

# Honors Scholars & Undergraduate Research Poster Symposium

## 7 March 2014



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

*Light Refreshments Served*

# Welcome

Undergraduate research facilitates intellectual agency, invites students to practice critical thinking and problem-solving skills, and prepares them for the leadership responsibilities of professional careers and graduate and professional school training.

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, James Hayward, Ante Jeroncic, Katherine Koudele, John Markovic, Beverly Matiko, Lionel Matthews, L. Monique Pittman, David Randall, Tiffany Summerscales, Trina Thompson, Bruce Wrenn, Robert Zdor, Givan Hinds, Nelson Starkey. We also thank our administrative assistants, Maria Sanchez-Martinez and Sarah Burton, as well as our student assistants, Alaryss Bosco and Matthew Chacko, 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  
Associate Professor of English



Gary Burdick  
Associate Dean for Research  
Professor of Physics



# Honors Thesis Poster Presentations

- P-01 *The Effects of Celite Formulated Rhizobium rubi and Tryptophan on Velvetleaf Plant Growth*  
Jonathon Ahn (Robert Zdor, Biology)  
J.N. Andrews Honors Scholar

*Rhizobium rubi* AT3-4RS/6 and tryptophan may be useful in replacing chemical herbicides as biological control agents. Previous research has shown that *Rhizobium rubi* AT3-4RS/6 produces IAA-like compounds that are deleterious to weed growth. In this project *R. rubi* AT3/4RS/6 will be formulated in Celite, a granular, diatomaceous earth carrier. The purpose of this research is to analyze if tryptophan influences *R. rubi* AT3/4RS/6 populations in the velvetleaf rhizosphere, and if this colonization is associated with reduced root weight and shoot length. The experiment design consists of five soil treatments (bacteria+tryptophan+celite, tryptophan+celite, bacteria+celite, celite alone, and soil alone) with 10 velvetleaf plants each. The decreasing trend of the root weights, shoot lengths, and bacterial colony counts of the tryptophan and *R. rubi* AT3/4RS/6 treatments will be recorded and analyzed using two statistical tests (t-test and ANOVA).

- P-02 *Service Un-Required: African American Civil War Soldiers and their Fight for Freedom and Pension Compensation*  
Clifford Allen (Kathryn Silva, History)  
J.N. Andrews Honors Scholar, Undergraduate Research Scholar, and Earhart Emerging Scholar

My research project consists of delving through over nine hundred pension records from the files of fifteen African American soldiers who participated in the Civil War. These documents are comprised of general affidavits, witness statements, physicians' certificates, military enlistment records, marriage certificates, military roll/attendance records, certificates for discharge, and documentation of receipt of or rejection of pension requests. Using these documents I investigated the cases of these soldiers in order to discover why they did or did not receive their military pensions, the length of time the process of attaining their pensions required, and explore the stories of the soldiers and their families behind each case. Using a combination of my findings and a variety of secondary source materials, this work will argue that in addition to their opportunities to receive pension assistance, the livelihood, and quality of life of black soldiers and their families after the Civil War were adversely affected by the bureaucracy of the Federal Pension System during the period of Jim Crow. The primary goal of my research is to add a personal dimension to the statistics from my secondary source material, which infers that the military pension system was prejudiced against African American soldiers.

- P-03 *Republic 'on Earth as it is in Heaven.' the Freedom of the Fall in Paradise Lost and His Dark Materials*  
Jordan Arellano (L. Monique Pittman, English)  
J.N. Andrews Honors Scholar

The epic poem *Paradise Lost* (1667, 74) retells the Biblical creation story through the blind eyes of the Christian political-poet John Milton. Three hundred years later, Milton's work is recast by the atheist children's and fantasy novelist Philip Pullman in the *His Dark Materials* trilogy (1995, 97, 2000). Although one might assume that these two writers' perspectives would contradict one another, Pullman's adaptation—though a perverted story of the Fall—still pursues the same goal as Milton's by imagining a new and better social structure. And not only do they share that goal, but they also explore the same mechanism—free will.

- P-04 *Processing Load and Biopotentials: An Evaluation of a Consumer Electroencephalogram (EEG)*  
Kristen Bishop (Karl Bailey, Behavioral Sciences)  
J.N. Andrews Honors Scholar

The general public is extremely interested in mental training and the use of brain imaging to study the mind. One device that combines the two and is currently on the market for consumers is a single channel EEG band produced by NeuroSky which claims to measure concentration. However, the claims that they have developed a single channel measure of concentration and meditation have not been tested. EEG power is related to cognitive memory and performance, which both contribute to concentration. In addition to EEG waves, pupil size is a reliable physiological index of processing load and concentration. The first purpose of this study is to replicate the finding of pupil diameter size and concentration. The second purpose is to see if the results of the replication correlate with the proprietary concentration reading from the NeuroSky single channel EEG as a first step towards understanding what, if anything, consumer EEG equipment measures.

P-05 *Visual Cognition While Listening to Stories*  
Nathalie Borges (Karl Bailey, Behavioral Sciences)  
J.N. Andrews Honors Scholar

Different people have different perceptual patterns in response to language. Different language accents may influence one's visual cognition by referencing to certain objects when listening to stories. The purpose of this study is to record differences in eye movement patterns while listening to stories by manipulating the auditory stimulus and cognitive load. Using the eye tracker, eye movement patterns will be recorded as subjects look at objects on a screen. I posit that subjects will delay eye movement patterns to target objects while listening to stories in a foreign accent as opposed to an American accent because of increased cognitive load. I will discuss my preliminary findings during the poster session.

P-06 *The Diversity of Color: An Analysis of Cross-Cultural Color Symbolism*  
Erica Bradfield (Øystein LaBianca, Behavioral Sciences)  
J.N. Andrews Honors Scholar

Does a person's perception of color symbolism depend on their cultural geographic origin? As color is often connected to different cultural elements, this study is intended as a contribution to advancing cross-cultural understanding in a globalizing world. The hypothesis states that the color perceived to be symbolic of various life events such as weddings, births, and deaths or emotions such as happiness and sadness, will vary based on a person's cultural geographic origin. Using eleven basic color terms, as determined by Berlin and Kay (1969), subjects' perceptions of color symbolism will be explored through responses to an online survey shared with a global convenience sample.

P-07 *The Role of Sabbath Keeping Internalization, Need Satisfaction, and Parental Environment in Well-Being*  
Paola Caceres (Karl Bailey, Behavioral Sciences)  
J.N. Andrews Honors Scholar

Identifying which specific religious practices promote religious internalization is crucial in understanding the relationship between religious practice and well-being. The current study seeks to use an episodic memory recall technique along with surveys to examine whether the relationship between internalization of Sabbath-keeping and well-being is mediated by basic need satisfaction (autonomy, competence, and relatedness) and parental environment. The relationships between Sabbath-keeping narratives, well-being, Sabbath-keeping internalization, need satisfaction, and perception of parental environment among life-long Adventists are also examined. I will discuss internalization of religion using the Self-Determination Theory-based models of Sabbath keeping proposed by Diddams, Surdyk, & Daniels (2004).

P-08 *A Composition Project: An Original 12-tone Fugue Modeled after J.S. Bach's BWV 847*  
Ilana Cady (Carlos Flores, Music)  
J.N. Andrews Honors Scholar and Earhart Emerging Scholar

The specific goal of this project is to explore the compositional techniques of the 12-tone system developed by Arnold Schoenberg in 1921 and apply these techniques to fugal writing. In this process I am taking Bach's fugue, BWV 847, and using it as the blueprint for my original 12-tone fugue. I will follow the same overarching structural pattern of BWV 847—retaining the number of voices, subject entries, and usage of the middle development section, while submitting them to the paradigms of 12-tone serialism. My composition will push the fugue form in an unexpected and more progressive direction. The 12-tone system negates the use of tonal centers and common practice harmony. To successfully compose a fugue no longer built on tonal relationships, I will employ unconventional techniques such as complex rhythmic patterns, pitch selection based on 20th-century practices, and serial relationships that will create the feeling of the traditional components of the fugue. This creative compositional project will result in an amalgamation of traditional and modern musical techniques in fugal writing.

P-09 *What's Important to Us? Understanding Cultural Differences between Science Disciplines*

Samantha Easton (Margarita Mattingly, Physics)

J.N. Andrews Honors Scholar

By identifying the different cultural aspects and learning styles of the departmental disciplines that take General Physics I hope to foster a better understanding of how our students learn and to build more effective teaching principles for the Physics Small Group Learning Program. To develop a list of disciplinary areas of emphasis I took notes during a number of conversations with both students and faculty in Math, Physics, Biology and Chemistry. From these important areas of difference I have chosen to focus on the Biological emphasis of system discovery as a guiding principle for the creation of a series of interrelated Small Group Lessons.

P-10 *The Effect of Mandatory Corporate Social Responsibility on Share Returns in Indonesia*

Stephen Erich (LeRoy Ruhupatty, Accounting, Economics and Finance)

J.N. Andrews Honors Scholar

The purpose of this study is to reveal investor perceptions regarding the relatively new phenomenon of government involvement in Corporate Social Responsibility (CSR). To accomplish this we use an event-study methodology to analyze the effect of the Limited Liability Company Act of 2007, passed by the Indonesian government, on share prices during a three-day window in July 2007. Drawing from the vast amounts of event-study literature, we are applying this method to share prices for the first time. As more countries begin exploring this type of legislation, our findings will provide a foundation for other lawmakers to consider, as well as help to shape corporate attitudes toward such legislation.

P-11 *Cytosolic Carboxypeptidase 5 (CCP5) and Cilia Development in Zebrafish*

Philip Giddings (Peter Lyons, Biology)

J.N. Andrews Honors Scholar

My research project is focused around a specific gene—cytosolic carboxypeptidase 5 (CCP5). Previous research suggests that the CCP5 gene is essential for the modification of  $\alpha$ -tubulin which is necessary for normal growth of cilia in the olfactory pit of zebrafish. It is my goal to confirm the role of the CCP5 gene in olfactory ciliary growth using scanning electron microscopy. Using a CCP5-MO to knockdown, the gene I can compare the resulting phenotype to that of a control specimen in order to determine any visible differences with respect to cilia morphology.

P-12 *A study on the relationship between GRE Scores of Pre-Physical Therapy Students and National Physical Therapy Examination Scores: A Retrospective Study of One Midwestern Physical Therapy Program*

Givan Hinds (Lori Walton, Physical Therapy)

J.N. Andrews Honors Scholar

**Background:** This study explored relationships between Graduate Record Examination (GRE) and National Physical Therapy Examination (NPTE) scores. **Methodology:** This is a retrospective correlational design utilizing a purposive sample ( $n = 102$ ) of Doctor of Physical Therapy (DPT) students from three consecutive cohorts. Correlations were examined between GRE Verbal (GREV), GRE Quantitative (GREQ), and GRE Total (GRET) scores with the NPTE pass rate utilizing a Spearman rho correlation coefficient. Discriminant analysis was used to calculate the cut-off score that would correlate with a passing score of 600 on the NPTE. **Results:** The results showed a weak, but significant correlation between GREV and NPTE scores ( $r = .454$ ,  $p < .001$ ), GREQ and NPTE scores ( $r = .420$ ,  $p < .001$ ) and GRET and NPTE scores ( $r = .484$ ,  $p < .001$ ). Discriminant analysis revealed cut-off scores for GREV (450), GREQ (540), and GRET (980). **Conclusion:** The cut-off score results from this study reflect an acceptable pass rate according to the Commission on Accreditation of Physical Therapy Education (CAPTE) Programs and the program goals for this institution. The significant correlations may be considered by the faculty of this DPT program when admitting students.

P-13 *The Relationship Between Student Motivation, Resilience, and Parental Environment*

Eliana Iller (Melissa Ponce-Rodas and Karl Bailey, Behavioral Sciences)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

The goal of this research is to better understand how student motivation and resilience are related to parental environment, distinguishing between parental involvement and parental conflict. Student motivation was measured based on the reasons that students endorse for why they are studying. I predict that parental involvement will be positively related to motivation and resilience and that parental conflict will be negatively related to motivation and resilience. I will also be examining the interactions between parental and child genders and environment, motivation, and resilience. I will discuss the correlations among these variables and their implications.

P-14 *Synthesis and Spectroscopic Studies of Chalcones*

Michelle Imperio (Desmond Murray, Chemistry & Biochemistry)

J.N. Andrews Honors Scholar

This study initially aimed to develop a method for synthesizing structural hybrids of chalcones and stilbenes, two classes of organic phytochemicals. A second goal was to examine the spectroscopic properties of these hybrids, which we have designated "chalcones." The proposed method of synthesizing these chalcone-stilbene hybrids, or chalcones, had two steps: first, the conversion from cyanostilbenes to methyl stilbene ketones using Grignard reagents; and second, a Claisen Schmidt reaction converting the methyl stilbene ketone to the final chalcone. When attempting to carry out the first step, however, spectroscopic analysis found the conversion to the methyl stilbene ketone to have been unsuccessful. In light of this outcome, the focus of this study has evolved to optimizing the conversion of cyanostilbenes to methyl stilbene ketones. So far, our work has focused on three experimental variables: catalyst, time, and solvent.

P-15 *Evolution Over Revolution: A Generic Criticism of the Muscle Car's Past and Present Hierarchy*

John Irvine (Ivan Davis, English)

J.N. Andrews Honors Scholar

Since the early 1960's the Muscle Car has been seen as representative of American cultural idealism; a post-war expression of Americanism through the medium of octane obsession. Muscle Cars are seen abstractly as an embodiment of several cultural principles; however, what physically constitutes this embodiment, the convergence of these features into the 'soul' of the muscle car, is broadly the subject of speculation. The 'soul', or formative characteristics, will be established through the generic criticism of a cross section of First Generation 1960's Muscle Cars. Through analysis of physical features and technical specifications, the substantive and stylistic elements necessary for participation in the Muscle Car Genre, as shaped around an organizing principle, will be generically described. This descriptive yardstick will then be applied against modern incarnations of the muscle car to judge if they generically participate in the muscle car genre, as demonstrated by the 1960's First Generation of their 'lineage'. Conditions for future participation in the genre will then be established upon the First Generation's generic characteristics.

P-16 *Constructing Short Fiction: The Creative Writing Process*

Mark Joslin (Scott Moncrieff, English)

J.N. Andrews Honors Scholar

This project explores a creative fiction writer's process through writing four pieces of short fiction. Documenting his progress along the way, the writer uses peer-revision to refine his work. This method means to improve early drafts by both interacting with readers and utilizing the examples of well-known authors. The writer's stories will be considered successful if their plot moves at a bright pace, if the characters and settings are authentic, and if they come to a satisfying conclusion. The project will consist of these stories and an accompanying writer's notebook, which examines certain revisions representative of a move to good fiction writing.

P-17 *Investigation of spatial isotope ratios in soil and the effects of fertilizer on plant isotope ratios*

Jamie Kim (H. Thomas Goodwin, Biology)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

A previous Honors study analyzed diet of thirteen-lined ground squirrels at the Andrews University Airpark by studying  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  isotope values of their fecal pellets. Fecal samples collected within 25 m of a cornfield had higher mean values of  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  than those outside that range. High  $\delta^{13}\text{C}$  values indicate greater consumption of C4 plants, such as corn, while high  $\delta^{15}\text{N}$  values may indicate increased consumption of insects. However, the spatial pattern might simply reflect spatial variation in the isotope values of the soil itself, reflecting long-term pattern isotope values in vegetation. In this experiment, soil samples were taken throughout the airpark and analyzed for  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ; these baseline values were removed from fecal isotope values. The spatial isotope patterns of fecal pellets still held after baseline removal. Therefore, it appears that the spatial pattern of  $\delta^{13}\text{C}$  seen in the fecal samples of the thirteen-lined ground squirrels is indeed due to greater consumption of corn. The pattern of  $\delta^{15}\text{N}$  could either be due to increased consumption of insects or enrichment of corn in  $\delta^{15}\text{N}$  due to fertilizer application. Further study is in progress to see the effects of fertilizer application on plant  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ .

P-18 *The Relationship Between Fruit and Vegetable Consumption and Diet Pattern in Andrews University Students*

Travis King (Fiona Lewis, Public Health and Wellness)

J.N. Andrews Honors Scholar

The goal of this research is to discover whether there is a relationship between diet pattern (vegetarian, non-vegetarian, vegan, etc.) and fruit and vegetable consumption. This research project has several hypotheses: There is a relationship between diet pattern and fruit and vegetable consumption; there is a relationship between one's reason for vegetarianism and the level of fruit and vegetable consumption; and there is a difference between fruit and vegetable consumption among different schools and departments in the university. This will be accomplished using data collected from lifestyle and food frequency questionnaires that have been distributed to undergraduate students. Comparative statistics will be used to assess the differences in fruit and vegetable intake among participants between the six groups. Correlation analyses will be used to assess the relationship between fruit and vegetable consumption and diet pattern.

P-19 *hcnABC Operon Transcription of Pseudomonas putida under Varying Iron and Oxygen Concentrations and Culture Age*

Christine Lee (Robert Zdor, Biology)

J.N. Andrews Honors Scholar

The species *Pseudomonas putida* produces hydrogen cyanide (HCN) through the transcription of the *hcnABC* operon. The purpose of this experiment is to determine how the *hcnABC* operon is affected by varying levels of iron and oxygen, and age of bacteria culture. To test this, *P. putida* is grown under five conditions: the presence of iron, the absence of iron, with aeration, without aeration, and without iron and aeration. At 8, 18, and 30 hours, the cultures are assessed for HCN production and cell density. HCN production is measured via bioluminescence; light emission occurs whenever HCN is produced because the modified form of *P. putida* contains the luciferase gene. The cell density is determined using agar plating and a spectrophotometer. Bacterial cultures with iron and minimal aeration tend to have greater bioluminescence and result in higher cell densities, increasing HCN production.

P-20 *Isolation and Disconnection*

Lynda Lee (Kari Friestad, Visual Art & Design)

J.N. Andrews Honors Scholar

As one of the most recurrent subjects of visual art, the human form has been an important means of communicating human experiences and expressing the philosophical and scientific thoughts of a society. During the early 20th century, artists in Europe began distorting and abstracting the human figure in ways that were unprecedented and often times visually unsettling to emphasize its withdrawn and isolated condition while also suggesting a sense of fragility and vulnerability. Although there are various forms of isolation that can result from a number of different causes, this project explores the concept of social isolation brought about by an impermeability of boundaries, or a disconnection between the self and other identities through the creation of a body of work. It also examines how W.E.B. Du Bois' notion of a double consciousness, defined as looking at one's self through the eyes of the other, functions in the formation of the self. Finally, my creative project considers how vulnerability and the idea of an other-self entity can function as a means of relating or forming a connection with the other.

P-21 *Teaching Strategy: Explaining the History and Themes of Abstract Expressionism to High School Students Through the Integrative Model*

Kirk Maynard (Rhonda Root, Visual Art & Design)

J.N. Andrews Honors Scholar

The purpose of my thesis is to create a blueprint for teachers to explain art history to students in an efficient way without many blueprints and precedence to guide them. I have chosen to focus my topic on Abstract Expressionism and the model that I will be using to present the concept of Abstract Expressionism will be the integrated model instructional strategy. This integrated model will serve as the guide to creating well crafted art history lessons in the classroom. This integrated model will also be laid out and summarized in a lesson plan designed to give the teacher direction in the lesson presented.

P-22 *Te Amo Mujer*

Ivan Ruiz (Steven Hansen and Paul Kim, Visual Art & Design)

J.N. Andrews Honors Scholar

*Te Amo Mujer* is a documentary film project exploring the story of Don Gustavo Jiménez, an old man who lives in a small village in the south of Mexico, and the grandfather of the filmmaker. The film seeks to use the narrative of Don Gustavo to explore the question of why we live where we live. The thesis of the film, or more accurately the suggestion, as the film is a very personal work, is that we live where we do, and how we do, out of love for the people that are closest to us.

P-23 *Worldview 2.0: Revisiting, Refinding, and Refining Faith in the University Years*

Jacina Shultz (Beverly Matiko, English)

J.N. Andrews Honors Scholar

In this non-fiction, creative extended essay, I revisit my worldview essay from Western Heritage, specifically focusing on my belief in a loving God. I trace my path to this belief, beginning with my freshmen year of college when I first started to question its legitimacy. Though teetering on the edge of agnosticism, I eventually learned how a belief in a loving God is not a blind one. I came to understand what it means to have a relationship with God. The project reconstructs the reasoning that verified to me that a faith in God does not have to be ignorant. This is the story of my journey to finding God's love.

P-24 *Sabbath-Keeping Experiences: The Relationships Between Religious Internalization, Well-Being, and Need Support*

Cheryl Simpson (Karl Bailey, Behavioral Sciences)

J.N. Andrews Honors Scholar

In this study I examine a possible correlation between Sabbath-keeping experiences and well-being as a function of Religious Internalization levels. I also ask whether that relationship is mediated by need satisfaction. My sample included Seventh-day Adventist community church goers. I surveyed various congregations about their Sabbath-keeping experiences, need satisfaction, and overall well-being. To ensure that my sample consisted of church goers, I only surveyed members at the church service. I predict that a higher level of religious internalization of Sabbath-keeping practices and fulfillment of need satisfaction will be more conducive to well-being.

P-25 *The Association between Open Market Operations and the S&P 500 Index from 2008-2010*

Allegra Stennett (Alan Kirkpatrick, Accounting, Economics, and Finance)

J.N. Andrews Honors Scholar

This research seeks to identify whether a relationship exists between Federal Reserve decisions via the Federal Open Market Committee and the equities market, and detail the specifics of that relationship. After the economic crisis, the Federal Reserve initiated a monetary policy to stimulate the economy known as Quantitative Easing, a strategy wherein the Fed buys securities, providing financial institutions with capital to spark economic growth. Throughout this research, I determine the outcome of the Fed's role in the behavior of equities market by using Linear Regression. Essentially I hypothesize that the Fed's Open Market Operations are related to S&P 500 index values from 2008-2010.



P-26 *Hawksbill Turtle (Eretmochelys imbricata) Density and the Effect of Pollution Debris on the Crawling Rates of Hawksbill Hatchlings in Utila, Honduras*

Kyungje Sung (Stephen Dunbar<sup>1,2</sup> and Thomas Goodwin<sup>3</sup>, <sup>1</sup>Protective Turtle Ecology Center for Training, Outreach, and Research, Inc. (ProTECTOR), Colton, CA, <sup>2</sup>Marine Research Group, Department of Earth and Biological Sciences, Loma Linda University, Loma Linda, CA, <sup>3</sup>Department of Biology, Andrews University)

J.N. Andrews Honors Scholar

The hawksbill turtle (*Eretmochelys imbricata*) is a critically endangered species. Hence, various conservation efforts by groups such as ProTECTOR are taking place to stabilize its population. To support such efforts, my study focused on the turtle population in and around the island of Utila, Honduras. Specifically, I examined the critical migration period of hawksbill turtle hatchlings from nest to water to determine if various densities of plastic pollution had an effect on crawling times. A reduction in crawling time is critical for it could increase predation time. Furthermore, the pollution debris may deter movement, causing the hatchling to expend additional energy before they reach the ocean. To test the effect of plastic pollution, we constructed four experimental corridors (ranging from 8-10 m in length) with varying densities of pollution and recorded hatchling crawling time from start to finish (10 hatchlings/corridor). Crawling rates differed significantly across corridors (Kruskal-Wallis H test). In addition, a potential baseline pattern of turtle abundance at dive locations around the island was determined through a survey of turtle sightings. Through ArcGIS, these specific GPS points of reported turtle sightings was plotted to observe any patterns of distribution.

P-27 *Factors Affecting Phonotactic Responses in Male Acheta domesticus*

Erik Thordarson (David Mbungu, Biology)

J.N. Andrews Honors Scholar

This research addresses some of the possible factors that affect male *Acheta domesticus* phonotactic responses to calls of males of the same species. The study examines cricket age and social interaction with females as possible factors affecting this behavior. Through logistic regression analysis, the study attempts to demonstrate a link between these factors and the responsiveness of the male crickets in the study. As the crickets aged, they responded to a wider range of syllable periods, which may imply that they follow a similar pattern of decreasing selectivity in their response with age as their female counterparts. The socialization aspect of the research is still underway. However, if it follows a similar trend as other cricket species, we expect to see socialization with females decrease responsiveness to conspecific calls.

P-28 *The Prevalence of Encysted Toxoplasma & Sarcocystis in Consumer-Grade Pork, Beef, and Mutton in Michiana*

Ross Trecartin (Bill Chobotar, Biology)

J.N. Andrews Honors Scholar

Commonly present in the muscle of animals are the tissue cysts of *Toxoplasma* and *Sarcocystis*. The aim of this study was to determine the presence and levels of *Toxoplasma/Sarcocystis* tissue cysts in retail pork, beef, and mutton throughout the Michiana area. A total of 36 samples, 12 from each species, were exposed to a digestive solution mimicking stomach conditions. The solution consisted of Pepsin 0.75% , NaCl 0.86%, and HCl adjusted to a pH of 1-2. The digested samples were then strained through several layers of cheesecloth, centrifuged, and examined for the presence of parasites.

P-29 *“Diagnosis” And Other Essays: Exploration In Personal Writing*

Kathleen Wilson (Beverly Matiko, English)

J.N. Andrews Honors Scholar

Revising and expanding work begun in ENGL454 The Writing Life, this creative thesis consists of a collection of six personal essays, ranging in topic from childhood wanderings in the woods of Virginia to missed flights, and medical mishaps. Research on the personal essay as genre, as well as extensive reading of personal essays and other life writings inform the composition process. Fellow essayists, including Joan Didion, Annie Dillard, Anne Lamott, E.B. White, and Virginia Woolf, serve as models for both content and form. An epilogue to the collection explores the connections between writing instruction and practice.

# Undergraduate Research Poster Presentations

- P-30 *Synthesis and Sensing Properties of Imino Stilbene Sensors*  
Cindy Bonilla (Desmond Murray, Chemistry & Biochemistry)

The goal of this research is to investigate the synthesis and sensing properties of imino stilbenes as a new class of bidentate sensors for toxic metals and organophosphates. To our knowledge, based on literature searches, this class of molecular sensors has not been previously synthesized or studied. A modular two-step synthetic strategy will be used to provide an easy and flexible method for sensor preparation. It allows us to systematically vary and study the effect of structure on sensor selectivity and color. The first step involves synthesis of formylstilbenes by reduction of cyanostilbenes. The second step involves imine formation by reacting 2-picolyamine with a formylstilbene.

- P-31 *Environmentally Friendly Heterogeneous General Synthesis of Ylidene Rhodanines*  
Davina Lowe (Desmond Murray, Chemistry & Biochemistry)  
Undergraduate Research Scholar

Ylidene rhodanines have found broad applications in biomedical and material sciences, such as in pharmaceuticals and as sensors. A number of different methods have been reported in the scientific literature for their synthesis. Our 'green chemistry' approach involves use of a cheap, nontoxic, heterogeneous base promoter in refluxing ethanol. We have discovered that our calcium oxide promoted Knoevenagel condensation method is very simple, reliable, versatile and applicable to a wide structural diversity of ylidene rhodanines. This research was contributed to and performed by both high school and undergraduate students. It opens the door for easy access to and wider applications of this important class of organic compounds.

- P-32 *Studies of Electrophilic Carbonyl Additions and the Synthesis of Isochroman Lactone Fragrances*  
Camille Martin (Desmond Murray, Chemistry & Biochemistry)  
Undergraduate Research Scholar

Isochroman lactones are a rare class of musk odorants that have not received much attention from synthetic chemists. This is so despite reports indicating their 'exceptional tenacity and stability in all media.' They have also been reported as important intermediates in synthesis of bioactive alkaloids. However, there are very few methods currently developed for the synthesis of 1-substituted isochroman lactones. This presentation discusses our research that uses a one-pot tandem synthetic approach for preparation of these rare lactones. It involves an initial electrophilic carbonyl addition followed by an intramolecular Friedel Crafts cyclization. This work builds on years of experience in our lab, with both high school and undergraduate researchers, exploring and developing electrophilic carbonyl addition reactions. Our isochroman lactone preparation illustrates the synthetic power of this underutilized class of organic reactions.

- P-33 *Investigation into the mechanism of copper(II) ions sensing using dimethylaminocyanostilbene fluorescence*  
Stephen Gilbert (Ryan Hayes and Desmond Murray, Chemistry & Biochemistry)  
Undergraduate Research Scholar

Copper(II) ions are selective quenchers of dimethylaminocyanostilbene (DCS) fluorescence over other metal ions even in a complex aqueous solution. This interaction provides a mechanism for developing a copper(II) ion sensor based on the fluorescence diminishment which could be used by individuals or businesses to do a quick screen of their drinking water to determine if the copper(II) ion concentration is above EPA actionable levels (1.3 ppm), especially if this technology can be integrated into a dip-strip device. The purpose of this research is to discover and understand the binding interaction between DCS and copper(II) ions to provide further insights in developing a robust and predictable sensing element. We have been able to show that DCS is able to easily detect copper(II) ions to 1.3 ppm using fluorescence quenching in an acetonitrile solution with a laboratory fluorescence spectrometer. Our investigation of pH, interfering ions, binding strength, and the development of molecular analogs of DCS have helped elucidate the details behind the specific fluorescence quenching mechanism in this copper(II) ion sensor.

P-34 *Preparation, isolation, and characterization of potentially carcinogenic heterocyclic amines derived from arginine*

Zachary Reichert (Ryan Hayes, Chemistry & Biochemistry)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

It is well established in scientific literature that cooked meat and fish produce heterocyclic amines (HCA), many of which are mutagens and/or carcinogens. The components that create HCAs are understood but the mechanism is not fully established. The formation reaction typically involves creatin(in)e from muscle tissue with any of the other available amino acids under anhydrous conditions. Sugars and glycols seem to improve the yield of HCA formation. However, our research and peer-reviewed literature suggests there are HCA compounds that are formed using arginine rather than creatin(in)e. Arginine is readily available in plants and animals and is found in high concentration in soy protein isolate, which is used in many meat substitute products. Therefore we have burned arginine in the presence of phenylalanine and performed a series of chemical separations to isolate compounds with similar properties as the creatin(in)e-based HCA. These purified compounds are being studied to determine their chemical structures and their relative mutagenic potential. We will report on our progress in ascertaining the structures and toxicity of our lead candidates.

P-35 *Optimization of Solvent-based NIR Hydroxyl Number Determination for Dendritic Polyols*

Hwuk Chan Woo (Ryan Hayes, Chemistry & Biochemistry)

Dendritic polymers, including hyperbranched polymers and dendrimers, are an emerging class of additives for a variety of industries such as the paints and coatings, plastics, adhesives, inks, and personal care products. The outer functional group type and density determines how these highly branched materials will perform and enhance the properties of consumer products. Near Infrared spectroscopy provides a direct, non-destructive analysis of this outer functionality specifically for the hydroxy group. This hydroxyl number analysis via NIR requires a high-boiling, polar, non-hydroxylated solvent such as DMSO to perform the analysis with sample amounts typically around 0.1 gram. Our research has shown that this NIR analysis works for the simultaneous determination of hydroxyl number and water content which is convenient but could be costly for characterizing expensive dendrimers, such as PAMAM dendrimers, which could cost \$300/0.1 gram. Our research has focused on optimizing the sample concentration and solvents so as to provide the lowest cost analysis. This spectroscopic method is simple, direct, and does not require the time and sample preparation required with electrochemical titrations. This poster will highlight the challenges with NIR hydroxyl number analysis and solutions to overcome these difficulties.

P-36 *Investigation of 1,3-Dipolar Cycloadditions Mechanisms: Synthesis of Thiolactomycin and Derivatives*

Lucyna Krzywon (Lisa Ahlberg, Chemistry & Biochemistry)

Undergraduate Research Scholar

Due to increasing resistance to pharmaceuticals among infectious bacterial strains and cancers, it has become necessary to research new antibiotic and chemotherapy treatments. Thiolactones are effective against resistant strains of tuberculosis and staphylococcus. Thiolactomycin is a thiolactone compound shown to have selective activity against fatty acid synthase (FAS) enzymes which enables it to be an effective treatment for urinary tract infections and intraperitoneal bacterial infections. FAS has also become a target for carcinomas of the breast, ovary, colon, prostate and endometrium. Higher levels of FAS are expressed in carcinomas compared to normal tissues. Derivatives of thiolactomycin, including thiotetromycin have similar antibiotic properties. Our purpose was to synthesize cyclic thiolactone derivatives using a simple, affordable mechanism. To date we have investigated 1,3-dipolar cycloaddition chemistry.

P-37 *Synthesis of Isoxazolines*

Rosanne Thornhill (Lisa Ahlberg, Chemistry & Biochemistry)

J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Isoxazolines are organic molecules characterized by their five-membered ring heterocycles containing nitrogen and oxygen, and by their diverse synthetic and biological properties. Isoxazoline derivatives exhibit quite a significance in medicinal chemistry, with reported anti-inflammatory, anti-viral, antifungal, antibacterial, anti-tuberculosis, analgesic and anticonvulsant activity. One group of isoxazoline derivatives, dibenzoazepine tethered isoxazoline derivatives, shows promise as possible future anticancer agents. A study conducted with these compounds tested them against murine osteosarcoma cells, human ovarian cancer cells, human melphalan-resistant multiple myeloma cells and human breast cancer cells. Results from that study showed that the compounds helped to inhibit the invasion, migration and proliferation of some of the cancer cells. This research project attempts to synthesize the isoxazoline structures, to which the dibenzoazepines can be tethered, by cost-effective and efficient means.

P-38 *Towards Amino Acid Analysis of Flame-treated Avian Eggshell Using RP-HPLC*

Jonathan Lee (David Randall, Chemistry & Biochemistry)

Undergraduate Research Scholar

We developed a method for the Agilent 1260 Infinity HPLC system to quantitatively study the extent of amino acid racemization in flame-treated ostrich (*S. camelus*) and emu (*D. novaehollandiae*) eggshell fragments. We ground the samples with a mortar and pestle, dissolved them in 7 M HCl, and heated them inside an oven at 110°C for 6 hours to isolate the eggshell proteins from the surrounding calcite and hydrolyze the peptide bonds. We then evaporated the samples and rehydrated them with an internal standard. For the analysis, we employed reversed-phase HPLC with pre-column derivatization using an OPA/IBLC reagent. We were able to analyze several amino acids while reducing the elution time to 30 minutes.

P-39 *Synthesis of Silver Nanoparticles by Silver Salt Reduction Method*

Bitna Yoon (Getahun Merga, Chemistry & Biochemistry)

Synthesis and characterization of noble metal nanoparticles are of current interest. Silver nanoparticles have novel optical, electrical, and thermal properties, which are different from the properties of the bulk silver. For example, metallic NPs smaller than the wavelength of light emitted on them show strong dipolar excitations of the electrons in the conduction band in the form of localized Plasmon resonances. It causes a certain wavelength of the light to be blocked from propagating. This property of the silver colloids can be changed by controlling the size, shape and medium of the nanoparticles. Hence, our current work focuses on the synthesis of silver NPs that are free or negligibly very small supporting organic molecules. Silver nanoparticles were synthesized by the silver salt (Ag<sub>2</sub>O) reduction method and compared with well established silver NPs from silver nitrate (AgNO<sub>3</sub>). In the present work, acetyl acetate (acac) was used as a reductant molecule. The colloids were centrifuged and/or evaporated using rotavapor in order to produce naked silver NPs. The fabricated silver nanoparticles were characterized by UV-Visible spectroscopy to confirm the formation of silver particles and reduction of stabilizers in the colloids. Inductively coupled plasma atomic emission spectroscopy (ICP-AES) and scanning electron microscopy (SEM) were used to analyze particle size, size distribution, and metal-atom concentrations.

P-40 *Accessing Information Using LVAAlert and Python*

Belinda Cheeseboro (Tiffany Summerscales, Physics)

Research supported by the National Science Foundation

GraCEDb is a database that stores events that could possibly produce gravitational waves. By using the notification system, LVAAlert, we can develop a program in python to extract necessary information from that event and store it in a usable data structure. That data can then be analyzed by our algorithms to extract gravitational waveform data from the detectors.

P-41 *Testing a Maximum Entropy waveform recovery method on data injected with simulated gravitational waves*

Michael McMearty (Tiffany Summerscales, Physics)

J.N. Andrews Honors Scholar, Research supported by the National Science Foundation

The purpose of LIGO (the Laser Interferometer Gravitational-Wave Observatory) is to detect gravitational waves through the use of laser interferometry. Sources such as seismic activity or unwanted particles in the laser vacuum arms produce a level of background noise that presently obfuscates nearly any gravitational wave signal that LIGO might detect. The next generation of LIGO, advanced LIGO, is expected to increase detector sensitivity tenfold. To prepare for gravitational wave detection in aLIGO, we test a maximum entropy method approach to signal extraction by (1) injecting artificial signals into background noise data, (2) extracting those signals using the maximum entropy method, and (3) comparing the extracted signal to the original by measuring cross-correlation between the two and by comparing calculated best-fit parameters (such as central frequency and envelope width for a sine-gaussian wavepacket) for the extracted waveform with the known parameters from the original.

P-42 *Optimizing MaxEnt to find Gravitational Waves for LIGO*  
William Tritch (Tiffany Summerscales, Physics)  
Research supported by the National Science Foundation

The Laser Interferometer Gravitational Wave Observatory (LIGO) Collaboration's signal processing software, MaxEnt, is computationally expensive. The goal is to change the data from the time domain to the frequency domain in the code and then back again to eliminate the need for large, unwieldy matrix inverses in an effort to optimize the code to improve detection of gravitational waves. This back and forth conversion is expected to greatly increase the speed of the calculation, thus streamlining the process so data can be covered more efficiently.

P-43 *Science Outreach: Spanish translation of summaries*  
Shannen Velasquez (Tiffany Summerscales, Physics)  
Research supported by the National Science Foundation

As society grows and develops, an increasing demand in scientific backgrounds will be encouraged. Information should reach every corner of the world, from aspiring scientists to non-scientists. With the intention that everyone have access to such information, we translate LIGO's science summaries for a Spanish-speaking audience.

P-44 *COMSOL simulation of transdermal toxin expulsion via adsorptive dermal patch*  
Michael Hess (Hyun Kwon, Engineering & Computer Science)  
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Human skin is a highly complex organ made of multiple composite layers, including the subcutaneous tissue, the dermis, and the epidermis. These layers contain ducts and pores that allow substances to pass into or out of the body. Mathematical skin models play an important role in fields such as transdermal drug delivery and assessment of dermal exposure to industrial chemicals. Extensive research has been conducted using the skin as a means of moderating and controlling drug delivery through transdermal adsorption. Little effort has been made, however, to view the skin as a permeable layer to expel waste chemicals or toxins from the body. In this work, we focused on topical application of charcoal poultices or dermal patches that are used for cleansing the body by stimulating circulation and drawing out impurities through transdermal adsorption. We developed a two-dimensional computational skin model to evaluate removal of toxins through skin as permeable layers. The simplified skin model consists of the dermis and epidermis layers as diffusive layers and endotoxins of inflammation as a point source. The results were compared with and without the aid of an adsorptive topical dermal patch or poultice.

P-45 *Simulation of light propagation in skin and subcutaneous blood vessels*  
Robert Polski (Hyun Kwon, Engineering & Computer Science)  
Undergraduate Research Scholar

The vein visualization system projects an image of subcutaneous veins by using the discovery that near-infrared (NIR) light, at certain frequencies, passes through and transmits back out of the skin tissue except at the blood vessels. We aim to understand the light propagation in tissue and improve the function by using computational models to interpret changes in properties of the subject, such as skin pigmentation, and settings on the device, such as light frequency. We also look to decrease error, as a result of the geometry of veins and the multiple layers of skin. A finite-element model implementing the diffusion approximation of the radiation transfer equation fulfills the role in part, but questions of boundary conditions and the description of the source need clarification.

P-46 *Design of a Prototype Clinical Near Infrared Imager*  
Ricardo Huancaya (Gunnar Lovhoiden, Engineering & Computer Science)  
Undergraduate Research Scholar

Near infrared (NIR) light allows for imaging of subcutaneous tissue. A portable prototype near infrared imager that can be used in a clinical setting for further research in this field is being developed. Research was conducted to determine the best combination of NIR illumination, lens choice, camera choice, and focal distance aiding lasers. The mechanical design is under development and consists of a housing that accurately positions the camera, lens, NIR LEDs, linear polarizers, an optical filter, and lasers, and also houses a printed circuit board and switches to control the operation. All these parts and the way they are fixed to the housing determine how well the NIR light contrasts skin and blood. This research shows a suitable prototype design capable of obtaining images of subcutaneous tissue.

P-47 *Design of a Prototype Clinical Near Infrared Imager*

Stefan von Henner (Gunnar Lovhoiden, Engineering & Computer Science)  
Undergraduate Research Scholar

A prototype near infrared imaging device is needed for research in the medical field. The design needed careful planning to complete the prototype. The prototype needed to include: a polarized camera, near infrared LEDs, focusing lasers, triggering switches, and a microprocessor. The near infrared LEDs require a very specific current threshold to prevent false readings and skewing the data. Simple resistors were not accurate enough to maintain this exact amount of current. Research into various current control devices led to the decision to implement LED drivers. This discovery expedited the design process by giving the circuit design a base. Additional components could be selected to work with the drivers.

P-48 *Evaluation of the Electrical Resistance and Capacitance of a Dielectric Electro-Active Polymer*

James Magbanua (Boon-Chai Ng, Engineering & Computer Science)  
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Dielectric ElectroActive Polymers (DEAP) have the potential of converting mechanical energy into electrical energy. DEAP 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 allowing for large mechanical deformations with low operating forces. This work examined the electrical properties of DEAP, in which the capacitance and the electrode resistance were affected by repeated stress relaxation cycles. Three samples of 25% strain DEAP were subjected to 3000 stress relaxation cycles at 4%, 10%, and 20% strain. The capacitance of each sample and the resistance of one electrode layer were measured in both the relaxed position and the stressed position, once per interval. The 4% sample did not indicate any changes up to 3000 stress cycles, but resistance increased uniformly by about 2%. The 10% stress sample's capacitance and resistance had an increase of 6% and 4% respectively at 3000 cycles. The increase, although appearing to jump slightly between 1000 and 1500 cycles, seems otherwise uniform. Overall, there was a small increase in the capacitance of the DEAP sample after the 3000 stress cycles but the capacitance never went above  $2nF$ .

P-49 *The Relationship Between Yearly and Daily Reproductive Synchrony*

Wadenerson Saint Martin (Shandelle Henson, Mathematics)  
Research supported by the National Science Foundation

A variety of taxa exhibit synchronous reproduction. Seabird colonies typically show synchronous reproduction on a yearly timescale. Hayward and Henson recently showed that colonial seabirds also can synchronize ovulation cycles on a daily timescale within the breeding season. Here we test the hypothesis that yearly synchrony and daily synchrony are inversely related; that is, we test whether a shorter laying season (more synchronous yearly reproductive pulse) is associated with a lower level of ovulation synchrony. For each of three years and five sample plots in the colony, we computed the standard deviation of the duration of the laying season and computed the level of ovulation synchrony within that season. The correlation coefficient was 0.48. The analysis gives moderate evidence suggesting that birds may not have sufficient time to synchronize ovulation cycles during a short laying season.

P-50 *Proving the existence of 2-cycle bifurcations in a discrete-time model of seabird reproduction*

Craig Dujon (Shandelle Henson, Mathematics)  
Research supported by the National Science Foundation

In mathematical biology, discrete-time dynamical systems can be used to model the progression of seabirds through various stages of their reproductive cycles. Burton and Henson posed a simple mathematical model of seabird reproduction; they showed the existence and uniqueness of a branch of stable equilibria that undergoes a 2-cycle bifurcation as colony density increases. Here we prove for a modified, more realistic model that a similar equilibrium branch exists with an analogous 2-cycle bifurcation appearing as the parameter representing colony density increases.

- P-51 *A space curve satisfying  $t/k = t$*   
Ye Lim Seo (Yun Myung Oh, Mathematics)  
Undergraduate Research Scholar

In 1802, Lancret stated that a necessary and sufficient condition for a curve to be a general helix is that the ratio  $t/k$  be constant where  $k$  is the curvature and  $t$  is the torsion of the curve. My goal is to investigate the case when the ratio  $t/k$  is a linear function, i.e.  $t/k = t$ .

- P-52 *Effects of immunity on genetic divergence of measles and dengue viruses*  
John Zdor (Kanya Long, Biology)  
Undergraduate Research Scholar

Phylogenies capture biological change in lineages through time, and for pathogens, this change is shaped by interaction between the pathogen and its hosts. In this study, we explore both published and novel methods to quantitatively define the shape of phylogenetic trees from outbreaks of two human pathogens: measles virus and dengue virus. Although both viral infections are acute in the human host, they experience very different immune pressures. Virus sequences were obtained from GenBank and aligned in MUSCLE, and trees were constructed from genetically defined outbreaks using Bayesian methods. To compare tree shapes, we used published methods to approximate Sackin's index as a measure of tree asymmetry and to detect the number of "cherries," or tips in each tree that share common ancestors. In addition, we explored the use of a novel summary statistic to compare virus tree shapes. While in-host exposure to strong cross-immunity by measles virus versus partial immune enhancement of dengue virus results in qualitatively different tree shapes, we demonstrate how tree asymmetry due to immune pressure can be quantitatively defined by these methods.

- P-53 *Field documentation of summer and fall diet in thirteen-lined ground squirrels, *Ictidomys tridecemlineatus**  
Trevor Zimmerman (Thomas Goodwin, Biology)  
Undergraduate Research Scholar

The purpose of this study was to observe and document the diet of thirteen-lined ground squirrels (*Ictidomys tridecemlineatus*) and how their dietary preferences might change during the summer and fall season. Observations of feeding were made in a field of mowed grass (with a few observations in an adjacent, normally unmowed field) at the Andrews University Airpark in SW Michigan from July to late September, 2013. Samples of plant material and representative insect samples fed on, based on direct observation, were collected. We are qualitatively and quantitatively describing what was eaten both overall and on a month to month basis based on samples collected and direct observations. Samples have been submitted for stable isotope analysis of carbon and nitrogen of collected plant and insect material to gain insight into whether the source of food was C3 or C4. We expect to see a shift in diet from C3 to C4 plant material from mid-August to early September, based on previous research on stable isotopes in teeth and fecal samples of thirteen-lined ground squirrels from the region.

- P-54 *Classifying Ethnographic Photographs from Tall Hisban: Toward an Improved Process for Analyzing Old Photographs from Jordan*  
Doneva Walker (Øystein LaBianca, Behavioral Sciences)  
Undergraduate Research Scholar

The goal of this project is to come up with an improved process for classifying and analyzing hundreds of ethnographic photographs collected by LaBianca and his students during the original Heshbon Expedition (1971-1976) in Jordan. To this end expedition photographs are being scanned and entered into the computer using NVivo, a commercial qualitative data analysis software. As photographs are being entered they are being categorized using two frameworks: the food system observation guide originally proposed by LaBianca (1990) and the "seven little traditions" framework proposed more recently by LaBianca & Witzel (2007). The findings resulting from this experiment in categorization will serve as the basis for coming up with an improved categorization scheme.

P-55 *Women's Work and Knowledge in a Traditional Arab Village: Analyzing Ethnographic Data from the Village of Hisban in Jordan*

Brittany Swart (Øystein LaBianca, Behavioral Sciences)  
Undergraduate Research Scholar

What is the nature of the knowledge required by women in order to succeed at “women’s work” in a traditional Arab Village? This question will be examined through analysis of ethnographic notes collected between 1971 and 1976 by Dr. LaBianca and his students in the village of Hisban in Jordan. Over the past six months I have been using NVivo, a commercial software for entering and analyzing various qualitative data, to transcribe hundreds of hand-written note cards containing ethnographic data from the original Heshbon Expedition. As I worked on transcribing this data, I noticed that the most common observations recorded by the ethnographers had to do with women and their work. In particular, there are a lot of notes dealing with food preparation and the areas involved with it. Some of the notes also deal with the women’s attitudes and skills/knowledge. This poster will describe the progress thus far in my research on women’s work, particularly in the area of food preparation, and the attitude toward the women’s work. The research will be done to further expand our understanding of the role of women and their work in Jordan.

P-56 *The use of 3-D Scanning in the Analysis of Ancient Pottery Sherds from Jalul*

Krystal Uzuegbu (Randall Younker, Institute of Archaeology)  
Undergraduate Research Scholar

Broken pottery sherds from an archaeological site can tell much about the ancient settlement and the people who lived there. Pottery was an abundant and common artifact in ancient sites. Pottery was used for making vessels for storage, cooking, eating, as well as for making other objects such as figurines. The shapes of the baked clay vessels are one key characteristic that tell much about both the date and use of these ancient vessels and objects. By using 3-D scanners, we can (fairly) quickly obtain a more accurate 3-D image of the shape of the vessel that will enable us to both date and determine the usage of these ancient vessels. This information can then be incorporated into the interpretation of the site in which these vessels are found. My presentation will describe the procedure and the results of my scanning of ceramics from the ancient Iron Age site of Jalul, Jordan.

P-57 *Water/Soil Conservation in Jordan, Nebulsi Agricultural and Archaeological Center at Tall Hisban, Jordan Archaeological Park*

Andrey Yun (Stan Beikmann, Agriculture)  
Undergraduate Research Scholar

According to The Millennium Project (Global Future Systems) the first two global challenges are Sustainable Development, Climate Change and Clean Water. Jordan-Arab region could face severe water crisis by 2015 (Jordan Times, 2013). The indigenous methods of harvesting and storing of rainwater in Jordan have been practiced for 4000 years. Archaeologists working in Jordan confirmed that in the past, the local population depended predominantly on cisterns, terraces and dams to obtain their annual water needs which included agricultural irrigation and domestic supply. This research provides a design of landscape exhibits with educational “storyboards” for indoor exhibit. Designs of models of cisterns, reservoirs and water conservation holding areas will be part of interpretive educational signage to incorporate archeological investigation and promote information for Jordanian people in their quest for solutions to this problem. The models will also serve as site drawings for constructing outdoor demonstrations at the proposed Nebulsi Agricultural and Archaeological Center during the 2014 Jordan Field School.

P-58 *The Life and Status of Women in Achaemenid Persia*

Erika Mikkelson (Constance Gane, Institute of Archaeology)  
Undergraduate Research Scholar

“The Life and Status of Women in Achaemenid Persia” aims to understand and explain Persian culture in light of the story of Esther and to dispose of presuppositions that may have arisen from misunderstandings of Jewish culture. Understanding this information gives us a better picture of how women lived within the palace thereby facilitating an understanding of how Esther may have lived. To accomplish this, the Persepolis Fortification Tablets, resources that examine the archeological structure and composition of the Palace in Persepolis, and current studies on women in Persia have been explored. The Persepolis Fortification Tablets provide information on transactions of goods (grain, wine, etc.), information on properties owned, salaries, and occupations of Persian women. It has been found that women could have their own scribes, estates/properties, and incomes. Understanding this information gives us a better picture of how Esther may have lived.



P-59 *The Influence of Family Dynamics on Contraceptive Use in Madagascar and the Ensuing Impact on Family Well-Being*

Azra Totobesola (Duane McBride, Behavioral Sciences)  
Undergraduate Research Scholar

The objective of this study is to explore the relationship between family influence, contraceptive use, and family well-being. A survey was administered in the Vatovavy Fitovinany region of Madagascar, which has one of the lowest contraceptive prevalence rates in the country. The survey collected data on family dynamics and knowledge and practice of family planning. Data were retained for 768 Malagasy couples. Multiple regression was used to determine (1) the relationships between contraceptive use and two levels of family dynamics and extended family influence and (2) whether the two levels of family dynamics and contraceptive use were associated with four types of well-being: psychological, physical, intellectual, and economic. There is evidence that while both spousal dynamics and extended family influence were associated with contraceptive use, spousal dynamics showed a stronger relationship. Analyses regarding well-being were inconclusive overall but suggest that spousal dynamics may also have a greater association with well-being than extended family influence. We recommend increased support for family planning promotion and training that includes couples as a unit rather than women only. Also, family planning can be promoted during community outreach in order to increase understanding and acceptance within the community, which includes extended family members.

P-60 *Bullying Behaviors and Correlates among Elementary and Middle School Girls in Berrien County, Michigan*

Lianne Wynne (Curtis VanderWaal, Social Work)  
J.N. Andrews Honors Scholar and Undergraduate Research Scholar

Bullying, defined repeated harmful acts and an imbalance of power between the bully and his/ her victim (Nansel 2001), is a widespread problem among school-aged girls. Nansel and colleagues (2001) found that 25.6% of girls said they were bullied and 23.2% admitting to bullying others in the past year. This study examined rates of bullying behaviors and responses to bullying for girls who participated in the Girls on the Run (GOTR) program. Data were collected in spring 2013 on 510 elementary and middle school girls across 28 schools in Berrien County, Michigan. The study included five questions related to personal involvement in or witnessing bullying and rumor spreading. Frequencies showed that 39.8% of girls admitted to bullying someone in the previous year. Cross tabulations examined bullying behaviors by ethnicity, self-esteem, and parent and teacher relationships. Pearson's chi-squared tests found that: 1) Caucasians had the higher rates of bullying (compared to other ethnic groups); 2) higher self-esteem related to lower bullying behaviors; 3) girls with stronger parent and teacher relationships were more likely to tell an adult when they saw bullying behaviors. Data suggest that improving self-concept may reduce bullying behavior and strengthening parental bonds may result in increased reporting.

P-61 *The Derivation of Identity: Gender, Masculinity, and Sexuality in Coriolanus*

Matthew Chacko (L. Monique Pittman, English)  
J.N. Andrews Honors Scholar, Undergraduate Research Scholar, and Earhart Emerging Scholar

William Shakespeare wrote *Coriolanus* (1608) when two epistemological modes, theater and empiricism, asserted competing constructions of selfhood. Theater imagined identity as fluid, subject to external manipulation by exposure to the stage. In contrast, as Renaissance anatomical texts imply, empiricism voiced an increasingly stable and innate subjectivity. Likewise, Coriolanus faces a dilemma of selfhood. Outside agents attempt to change his subjectivity, mirroring the theater, while Coriolanus asserts his immutable identity, paralleling empirical understandings. Coriolanus's concerns of selfhood echo Renaissance subjective anxieties during a changing period as different epistemologies, theater and empiricism, launched rival notions of identity.



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