scholar

An escalating need for emergency or point-of-care diagnostics drives the biosensor to be portable, affordable, and easy to manufacture, while still providing the reliability and sensitivity of high-end equipment. A recent NSF grant has been awarded to the development of an electrochemiluminescence (ECL) based biosensor platform utilizing mobile technologies and screen-printed electrodes to create a portable and inexpensive device. The mathematical models describing the reaction on the electrode and diffusion of analytes were developed and numerically solved in the screen-printed electrode geometry. Numerical simulation was performed to understand and verify the underlying mechanisms, determine kinetic parameters, and aid in the biosensor design application.

P-41 *Electrochemiluminescence Casing and Prototyping*
William Mzumara (Hyun Kwon, Engineering & Computer Science)
Undergraduate Research Scholar

The purpose of this research is to design and 3D print a casing that can be used for electrochemiluminescence. Using Solidworks, the design will include space for a camera and optional extras such as a mini display to visualize the data and to support external outputs such as USB and HDMI for educational use. Lastly, the python based program analyzing the low light chemical process will be updated for better use in such scenarios.

P-42 *Using the Raspberry Pi for ECL Reaction Analysis*
Jonathan Swerdlow (Hyun Kwon, Engineering & Computer Science)
Undergraduate Research Scholar

Using a Raspberry Pi and its camera module, we developed an affordable and easily available system for photographing and analyzing electrochemiluminescent (ECL) reactions. These reactions can be represented as a function of average light intensity over time, allowing for a future program to determine the concentration of certain reactants. Such ECL reactions will be useful in the diagnosis of medical conditions such as cancer without the need for expensive equipment or laboratories. The proposed system will make certain diagnoses easy and available to people across the globe and will likely require only a small blood

sample.

P-43 *Mobile-Phone Based ECL Instrumentation*

Daniel Marsh (Hyun Kwon, Engineering & Computer Science)
Undergraduate Research Scholar

The process of using current electrochemiluminescence (ECL) instrumentation is costly and cumbersome. The goal of this research is to create an instrument that provides an economical and user-friendly platform for performing ECL experiments. This development involves component-by-component replacement. A computer interface is replaced by a mobile-phone interface. A permanent electrode is replaced by a disposable screen-printed electrode. Lastly, a potentiostat power source is replaced by a mobile-phone audio jack (and supplementary circuitry). Development of the device is in its final stages. Its immediate application will be as a learning tool in Andrews University chemistry labs. A potential long-term application is medical diagnosis.

P-44 *The Effect of Tail Stretching on the Ionospheric Accessibility of Electron Beam Experiments*

Jacob Willard (Jay Johnson, Physics)
Undergraduate Research Scholar

An electron beam fired from a satellite in orbit could carry energy flux into the ionosphere if the beam is fired into the loss cone. Such an experiment would allow for the accurate mapping of magnetic field lines. High energy electrons are preferred for stability, but the loss cone becomes dependent on field line curvature for relativistic particles. We looked at how tail stretching of the magnetic field affects the accessibility of 1 MeV electrons to the ionosphere. We found that accessibility is increased off of the midplane, but the high curvature region near the midplane of the magnetotail shows significantly reduced accessibility.

P-45 *Mathematical Modeling of a Regenerator Heat Exchanger Utilizing Phase Change Material*

Justin Wiley (Lauber Martins, Physics)
Undergraduate Research Scholar

Fluctuations in available thermal energy reduce performance of absorption refrigeration systems, and a regenerator is a heat exchanger designed to absorb such fluctuations and keep the efficiency of the system high and steady. It is advantageous to stabilize operating heat intake by incorporating latent heat storage using phase change materials. A general mathematical and simulation model of a regenerator was conceived, and we are currently studying how to incorporate phase change material into the model. The model will be used for optimization and design of heat exchangers predicting performance through computational simulation.

P-46 *A Periodic Matrix Model of Seabird Behavior and Population Dynamics*

Mykhaylo Malakhov (Shandelle M. Henson, Mathematics)
J.N. Andrews Honors Scholar

Rising sea surface temperatures (SSTs) in the Pacific Northwest lead to food resource reductions for surface-feeding seabirds, and have been correlated with several marked behavioral changes. Namely, higher SSTs are associated with increased egg cannibalism and egg-laying synchrony in the colony. We study the long-term effects of climate change on population dynamics and survival by considering a simplified, cross-season model that incorporates both of these behaviors in addition to density-dependent and environmental effects. We show that cannibalism can lead to backward bifurcations and strong Allee effects, allowing the population to survive at lower resource levels than would be possible otherwise.

P-47 *Florida Manatees Have Less Functional Teeth and Higher Levels of Mesowear than Other Manatee Populations*

Ezra Panjaitan (Daniel Gonzalez-Socoloske, Biology)

Undergraduate Research Scholar

Manatees possess molars that are replaced in a conveyor-belt-like fashion. This mechanism is thought to be an adaptation for their diet. Because manatees of different populations consume foods growing on different substrates, we hypothesize that they will have different levels of mesowear. We hypothesize that Florida manatees will experience higher levels of mesowear than other manatee populations, as Florida contains food growing on abrasive substrates. After analyzing ~194 specimens containing 3,434 teeth, data suggests Florida manatees have significantly less functional teeth per quadrant and experience significantly higher levels of mesowear than other manatee populations (African, Amazonian, and Antillean manatees).

P-48 *How Age Affects Phonotaxis in Male-exposed Female Crickets (Achetus Domesticus)*

Chelsea Kent (Benjamin Navia, Biology)

Undergraduate Research Scholar

This study seeks to evaluate the potential effects of male-exposure on female cricket's behavioral response and consequently on their underlying neuronal circuits. Previous studies have reported that virgin females respond with varying degrees of selectivity to a narrow range of calls, and that as these virgin female crickets age, they respond to a wider range of calling songs. In comparison, the current study indicates that exposure to males may be causally related to a loss of selectivity in young females. Females raised in the same chamber as males were placed on a non-compensating treadmill and exposed to a range of computerized calling songs as their trajectory was monitored. Additionally, this study evaluates how Juvenile Hormone III, a hormone found in younger crickets, affects the phonotactic selectivity of these young, male-exposed female crickets.

P-49 *The Response of Auditory Neurons in Male Exposed Female Acheta domesticus*

Shekinah Dosunmu (Benjamin Navia, Biology)

J.N. Andrews Honors Scholar

This study investigates the electrophysiological response of identified auditory neurons in the nervous system of female crickets raised in vicinity to males. A typical male call for this species consists of chirps, with each chirp composed of three sound pulses. We hypothesize that the response pattern in these neurons will differ from those previously measured in neurons from virgin females raised without exposure to males. To evaluate the neuronal response, a suction electrode is used to record the activity of the L3 auditory neuron after careful dissection and removal of a section of the cricket's ventral exoskeleton.

P-50 *Hybrid Boronic Acids as Potential Anti-cancer Agents in Glioblastoma Brain Cancer*

Daniel Jhang (Denise Smith, Biology)

Undergraduate Research Scholar

Glioblastoma (GBM) is arguably one of the most devastating types of brain cancer. Many therapeutic methods, including gene therapy, immunotherapy, and systemic chemotherapy, have shown some promise. However, many obstacles hinder the effectiveness of these methods. Hybrid boronic acids show some promise as potential antiglioblastoma agents because they have multiple pharmacophores, allowing for a wide range of therapeutic action. The purpose of this study is to investigate the synthesis and biological activity of hybrid boronic acids as potential antiglioblastoma agents. Various hybrid boronic acids were synthesized and tested on U87 MG glioblastoma cells. Cell viability was calculated with some compounds showing a decrease in cell growth.

P-51 *Synthesis and Activity of Novel Dual Binding Transfectors*
Michaella Souza (Desmond Murray, Chemistry & Biochemistry)
Undergraduate Research Scholar

The purpose of this interdisciplinary chemistry-biology project is to better understand the synthesis and transfecting capabilities of arylidene thiobarbituric alkylpyridinium (ATAP) salts. Our research involves designing, synthesizing and testing novel dual binding transfectors capable of both electrostatic attractions and hydrogen-bonding as the means of nucleic acid complexation and ultimately transfection. To our knowledge, this sort of dual-binding transfecter has not been made before and we anticipate that it could offer some advantages over the currently and commercially available transfecting agents. Transfectors are important and essential 'tools' for cutting-edge biomedical technologies such as gene editing, gene therapy and cloning.

P-52 *The idPAD Project: A Simple Way to Identify Illicit Drugs*
Tammy Leong (Getahun Merga, Chemistry & Biochemistry)
Undergraduate Research Scholar

For many years, researchers have sought an efficient and cost-effective method of identifying illicit drugs. Currently, the most common methods of illicit drug identification have numerous limitations. In response, a paper analytical device (idPAD) has been developed to identify illicit drugs both efficiently and inexpensively. The test does not require power, chemical solvents, or expensive instruments. I have recently finalized the limit of detection of five different drugs on the PAD based on the pattern and color intensity of each drug. I am currently conducting a study on the latest revision of the PAD to test its reliability in the field, which is the ultimate goal of this project.

P-53 *Isoxazoline Use in Antibacterials*
Taejun Lee (Lisa Ahlberg, Chemistry & Biochemistry)
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

New antibiotics are needed to combat resistance developed to current treatments. This study investigates the use of the isoxazoline ring moiety as part of a new antibiotic. Investigations of the binding enzyme utilizing the drug indicated a large bulky hydrophobic scaffold was necessary along with the isoxazoline ring. The current study aims to synthesize the original isoxazoline ring and then attach a bulky hydrophobic scaffold in the form of two benzene rings, with a hydrophobic, alkyl chain connecting them, giving the molecule flexibility and binding capability. Binding research and synthesis plans will be discussed.

P-54 *The Stabilization of Aqueous Ascorbic Acid Solutions Using PAMAM Dendrimers and Evaluation of Its Antioxidant Properties*
Chan Kim (Ryan T. Hayes, Chemistry & Biochemistry)
Undergraduate Research Scholar

Ascorbic acid is an essential enzymatic cofactor with antioxidant properties that is added to many beverages. However, due to its instability in aqueous solutions, ascorbic acid degrades readily when exposed to air and light. PAMAM (polyamidoamine) dendrimers were found to stabilize dilute concentrations of ascorbic acid solution. UV-Vis absorbance spectroscopy was used to monitor ascorbic acid degradation in the absence and presence of G2-PAMAM dendrimers while exposed to various types of light and levels of oxygen. The DPPH assay was then used to evaluate the ascorbic acid's antioxidant efficacy while stabilized with PAMAM dendrimer solutions.

P-55 *Nanoparticle Synthesis with Platinum and Silver Oxide*

Teddy Kim (Getahun Merga, Chemistry & Biochemistry)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Nanoparticles are chemical species that exist from 1-100 nanometers. Their applications extend to many different fields of interest. This project seeks to synthesize silver nanoparticles from silver oxide by way of a platinum catalyst. Silver oxide is placed in boiling water. Platinum is then placed in the solution in hopes that the platinum will oxidize the silver oxide and isolate the silver. The product is then examined under Ultra-Violet Visible Spectrophotometry (UV-VIS) to verify if silver particles were isolated. The goal of the project is to create an effective methodology for synthesizing silver nanoparticles.

Upcoming Research Events

Michigan Academy of Science, Arts and Letters (MASAL)

March 9, 2018, Central Michigan University
<https://www.alma.edu/offices/michigan-academy/>

Exploring the Composition of the Pentateuch

March 25-26, 2018, Seminary
<http://digitalcommons.andrews.edu/pentateuch-conference/>

AU Teaching and Learning Conference

March 29, 2018, Chan Shun Hall & Bell Hall
<http://digitalcommons.andrews.edu/autlc/>

Summit on Social Consciousness

April 5-7, 2018
<http://digitalcommons.andrews.edu/scs/>

Sigma Theta Tau Intl Honor Society of Nursing: Spring Research Conference

April 16, 2018
<https://www.andrews.edu/shp/nursing/contact/>

Spring Honors Thesis Symposium

April 20, 2018, Buller Hall
<https://www.andrews.edu/services/honors/>

Michigan High School Math & Science Symposium

April 27, 2018, Buller Hall
<http://www.berrienresa.org/cms/One.aspx?portalId=148604&pageId=414230>

Andrews Research Conference: Early Career Researchers in Social Sciences

May 15-16, 2018, Buller Hall
<http://digitalcommons.andrews.edu/arc/>

Adventist Human-Subject Researchers Association (AHSRA)

May 16-20, 2018, Buller Hall
<http://ahsra.adventist.org/>

Adventist Conference on Family Research & Practice

July 19-21, 2018, Seminary
https://www.andrews.edu/sem/reled/acfrp_conference/

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Administrative Assistant and Recruiter

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

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



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Gary W. Burdick, PhD
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Mordekai Ongo, MA
Research Integrity and Compliance Officer

Jeff Boyd, MA, MBA
Research Support Specialist

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

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

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