

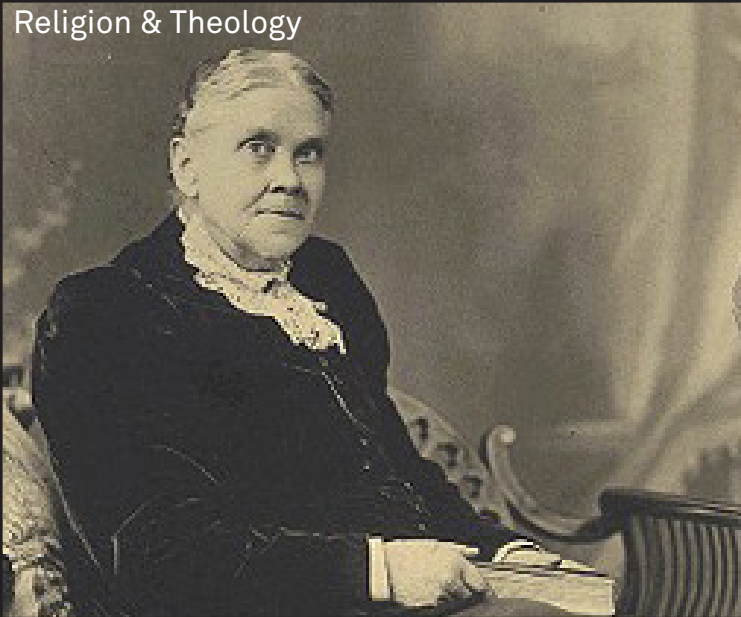
Ninth Annual Andrews University

Celebration of Research & Creative Scholarship

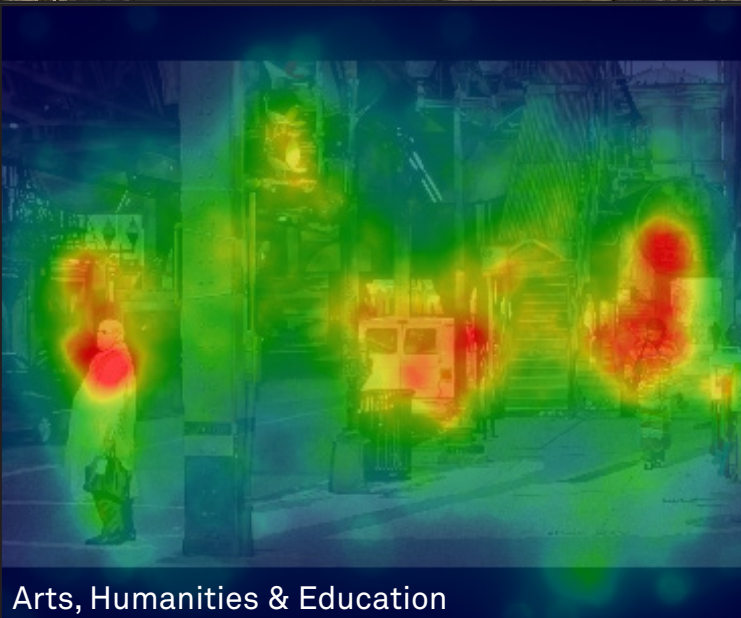
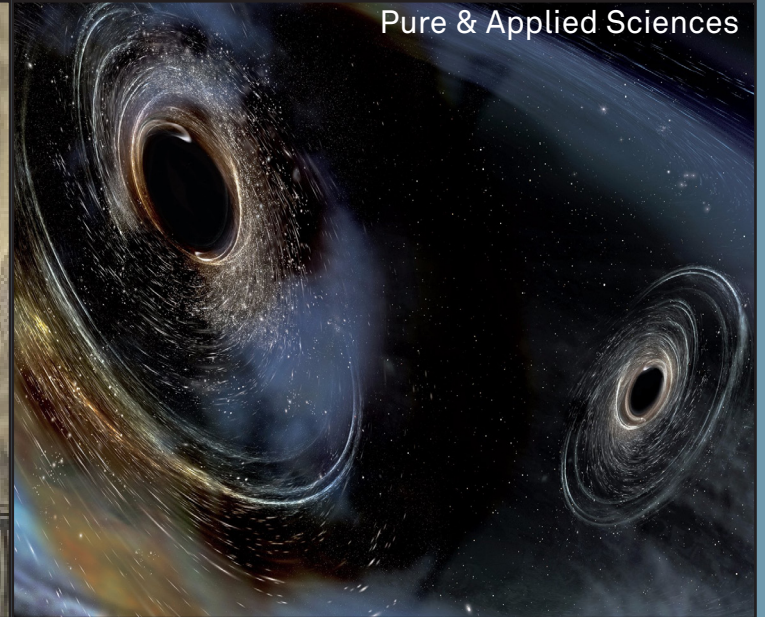
November 3, 2017 | Buller Hall

PROGRAM AND ABSTRACT BOOK

Religion & Theology



Pure & Applied Sciences



Arts, Humanities & Education



Professional Programs

“At Andrews University, research is an inextricable part of the education experience. It informs our commitment to knowledge, faith and service.”

~Andrea Luxton, President

WELCOME

Welcome to the Ninth Annual Andrews University Celebration of Research and Creative Scholarship.



Andrews University faculty and graduate students have had a productive year: 94 faculty members published 222 peer-reviewed books, book chapters, and articles, with an additional 98 general audience publications. The range of topics covered in today's plenary, oral, and poster presentations demonstrates the commitment to research and creative scholarship of the Andrews community. Again this year, there is much to be celebrated!

Three Plenary Presentations will be given by the 2017 Siegfried H. Horn Excellence in Research and Creative Scholarship Award recipients—Kathleen Demsky (Professional Programs), Herbert Helm (Arts, Humanities & Education), and Tiffany Summerscales (Pure & Applied Sciences). Denis Fortin, professor of Historical Theology, also received the Horn Award in 2017 (Religion & Theology); however, he is unable to join us today. Kathleen Demsky, Director of the Architecture Resource Center and associate professor of Library Science, will review the experience and faith of the Waldensians. Herbert Helm, professor of Psychology, will look at eye tracking and artistic expression. Tiffany Summerscales, professor of Physics, will discuss gravitational wave astronomy. She studies astrophysics as a member of the LIGO Collaboration, which has received significant scholarly recognition for detecting gravitational waves. Three key LIGO leaders have been named as recipients of the 2017 Nobel Prize in Physics.

The Horn Award was established in 2011 to honor Siegfried H. Horn's legacy of scholarship and contribution to the field of biblical archaeology at Andrews University. The award recognizes lifetime achievement in research and creative scholarship for faculty members of Andrews University.

After the plenary session, please join us for refreshments in the Buller Lobby during our poster session, followed by three oral sessions covering faculty and student research and creative scholarship across the disciplines.

Thank you for joining us for this celebration. I hope you enjoy engaging the breadth and depth of research and creative scholarship, and I hope you will be encouraged to continue focusing your own creative and intellectual energy into future research projects. Additionally, we invite you to join us on March 2, 2017, to celebrate efforts of younger researchers at the Undergraduate Research Scholars and Honors Poster Session. To learn more, please visit www.andrews.edu/research.

Sincerely,

A handwritten signature in cursive script that reads "Gary W. Burdick".

Gary. W. Burdick
Dean of Research

Cover, clockwise from top-left: (1) Ellen White; (2) Black hole rendition, LIGO/A. Simonnet; (3) Waldensian architecture, Troy Homenchuk; (4) Observation map, Herbert Helm & Karl Bailey.

SCHEDULE OF EVENTS

12:30–2:00 pm

Plenary Session (Newbold Auditorium)

See page 5 for program abstracts.

Welcome and Introduction – **Andrea Luxton**, President

Introduction of Speakers – **Gary Burdick**, Dean of Research

Presentations by recipients of the 2017 Siegfried H. Horn Excellence in Research and Creative Scholarship Award:

PL-1 **Kathleen Demsky**, Director, Architecture Resource Center

The Waldensians: A Story of Faith and Survival

PL-2 **Herbert Helm**, Professor of Psychology

Can Artists Really Predict Where You Will Look

PL-3 **Tiffany Summerscales**, Professor of Physics

The New Era of Gravitational Wave Astronomy

2:00–3:00 pm

Poster Presentations (Buller Hallways)

See pages 8-14 for program abstracts. Refreshments served in the central atrium.

Humanities & Social Sciences

P-01-02 Library

P-03 English

P-04 Anthropology

P-05 Visual Art, Communication & Design

P-06-07 Architecture

P-08 Leadership

Health Professions

P-09 Physical Therapy

P-10 Nursing

P-11 Public Health, Nutrition & Wellness

P-12-13 Speech-Language Pathology & Audiology

STEM & Business

P-14 Business Administration

P-15 Physics

P-16-19 Mathematics

P-20-21 Chemistry & Biochemistry

P-22-26 Biology

3:00–4:00 pm

Oral Breakout Sessions (Buller Classrooms)

See pages 5-7 for program abstracts.

Session A Social & Health Sciences (BUL 108)

Session B Communication & Leadership (BUL 149)

Session C Religion & Music (BUL 150)

PLENARY PRESENTATIONS

PL-1 *The Waldensians: A Story of Faith and Survival*
Kathleen Demsky, Director, Architecture Resource Center

The history of the Waldenses, an ancient group of Christians who resided in the mountain valleys of Piedmont, Italy, is a complicated story of faith and survival. Piecing this history together is difficult because so many Waldensian records were destroyed by papal powers. This study seeks to present a comprehensive perspective on the origins of the Waldenses and their relationship to Christian Scripture, while viewing the Waldenses as examples for modern Christians. The Waldenses were of apostolic origin, inhabiting the Valleys long before the advent of Peter Waldo, their alleged founder, and did not consider themselves reformers. They were among the first to translate Scripture into their own language, which they preserved for many generations before passing it on to the Protestant Reformers. The Waldenses' steadfastness in the face of persecution and perseverance in spreading the Gospel to the world set a precedent that today's Christians would be wise to emulate.

PL-2 *Can Artists Really Predict Where You Will Look*
Herbert Helm, Professor of Psychology

Artists often talk about composition as it is the element which pulls the eye of the viewer across the painting. So if it is true that design elements can be used to lead a viewer's eye then the artist should be able to predict where the viewer will look. With this in mind, three artists, including an internationally renowned urban landscape painter, were asked to predict where subjects would look in their paintings. Subjects were then hooked up to an eye-tracking device which measures the pupil position 60 times per second and presented the paintings for 30 seconds. Following the collection of data, heat maps were made of the viewers' fixations. These fixations were then compared to the predictions the artists made. In general, the areas defined as most important by the artists were indeed where the participants predominantly focused. Other findings were also noted via the heat maps.

PL-3 *The New Era of Gravitational Wave Astronomy*
Tiffany Summerscales, Professor of Physics

Gravitational waves, the faint ripples in spacetime predicted by Einstein's theory of general relativity, were first measured by the LIGO detectors on September 14, 2015. The gravitational waves measured in this first detection came from a pair of black holes as their orbit decayed and they collided and merged with each other. Three subsequent detections of gravitational waves from black hole binaries have started to build a better picture of the properties of black holes and the stars that they descended from. On October 16, 2017, the LIGO and Virgo Collaborations, along with a large number of astronomy partners, announced the discovery of both the gravitational waves and light from a pair of neutron stars that collided and merged. This multi-messenger observation has opened up a new way to explore the universe and resulted in new astronomical discoveries.

ORAL PRESENTATIONS

A - Social & Health Sciences (Buller Hall, Room 108)

A-1 *Children's Participation Rights*

Michelet William, PhD Student, Seminary/World Mission Department

3:00 pm

This paper presents an overview of the concept of children's participation from a human rights perspective, using the United Nations Conventions on the Rights of the Child as framework. It emphasizes the importance of children's active participation in decisions and actions that relate to their advancement and that of their community. Drawing on examples primarily from Haiti, the paper proposes three basic rationales for children's participation: 1) historically, they are key actors of social and political changes; 2) their participation enhances order and stability; and 3) their participation enhances provision and protection rights. As right-holders, children should not be treated as mere recipients of ideas, policies or interventions generated unilaterally by professionals, but be part of the reflections and decisions that inform social policies aiming to improve their lives.

A-2 *Intimate Partner Violence and Substance Abuse: Male and Female Perpetrators*

Christiana D. Atkins, Graduate Student, Graduate Department of Psychology and Counseling

3:15 pm

Domestic violence has been a pervasive, long-standing problem in our society, likely for as long as society has been around. In the United States, it wasn't until 1871 that the first state (Alabama) rescinded the "husbandly" right to physically punish their wives. Societal views on relationship violence have since changed significantly. Male perpetrators of intimate partner violence have been the focus of studies since the 1970's when domestic violence started gaining attention in literature and in popular culture. Contrary to popular belief, females have been found to be more likely to initiate violence. Female intimate partner violence perpetration rates have been found to be equal or higher than males in some studies. Substance abuse problems, like intimate partner violence, has also come to impact people from all walks of life. Some researchers claim there is sufficient evidence to demonstrate a causal relationship between substance abuse and intimate partner violence. Researchers have found that approximately half of those with substance abuse problems have committed some form of intimate partner violence and half of those in batterer intervention programs have substance abuse problems. That rate is approximately five times higher than that of the general population, making those who abuse substances a high-risk population for intimate partner violence. This presentation will be a literature review that is the basis of a Masters Thesis research study.

A-3 *Relationship between BMI, Truncal Fat and Functional Performance in Elderly People with COPD*

Bea Ade-Oshifogun¹, Temitope Ade-Oshifogun², ¹Nursing Department Chair, ²Professor, University of Ghana

3:30 pm

Purpose: To explore the relationship between functional performance, using categories of Body Mass Index (BMI) and truncal fat in elderly persons with COPD. **Design and Methodology:** The authors used a descriptive, cross-sectional design. Subjects were screened through physical examination, spirometry testing, and a 4-minute walk. After enrollment, subjects performed a 6-minute walk test (6MWT) and upper body functional performance test (UBFPT) on two visits, four weeks apart; a whole-body DEXA scan and anthropometrics to measure truncal fat and waist-to-hip ratios. Grouped into normal weight, overweight, or obese according to body mass index. Functional Performance Inventory (FPI) questionnaire used to measure functional performance. **Results:** 76 subjects aged 55 years and older with mild to severe COPD classified as normal to moderately obese. There was no significant difference in Total FPI scores between the normal weight (2.05 ± 0.38); overweight (2.03 ± 0.44); and obese (2.09 ± 0.45) groups. All groups reported moderate level of performance. Disease severity was negatively associated with BMI. Percent truncal fat significantly differentiated the normal weight group from the other two groups ($F(2, 73) = 28.33, p < .001$). Waist-to-hip ratio was significantly and negatively correlated with functional performance ($-.295, p < .001$). **Conclusion:** (1) percent truncal fat may be a factor in the performance of daily activities of people with COPD; and (2) mild to moderate obesity may not have any significant effect on functional performance of elderly people with COPD.

B - Communication & Leadership (Buller Hall, Room 149)

B-1 *The Impact of Adventist World Radio in India and Russia*

Duane C. McBride¹, Petr Cincala², Karl G. D. Bailey³, René Drumm⁴, Curtis J. VanderWaal⁵, Alina Baltazar⁶, Desrene Vernon⁷, ¹Research Professor of Sociology, ²Assistant Professor of World Mission, ³Professor of Psychology, ⁴Professor of Social Work, Southern Adventist University, ⁵Professor of Social Work, ⁶Associate Professor of Social Work, ⁷Professor of Communication
3:00 pm

Our team was awarded a contract to evaluate awareness of and impact of Adventist World Radio (AWR). There were three projects: (1) a literature review of Christian radio; (2) focus groups on AWR effectiveness; and (3) and an audience impact survey in two areas of India and Russia. This presentation is based on the audience impact survey. Approximately 500 surveys were collected in market places in two areas of India and 500 from Adventist Churches in these two areas. This methodology was repeated in Russia. These countries were chosen because AWR invested considerable resources in these counties. In India it was found that the majority of Church members were unaware of AWR and less than 5% in the market place had ever heard of AWR. Awareness was higher in Russia; 12% of the market place was aware of the existence of AWR with 86% of Church members aware. Within the market place, only two of the 500 individuals surveyed reported any impact from AWR. The data showed the difficulty of market awareness penetration in any culture but particularly in a non-Christian culture. AWR was primarily listened to by the elderly with youth noting that there was little of interest to them. The data suggested that AWR needed to work with churches to improve market impact, move from Shortwave to FM and more specifically apps and podcasts for brief messaging that can be shared by church members with friends and family, and focus on increasing the cultural contextualization of the messages and credibility of speakers.

B-2 *Serving Leadership Style Revisited*

Petr Cincala¹, Paul Cho², ¹Assistant Professor of World Mission, ²PhD student
3:15 pm

This presentation highlights findings from a study exploring the congregational health and church growth of more than 9,000 congregations from various denominations across United States. These congregations have used a Natural Church Development (NCD) survey to obtain a health assessment over the period of last 10 years. Findings reveal a fascinating pattern of church growth and health that is related to leadership style of the pastor. The data show that the churches whose pastors say their style of leadership is “serving” are actually growing less and have lower health scores than those who do not list their leadership style as “serving.” Serving as pastor’s style of leadership predicts smaller size of church attendance.

B-3 *Parental Motivation for Providing Monolingual Children with a Second Language Acquisition Experience in a Monolingual Context*

Anneris Coria-Navia, Associate Professor, Teaching, Learning, and Curriculum
3:30 pm

This qualitative study seeks to find motivating factors for parental engagement in providing children with a second language acquisition experience in a monolingual context. Bilingualism and multilingualism have been largely explored in countries where there are languages in contact. Very few studies have investigated themes of raising bilingual children in monolingual countries unknown for any commitment to (at least) bilingualism let alone multilingualism. Spanish-speaking countries in Latin America provide a good model to study this topic given the vast majority of them share borders with other Spanish speaking countries. As opposed to other continents where bordering countries speak different languages. Although 40% of the Argentinean population claims to have some degree of English proficiency, Argentina is a monolingual country. The question driving this work stemmed from the peculiarity of parental motivation in supporting bilingualism or multilingualism in children in a largely monolingual context when in most cases the parents’ first language is Spanish. The families selected qualified to participate in the study on the basis of intentionality in raising bilingual or multilingual children. The majority of the families interviewed homeschool their children and conduct most of the academic work in a language or languages other than Spanish. Semi-structured interviews were conducted with seven parents. Preliminary analysis shows that parents ground their motivation in reasons related to occupation, career options, and the opportunity to travel without assistance. Minimal references to transcultural dispositions or empathy were made.

C - Religion & Music (Buller Hall, Room 150)

- C-1** *Seven Trumpets Reconsidered*
Kyung Ran Yang, MDiv Student
3:00 pm

If the major event of Christ entering the final phase of His ministration in 1844 was misinterpreted as His Second Coming, should we not reconsider the interpretation of the Seven Trumpets also? The question about the accuracy and relevance of the historical interpretation has to be reassessed because the Seven Trumpets message is housed by the ministry of Jesus in the heavenly sanctuary. In believing the historical account, we almost lost Jesus. What I mean by this is that in this flawed explanation that God is judging the nations that are oppressing His church, our focus is taken away from Christ's work in the heavenly sanctuary. This is what I mean by almost losing Jesus. Do we know what He is doing in the heavenly temple? Do we know what our duty is while He is there? The Seven Trumpets message is not about God's judgment upon pagan Rome, and neither is it about the rise of Islam or the Ottoman Turks. If we insist it is past history, we will never be prepared for the crisis to come.

- C-2** *Did the Reformers Misunderstand Righteousness by Faith? New Perspectives on Habakkuk 2:4b*
A. Rahel (Schafer) Wells, Assistant Professor, Department of Religion and Biblical Languages
3:15 pm

One of the hallmark cries of the Reformation, "the just shall live by faith," was first penned by the prophet Habakkuk, and is often quoted and alluded to in the New Testament. For decades and even centuries, this phrase has been interpreted as referring to righteousness by faith in terms of forensic legal substitution, based on human faith in Jesus' sacrifice. However, scholars who follow the "new perspective on Paul" have argued that the typical interpretation is a misunderstanding of the context, and that the phrase is actually referring to God's faithfulness, rather than human faith. In this paper, I consider the possibility that both the old and new perspectives are right in their theology, and that both aspects are found in the context and content of the phrase in Habakkuk itself. Rather than negating the foundational message of the Reformation, the new perspective on Paul simply addresses an additional aspect of righteousness by faith that had yet to be examined and expounded upon. In addition, Paul's focus on the imperative of an ethical lifestyle resulting from faith in Jesus, can also be seen within the context and content of Habakkuk. Thus, Hab 2:4b supports all three of the following: (1) the insights of the Reformers; (2) the recent proposal by those championing the new perspective on Paul; and (3) the importance of good works as the sign and confirmation of human faith in God's faithfulness.

- C-3** *Musical Composition Interacts with Place*
Kenneth Logan, Professor of Music
3:30 pm

On my 2017 composition retreat in the Cariboo region of British Columbia, an evacuation from my normal retreat location there (based on local fire) occasioned my composing in a significantly different place. This new location was a ranch of nearly 1,000 acres. An early challenge at the new ranch was that of finding a preferred site or sites for composition, where the influences of both people and cows would be favorable to sustained thought. Potential wildlife predator incursion, especially by bear, was also a consideration. But this presentation focuses specifically on the relationship of poetic content in one of the poems that I set to music, to the very specific environment of the new ranch location. The poem, by Wendell Berry, reflects on the question of what "true quiet" is, relating the question to the author's claim that "true quiet" is not a certain silence that he specifies. Particular abandoned items on the ranch played into my compositional context. I will interlace video that I shot on the ranch with content from Berry's poem in demonstrating relationships and apparent influences of the environment on the creation of the music.

POSTER PRESENTATIONS

Library

- P-01** *Aligning Academic Library Space with Millennials' Learning Styles*
Silas Bruscaquin Marques, Reference/Database/Off-Campus Services Librarian, James White Library

Technology has resulted in more modernization than transformation. There is an apparent disconnect between the culture of library organizations and that of Net Gen Students. Since much of the learning in higher education institutions takes place outside the classroom, the library can play a critical role in students' learning outcomes. It is well reported that intensive technology use has affected how millennials learn and how they interact. Due to millennials' characteristics, this generation demands a new learning and pedagogical paradigm. Thus, faculty are realizing that traditional classroom teaching is no longer effective with millennials – they require a learner-centered pedagogy, a constructivist learning paradigm. Learning and the space in which it takes place are of utmost importance. We must design library learning spaces that optimize the convergence of the Net Generation, current learning theories, and information technology. This paper describes who are the millennials, their learning styles, and the types of library spaces most appropriate for promoting and enhancing millennials' learning outcomes.

- P-02** *The Wurker-Gibson Bible Collection and the 500th Anniversary of the Reformation*
Lawrence Onsager¹, Terry Dwain Robertson², ¹Dean of Libraries, ²Seminary Librarian

As part of the celebration of the 500th anniversary of the Reformation, we decided to highlight the James White Library's copy of Luther's 1534 Bible, the role of Chester Gibson in donating the Bible to Andrews, and the story of Paul Wurker, who collected this particular Bible and the other Bibles which we are calling the Wurker-Gibson Bible Collection.

English

- P-03** *"How Dey Goin to Kill Othello?!": Key & Peele and Shakespearean Universality*
Vanessa Corredera, Associate Professor of English

As a year commemorating the 400th anniversary of William Shakespeare's death, 2016 saw repeated assertions of the Bard's lasting cultural significance with words and phrases like "lasting legacy," "relevance," "timeless," and "international appeal" recurring. Essentially, these accolades advocate for a universal Shakespeare, a figure whose works speak across both time and cultures. Yet scholars of Shakespeare and race have been wary of such claims, suggesting that they turn a blind eye toward Shakespeare's historical and continued associations with whiteness as a privileged category of difference. Precisely such an interrogation of Shakespeare and whiteness appears in a surprising place—a Season 3 sketch written and performed by bi-racial comedy duo Keegan-Michael Key and Jordan Peele in their Comedy Central sketch show *Key & Peele*. A close reading of the sketch reveals how Key and Peele imagine Shakespeare and race, specifically, Shakespeare's representation of blackness. In under five minutes, Key and Peele launch a potent critique of Shakespeare, invoking the author and his works in order to explore the racialized boundaries of the dramatist and his iconic oeuvre. According to this sketch, Shakespeare's universality finds its limits when confronted by its potential irrelevance to the black experience due to its inauthentic depiction of blackness. As such, Key and Peele's satire challenges the comforting narrative of universal Shakespeare, forcing viewers and scholars alike to grapple with whether Shakespeare really does or even can speak to all people across all times.

Anthropology

- P-04** *Animation of the Cultural Landscape of Hisban and Vicinity in the Longue Duree*
Øystein LaBianca, Professor of Anthropology

In today's markets, archaeological publishing must include on-line presentation of findings using various technologies for rendering results, such as 3-D visualization and animation media. The goal of the present project is to build capacity here at the Institute of Archaeology in deployment of animation technologies for rendering of archaeological findings and narratives. To this end I have assembled a team of two graduate students with significant computer skills (Jared Wilson and Stanley Lebrun) and one undergraduate student (Paul Roschman) who will collaborate with me to animate, using Esri CityEngine software, the story of long-term change in the cultural landscape of Tall Hisban. The poster presentation will update on progress of our team toward meeting the objectives of this project.

Visual Art, Communication & Design

P-05 *Wyoming Landscapes*

Greg Constantine, Emeritus Professor and Artist in Residence

The “discovery” of a particular red rock formation 15 miles from Cody, Wyoming, has inspired me to investigate the theme of stratification. The results of this exploration are 35 paintings of the mountain I refer to as “Mont St Gregoire,” as well as a series of works that utilize the mountain’s shape in featuring the possibilities of variations of the sky above it.

Architecture

P-06 *Cuilcagh Mountain Regional Research Project, Ireland*

Rhonda Root¹, Ariel Solis², Robin Johnson², ¹Professor of Art, ²Assistant Professor, Architecture

During May and June of this past summer (2017) Professors Ariel Solis, Robin Johnson, and Rhonda Root began a faculty research project that started recording and investigating traditional Irish cottages (post-famine) along the border between Northern Ireland and the Republic of Ireland. This project is affiliated with the Marble Arch Caves UNESCO Global Geopark, which is within the Cuilcagh Mountain Region along the border between Northern Ireland and the Republic of Ireland. While in Ireland our research focused on three sites: Moneygashel Cashel (Co Cavan), located in the Republic of Ireland, and Gortmaconnell and Legnabrocky (Co Fermanagh) in Northern Ireland. Documenting of the sites involved recording the architecture by using photographs, drone flights, laser and tape measuring, hand-graphed field sketches of plans, elevations, perspectives, and details of various features. Photographs and drone images will also be used to create non-invasive photogrammetry models. Back on campus, work continued on researching precedent of architectural features and details; producing hand drafted and digital architectural renderings; restoration images of the ruined cottages; illustrative watercolors; and compiling a writing record on the history and culture of the region (this history is the work of our Irish team member, Gaby Burns, a local historian).

P-07 *Re-Purposeful Sustainable Design: Standard Buildings and Ethics of Care*

Thomas Lowing, Associate Professor, School of Architecture and Interior Design

A common project problem statement from a community design perspective asks, “How do you take an existing, ‘tired’ building whose care-taking has waned over the years, and revive the structure to one in which owner, user, and community find a common ‘context of care’?” The design team is challenged to determine how each project gives them an opportunity to express the value of design in the contexts of client, community, and profession. The majority of our communities’ building stock is composed of numerous projects of modest scale and budget. Most existing buildings, although modest in scale, hold a potential value that can only be actualized within a context of care. As the maxim suggests, “people don’t care how much you know, until they know how much you care.” Every project needs to be grounded in this aspect of care if it is to become or remain sustainable. It is an ethical responsibility of the design community to generate designs and constructed environments that identify and foster a “standard of caring” within the context for of their projects. This presentation explores project design as an ethical response within a professional standard of care. A specific project design is presented as a case study for evaluation in a sustainable matrix that includes criteria of care.

Leadership

P-08 *The Role of the Church Planter over the Lifecycle of a Church Plant*

Erich Baumgartner¹, Andres Jorge Flores², ¹Professor of Leadership, ²Founding Pastor, Epic Church

The role of a church planter is multi-faceted and unique. Church planters and their teams venture out as faith entrepreneurs, experimenting with creative ministry approaches in a particular context. Then, as they find methods that prove helpful to meet the needs of people in a particular context, experimenting gives way to more predictable ministry structures. Church growth requires constant fine-tuning of leadership roles to deal with new challenges and growth pains calling for new skill sets that the original church planter may not possess. As church planters steer a path between creative vitality and routinized programming, they are faced with multiple tests to adapt their leadership to new circumstances. This study tracks the transformation of a successful Chicago church plant (Epic Church) in its first five years from an experimental ministry laboratory to a mature and effective ministry community. The study describes the leadership role changes of the original church planting pastor and his team. The purpose of this study is to document the actual role changes one church planter experienced as his congregation grew from a new church plant to a mature and self-propagating church, taking into account various contextual variables. The data were gathered through interviews, observation, self-reflection, and communal reflection. The study attempts to develop a theory of Church Planting Leadership that is based on discernible role changes in the leadership of the church planter and his/her team.

Physical Therapy

- P-09** *Using Student Scores on Commercial Preparatory Examinations as a Predictor of Success on the National Physical Therapy Examination*
Ryan Orrison, Assistant Professor of Physical Therapy

Purpose/Hypothesis: Comprehensive examinations (CE) have been used in physical therapy education as an indication of competency and as a preparatory tool with the goal of first-time success for students on the National Physical Therapy Board Exam (NPTE). The purpose of this study is to determine the effectiveness of CE at indicating NPTE performance after evaluating for significant confounders and adjusting for variables that have been previously identified as potential indicators of success. **Methods:** Participants included 301 students from the DPT classes of 2006-2015 at Andrews University. Scorebuilders PT exam scores, scores on the NPTE, academic and demographic data were collected for each subject. The likelihood of passing the NPTE exam based on the CE score was controlled for age at enrollment, class year, vGRE, qGRE, uGPA and pGPA. Logistical regression was performed to determine which of the variables predict success. **Results:** Four variables were found to be correlated with passing the NPTE on the first attempt: vGRE, qGRE, pGPA after the first semester and CE score. Students that scored 71% on the CE were 6.7 (OR= 6.72, p= 0.001) times more likely than the reference group to pass the NPTE on the first attempt. Students with a first semester GPA \geq 3.41 were 4.58 (OR= 4.58, p=0.003) times more likely than the reference group to pass. **Conclusions:** After adjusting for vGRE, qGRE, uGPA, and pGPA, Scorebuilders CE predicts first time NPTE success. Independently, GRE scores and first semester pGPA were also predictive of first time NPTE success.

Nursing

- P-10** *The Effect of Music Relaxation Video on Anxiety and Biophysical Measurements in College Students: A Randomized Controlled Trial*
Grace Chi¹, Dennis Cheek², Jerry Chi³, ¹Professor of Nursing, ²Abell-Hanger Professor of Gerontological Nursing, Texas Christian University, ³Professor of Management

College students deal with a variety of stressors such as academic, financial and social issues during their college years. Long-term mental stress puts the human body constantly in a fight-or-flight mode and at implicated risks for health complications such as hypertension, cardiovascular disease and anxiety. Anxiety is a predominant mental illness and is a major concern for students. According to the American College Health Association, students report that anxiety impacts their academic performance and scores. The study was to examine the effects of a music relaxation video (MRV) on blood pressure (BP), pulses (P), Respiration (R) and anxiety on college students. A two-group randomized controlled trial was conducted in an exercise physiology lab. Participants were randomly assigned to either in the experimental group to view a 30-minute MRV, or a control group with no MRV. All baseline BP, P and R were collected prior to the beginning of the 30-minute MRV. The BP, P, R were measured every 10 minutes during the 30-minute intervention. State Anxiety Inventory (SAI) was measured before and after the MRV. Participants in the control group received the same measurements. Results showed that SAI and pulse rate in the experimental group were significantly reduced as compared to the control group. Diastolic blood pressure indicated significant decrease for the first 20 minutes. Respiratory rate and systolic blood pressure were not significant.

Public Health, Nutrition and Wellness

- P-11** *Obesity and Breast Cancer Incidence and Mortality among Minority Women in Berrien County, MI*
Padma P. Tadi Uppala¹, Mary S. Gayen², Sherine Brown-Fraser³, Alfredo Mejia³, Dixon Anjejo³, ¹Professor of Public Health, Nutrition and Wellness, ²Student, Public Health, Nutrition and Wellness, ³Associate Professor of Public Health, Nutrition and Wellness

In Berrien County, 72% of adults are overweight or obese. The Berrien County Needs Assessment Report identified obesity, diabetes, cardiovascular conditions and mental health as common risks. Most of these conditions are hallmarks of metabolic syndrome, which signals the onset of chronic diseases such as cancer and cardiovascular diseases. The purpose of the current study is to establish partnerships with Black/African American (AA) women in Berrien County, who experience a high incidence of breast cancer, and to investigate the relationship between metabolic syndrome and breast cancer. We report preliminary data on breast cancer and obesity rates in Berrien County. **Methods:** Data obtained from Berrien County Needs Assessment Report 2016-2019 were generated by analyzing the input of 1,300 community residents who participated in focus groups, key informant interviews, surveys, and photovoice projects. Secondary data was collected by Berrien County Health Department and Susan G Komen Michigan Quantitative data report (2015). **Results:** Berrien County late stage age-adjusted breast cancer incidence rates is 46 among AA women compared to 43.7 for US women. Age-adjusted Invasive breast cancer incidence is 134.3. Female breast cancer incidence and mortality rates for years 2006-2010 for AA women in Southwest Michigan are 124 and 35.8, while for White women the incidence and mortality rates are 114.5 and 23.1.

Speech-Language Pathology & Audiology

P-12 *What is Normal? Normative Data for Healthy Older Adults Learning New Verbal Material*

Brynja Davis¹, Margaret L. Greenwald², Ching-I Lu³, ¹Assistant Professor, Speech-Language Pathology & Audiology, ²Associate Professor of Communication Sciences & Disorders, Wayne State University, ³Adjunct Professor of Communication Sciences & Disorders, Wayne State University

The poster presents the normative data that was collected on a group of healthy older adults as they participated in a novel verbal learning task. For persons with aphasia (a language disorder resulting from brain injury), one of the challenges of speech therapy is facilitating generalization—from individual and group treatments to everyday situations and functional communicative interactions. In order to do this more effectively, therapists need to know more about what normal healthy adults do in situations similar to group and individual therapy treatments. What does normal look like? Preliminary norms have been collected on novel verbal learning. Difficulty learning is likely not all due to stroke, there is a range of learning for healthy adults. Learning improvement was found to be statistically significant. Younger individuals showed better improvement on the learning task than older individuals.

P-13 *Understanding DV Attitudes in a College Sample*

Amy Manjarres¹, Melissa Ponce-Rodas², ¹Undergraduate, Behavioral Sciences, ²Assistant Professor of Psychology

More than 20,000 phone calls are placed to domestic violence (DV) hotlines on a typical day, and one in three women and one in four men have been victims of some form of physical violence at the hands of an intimate partner within their lifetime (www.enditnow.org). Even though rates of DV are pandemic, very little literature has examined how religious beliefs impact people's perceptions of DV. Even less has focused on perceptions of college students. Therefore, using online surveys, the current study aimed to document student's religious and gender role beliefs, and assess their relationships with definitions of domestic violence and acceptability of church-related and secular helping resources. Our sample consisted of 98 students (45 freshmen, 20 sophomores, 12 juniors, 13 seniors and 8 Graduate or other) at a Midwestern Christian College. We examined relationships between identified and introjected religiosity, machismo and caballerismo gender role beliefs, definitions of which acts are considered DV and which resources, Adventist or not, student's felt were acceptable for Adventist victims to seek help from. Results and their implications for collaborations between churches and helping agencies will be discussed.

Business Management

P-14 *Creation of Renewable Energy Regional Hubs: The Case of Northern Colorado*

Kimberly S. Pichot, Associate Professor of Marketing

The United States is the number one consumer of energy but was a late entrant into researching and implementing renewable energy programs. There is a growing interest across the U.S. from entrepreneurs, policy makers, economic development centers, and consumers into creating renewable energy centers, and thereby create regional economies of scale. The purpose of this case study is to take an in-depth look at the factors characterizing the conditions that entrepreneurs and policy makers found in Northern Colorado which created the ripe opportunity to transform the region into one of the main hubs of activity in the United States. The development of a framework for the creation of regional hubs of entrepreneurial activity around renewable energy will contribute to policy makers, entrepreneurs, chambers of commerce, and renewable energy associations who would like to establish a hub of activity in their region.

Physics

P-15 *Feasibility Study of Edifical Fuel Cell Applications at Andrews University*

Lauber de Souza Martins¹, Daniel Marsh², Elise Watzko³, ¹Assistant Professor of Physics, ²Student, Department of Engineering and Computer Science, ³Universidade Federal de Santa Catarina

When evaluating energy systems, fuel cells have many favorable characteristics. A few of these characteristics include: next-to-zero pollutants, reliability, fuel flexibility, dual energy production (both electricity and heat), and high efficiencies when implementing Combined Heat and Power (CHP). Because of these advantageous characteristics, a study has been initiated to evaluate the feasibility of stationary fuel cell applications for facilities at Andrews University. The objective of this study is to, first, identify successful cases of fuel cells systems with CHP that have been implemented around the world. The second objective is to verify the economic viability of the installation of fuel cell systems for co-generation in stationary applications. The cost analysis will consider government incentive programs that subsidize environmentally beneficial projects.

Mathematics

P-16 *Mathematical Modeling of ECL Reactions on the SPE*

Hyun J. Kwon¹, Daniel Marsh², Jaymes Carson², ¹Professor of Engineering, ²Student, Department of Engineering and Computer Science

A recent NSF grant has been awarded to develop an electrochemiluminescence (ECL) based biosensor platform utilizing mobile technologies and screen-printed electrodes. Our goal is to advance the traditional ECL immunosensor instrumentation into a portable and inexpensive device. 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. Significant progress has been made in developing electronic interface and methods using reagent $[\text{Ru}(\text{bpy})_3]^{2+}$ with coreactants. In this paper, we are focusing on developing mathematical modeling and design of the methods through the finite element analysis. The mathematical model describing the reaction on the electrode and diffusion of analytes and electrolytes were developed and numerically solved in the realistic geometry. Numerical simulation was performed to understand and verify the underlying mechanisms, determine kinetic parameters, and aid in the biosensor design application.

P-17 *Region of Smooth Functions for Positive Solutions to an Elliptic Biological Model*

Joon Hyuk Kang, Professor of Mathematics

The question concerns the existence of positive coexistence states when all growth rates of two species of animals residing with cooperation in the same environment are nonlinear and combined.

P-18 *Involute-evolute of Rectifying Curves in R^3*

Yun Oh, Associate Professor of Mathematics

The idea of rectifying curves in R^3 was introduced by B. Y. Chen in 2003 and many characterizations results have been found with applications in kinematics and mechanics. The idea has been generalized to the arbitrary dimension and it is now called the rectifying submanifold. In this project, we are going to investigate the involute and evolute of rectifying curves in R^3 .

P-19 *Higher Order Linking Up to Shake Concordance*

Anthony Bosman, Assistant Professor of Mathematics

A link is an embedding of some number of circles into three dimensional space that may be knotted or linked together. They have been well-studied for their deep connections to the study of 3- and 4-manifolds as well as their applications to many fields, including the linking that occurs in DNA. Here, we explore a number of equivalence relations on the set of links--isotopy, concordance, and shake concordance--and show how Milnor's μ invariants, a measure of higher order linking, are at least partially preserved under each of these equivalences. This work calls for further study to see what other properties of links are preserved under shake concordance.

Chemistry

P-20 *The Stabilization of Aqueous Ascorbic Acid Solutions using PAMAM Dendrimers*

Hyelin You¹, David Nowack², Ryan T. Hayes³, ¹Honors Biochemistry Student, ²Professor of Biochemistry, Chemistry and Biochemistry, ³Professor of Chemistry, Chemistry and Biochemistry

Ascorbic acid, also known as vitamin C, is an effective antioxidant and an essential human enzymatic cofactor. However, it is unstable when isolated in aqueous solutions and readily degrades upon exposure to air and ultraviolet light. PAMAM (polyamidoamine) dendrimers were evaluated to stabilize dilute aqueous solutions of ascorbic acid. UV-Vis absorbance spectroscopy was used to measure the degradation and stabilization over four hours with various dendrimers and varying pH values. Our data shows that PAMAM dendrimers can significantly decrease the rate of degradation, especially near physiological pH. These results demonstrate dendrimers as a technology for stabilizing reactive organic molecules.

P-21 *Investigation of Mutagenic Compounds from Burnt Plant Based Amino Acids*
Ryan T. Hayes¹, Brian YY Wong², Victoria Kim³, Rayford Alva³, Irene Hwang³, ¹Professor of Chemistry, ²Professor of Biology, ³Students

Investigation of cancer-inducing molecules in cooked foods has led to the discovery of mutagenic heterocyclic amines (HCAs) in meat. The amino acids creatin(in)e and phenylalanine form the precursors for these HCAs. Recent research has found similar mutagenic HCAs produced from plant-based proteins when arginine, rather than creatin(in)e, is substituted in high temperature reactions (simulated cooking) with phenylalanine. Our research focuses on developing methods to isolate individual candidates that are then screened for mutagenicity via the Ames test. HPLC, Mass spectroscopy, and NMR methods are also being developed to identify the molecular structure of these lead mutagenic arginine-based HCAs.

Biology

P-22 *Screening of Hybrid Arylidene Heterocycles as Potential Anticancer Agents*
Jemma McLeish¹, Denise Smith², Desmond Murray³, ¹Graduate Student (graduated), Biology, ²Professor of Biology, ³Professor of Chemistry

This interdisciplinary chemistry-biology study was focused on two aspects: (1) the synthesis of hybrid arylidene heterocyclic compounds containing a variety of functional groups including boronic acids; and, (2) the analysis of their potential anticancer activity on breast cancer cells. These hybrid organic compounds were designed based on the literature reports about the independent pharmacological activity of rhodanine and related heterocycles, and boronic acids. The synthesis of the arylidene heterocyclic compounds containing 2-sulfanylidene-1, 3-thiazolidin-4-one (rhodanine) and related compounds with varying functional groups, was achieved via the Knoevenagel condensation reaction. The viability of the AU565 breast cancer cells was determined after the cells were treated with eleven test compounds by using the CellTiter-Blue® cell viability assay. The synthesized arylidene heterocycles used in this study have shown both a decrease and an increase in cell viability. The results indicate that the ortho-substituted groups with rhodanine appeared to be more effective in producing anticancer activity.

P-23 *Carboxypeptidase O Is Able to Cleave both Acidic and Polar Amino Acids from Substrate Proteins within the Early Secretory Pathway*
Peter J. Lyons¹, Linnea C. Burke², Hazel O. Ezeribe³, Anna Y. Kwon³, and Donnel Dockery³, ¹Associate Professor, Biology, ²Student, Biology, ³Student (graduated), Biology

Carboxypeptidase O (CPO) is a member of the M₁₄ family of metallo-carboxypeptidases with a preference for the cleavage of C-terminal acidic amino acids. CPO is largely expressed in the small intestine, although it has been detected in other tissues such as the brain and ovaries. CPO does not contain a prodomain, nor is it strongly regulated by pH, and hence appears to exist as a constitutively active enzyme. The goal of this study was to investigate the intracellular distribution and activity of CPO in order to predict physiological substrates and hence function. The intracellular distribution of CPO, expressed in MDCK cells, was analyzed by immunofluorescence microscopy. CPO was detected on the endoplasmic reticulum in a punctate, circular, or reticular pattern that was poorly associated with lipid raft markers, although modulated by cholesterol. Cholesterol also modified the enzymatic activity of CPO in vitro; no effect was observed in vivo. The ability of CPO to cleave C-terminal amino acids within the early secretory pathway was examined using Gaussia luciferase as a substrate, C-terminally tagged with variants of an ER retention signal. These data show that CPO functions in the ER or Golgi to remove C-terminal glutamates and aspartates, as well as a number of polar amino acids. Following bioinformatics analysis to determine candidate substrates, Torsin 1A, an ER protein known for its role in early-onset torsion dystonia, was confirmed as a substrate of CPO.

P-24 *Elevated Soil Sand Content Enhances the Suppressive Effect of Mustard Seed Meal on Velvetleaf Growth*
Robert Zdor¹, Warit Chirachevin², ¹Professor of Biology, ²Honors Student, Biology

The use of mustard seed meal (MSM) as a biofumigant in managing weeds in agricultural settings has been well documented. However it has been suggested that soil types may differ in their ability to foster the deleterious effects of the meal on undesirable plants. Work with MSM in altering velvetleaf (*Abutilon theophrasti*) seedling soil growth has shown that certain soils were better suited for weed suppression than other soils. The most effective soils had elevated levels of sand in comparison to less effective soils. The hypothesis that soil sand content influences the effect of MSM on velvetleaf growth was tested by adding sand in varying amounts (final soil content: 29-70%) to a silt loam soil where velvetleaf seedlings were grown short-term. The resulting pattern of growth was consistent with the hypothesis that increased sand levels correlated with decreased weed growth. Weed seed germination was reduced at the highest sand levels. Possible mechanisms of the effect of sand on MSM effectiveness will be discussed.

P-25 *Experiments on the Effect of UV Reflectance on Egg Predation by Gulls*

James L. Hayward¹, Shandelle M. Henson², Athena T. Mitchell³, Isabelle Hwang³, ¹Professor Emeritus of Biology, ²Professor of Mathematics and Ecology, ³Department of Biology

Conspecific egg predation (egg cannibalism) is common in gull colonies. Studies by our Seabird Ecology Team demonstrated that the rate of egg cannibalism by Glaucous-winged Gulls increases when food supplies are scarce, such as during El Niño-Southern Oscillation (ENSO) events. Gull retinas are sensitive to UV light reflectance. We hypothesized that UV light reflectance influences the selection of eggs by gulls for predation. We performed four experiments, each of which involved placing 50 white chicken eggs in randomly-placed artificial nests in the gull colony. Half the eggs were coated with a UV-blocking agent and the other half were coated with a control substance that did not block UV reflectance. The eggs were checked at 2-hour intervals throughout the day. Poisson regression showed that UV-blocked eggs were taken earlier than control eggs, although this effect disappeared on days with rain. Given that most gull eggs reflect little UV light, we concluded that gulls selectively preyed on chicken eggs that reflected light most like eggs of their own species, and that UV light reflectance plays a role in egg predation by gulls.

P-26 *Effect of Male-exposure in Female's Phonotactic Response in Cricket Acheta Domesticus*

Benjamin Navia¹, Chelsea Kent², ¹Associate Professor of Biology, ²Undergraduate Student, Biology

Syllable period-selective phonotaxis in female cricket *Acheta domesticus* as well as the corresponding response of neural elements (neurons that influence phonotaxis) have been the focus of multiple studies. These have reported individual variability in the responses. However, clear differences in responses based on age are typical for these females. The described behavioral and neuronal responses correlated, and ranged from selective to unselective. Young females were more likely to be selective. All of these studies used females raised in isolation. The current project investigates the possible influence in the phonotactic and neuronal responses of male-exposed females of different ages. It was proposed the presence of males would reduce phonotaxis by females to model calls. Preliminary results suggest there does not seem to be an age correlation in selective-phonotaxis exhibited by these females. Regardless of age, male-exposed females do not seem to discriminate between an attractive and unattractive model call. Additionally, intensity of the call may also affect syllable-period selective phonotaxis in these females. The possible effects of male exposure in the response of prothoracic auditory interneurons L3 are unknown. When presented with attractive calls only, L3s in young virgin females exhibit decrement (reduction in the number of action potentials to consecutive sound pulses within a chirp; and thus is syllable-period selective). L3s in old virgin females exhibit lower levels of decrement in their responses. Preliminary results suggest that regardless of age, L3s of male-exposed females show little decrement in response to auditory stimuli, irrespective of syllable period. Implications of results are discussed.

P-27 *Genetic Diversity of the Eastern Massasauga rattlesnake (Sistrurus catenatus) in Berrien and Van Buren Counties, Southwest Michigan*

Roshelle Hall¹, Daniel Gonzalez-Socoloske², Peter Lyons³, ¹Graduate Student, Biology, ²Assistant Professor of Biology, ³Associate Professor of Biology

The Eastern Massasauga rattlesnake (*Sistrurus catenatus*; EMR) is a small robust pit viper currently found in nine states and the province of Ontario, Canada. EMR wetland habitats have experienced significant destruction and fragmentation by humans and as a result the current distribution of the EMR is a fraction of its historic distribution. For this reason, the EMR has been federally listed as threatened. A recent analysis of the mitochondrial NADH dehydrogenase (ND2) gene from 179 individuals from 34 unique locations throughout the EMR range found 18 unique haplotypes clustering into three groups corresponding to the following geographic regions: western cluster in Iowa, Wisconsin and Illinois; central cluster in Indiana, southern and central Michigan, and Ohio; and eastern cluster in Pennsylvania, New York, Ontario and northern Michigan. The exact boundary between the western and central clusters is not known due to the lack of samples from Berrien and Van Buren Counties in southwest Michigan. The objective of our study was to determine the genetic diversity of EMRs in Berrien & Van Buren County, Michigan adding clarity to the boundary. A total of 11 EMRs were captured from three locations during three field seasons (2015-2017). Blood samples were collected from the caudal vein and DNA extracted. The mitochondrial ND2 gene was amplified by polymerase chain reaction (PCR) and sequenced using the Sanger dideoxy method. Results indicate that all three EMR haplotype clusters are represented within Berrien and Van Buren Counties, including a new undescribed transitional haplotype between the central and western clusters.

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Upcoming Research Events

Fall Honors Thesis Symposium

November 16, 2016, Buller Hall, <https://www.andrews.edu/services/honors/>

Medical Laboratory Science Research Symposium

November 16, 2017, Halenz Hall Amphitheater 107

Seminary Scholarship Symposium

February 6, 8-9, 2018, Seminary, <http://digitalcommons.andrews.edu/sss/>

Honors Scholars and Undergraduate Research Poster Symposium

March 2, 2018, Buller Hall, <http://digitalcommons.andrews.edu/honors-undergraduate-poster-symposium/>

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, Bell Hall, Campus Center, Buller Hall, <http://digitalcommons.andrews.edu/autlc/>

Summit on Social Consciousness

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

Honor Thesis Symposium

April 30, 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 17-19, 2018, Buller Hall, <http://ahsra.adventist.org/>