



UROP
Undergraduate Research
Opportunities Program

UNDERGRADUATE RESEARCH AND CREATIVE PROJECTS

2019 CONFERENCE



- The WSU Academy of Scholars was founded in 1979 to promote and recognize sustained excellence in scholarship and creative achievement. The academy provides support to promising young scholars and periodically hosts special programming for the campus community.

Election to the Academy of Scholars is the highest recognition that may be bestowed upon a Wayne State University faculty member by his or her colleagues. Membership in the academy is for life.

The Undergraduate Research Opportunities Program (UROP) would like to thank the following members of the Academy of Scholars for their participation as judges:

Dr. Paula Dore-Duffy

Professor, Neurology

Dr. Donald Haase

Senior Associate Dean, College of Liberal Arts and Sciences

Dr. Anjaneyulu Kowluru

Distinguished Professor, Pharmaceutical Sciences

Dr. Renu Kowluru

Professor, Anatomy and Cell Biology

Dr. Arthur Marotti

Professor Emeritus, English

Dr. Yaddanapudi Ravindranat

Professor, Pediatrics

Dr. Le Yi Wang

Professor, Electrical & Computer Engineering

Dr. Gang George Yin

Professor, Mathematics



- **Sandra M. Gonzales** is an Associate Professor of Bilingual/Bicultural Education in the Division of Teacher Education at Wayne State University. She received her doctorate in International Educational Development from Columbia University, Teachers College. Her research interests include: Latina/o identity and belonging; school reform efforts; culturally and linguistically responsive teaching and learning practices; and, the revitalization of elder and abuelita epistemologies, such as testimonio, stories and storytelling, centering on Detroit's Mexican and Indigenous Mexican community. She is a Co-Principal Investigator (P.I.) in partnership with the Daman J. Keith Center for Civil Rights, investigating school policing trends across Southeastern Michigan. She is also a Co-P.I. to the Army Education Outreach Program, a Department of Defense grant which aims to increase access to STEM programming for underrepresented groups. And, she is the P.I. of the College of Education Upward Bound program, a pre-college TRiO program funded by the U.S. Department of Education. She also coordinates the Native Development Network and Learning Community, a student success initiative for Native American students and allies at Wayne State University. She sits on the Michigan Department of Education's Advisory Council for English Learners, the Detroit Public School Community District's Bilingual Parent Advisory Committee and the Michigan Native American College Cooperative. A list of her publications can be found on Google Scholar and Academia.edu.

■ **Wednesday March 27, 2019, Student Center Building**

- 8:00 a.m. **Registration** — *South entrance*
- 9:00 a.m. **Poster Session**
Life Sciences - *room 20*
Engineering and Physical Sciences - *room 25*
Behavioral and Social Science and Arts and
Humanities - *room 10*
- 10:30 a.m. **Break**
- 10:45 a.m. **Oral Session** — *Hilberry A, B, C, D*
See page 5
- 11:45 a.m. **Break**
- 12:00 p.m. **Luncheon and Awards Ceremony** — *Ballroom C*

Greeting and Introduction of Speakers
Matthew Orr
Program Coordinator for Student Success

Speaker
Monica Brockmeyer
Senior Associate Provost for Student Success

Keynote Speaker
Sandra M. Gonzales, Ed.D.

Awards
Introduction: **Matthew Orr**
Presentation: **Veronica Bielat**, Student Success
Librarian and Instruction Services Coordinator
Presentation: **WSU Academy of Scholars**

Closing Statement
Matthew Orr

■ Hilberry A | Moderator - Christine Chow

John Karns - *Designing Hydroximate Antenna Ligands for Lanthanide-Based Luminescence*

MacKenzie Olbrys - *Modifying Peptide with Cell-Penetrating Oncocin Sequence for Cellular Delivery*

Bohdan Matsko - *Mechanically Inducing Invasion by Altering Integrin beta-3 Expression in Cancer Cells*

■ Hilberry B | Moderator - Stefanie Baier

Ashi Arora - *Menstruation, Reproductive Health, and Housing: Reports from Women Living in a Transitional Homeless Shelter*

Rachel Bruinsma - *Effects of Specific Pain-Related Emotional Disclosure and Partner Responsiveness in Chronic Pain Couples*

Chelsea Roberge - *TREATment to Entice Maternal Care: A Translational Rat Model Resembling Skin-to-Skin Contact*

■ Hilberry C | Moderator - Andrew Newman

Revelle Gappy - *Implementation of an Outpatient Pharmacy Transitional Care Clinic (Tcc): The Pharmd/Ed Collaboration to Improve Hypertension and Access to Primary Care for Urban Underserved Patients*

Hannon Hylkema - *Urbanization Processes: Sociocultural Influence and Dynamic Residential Infrastructure Outside Accra, Ghana*

Nelson Stockdill Garay - *So we had to Unite: The Testimonio of Pilar Garay Marroquin*

■ Hilberry D | Moderator - Francesca Pernice

Taimoor Khan - *Integrated Healthcare in Psychiatric Clubhouses*

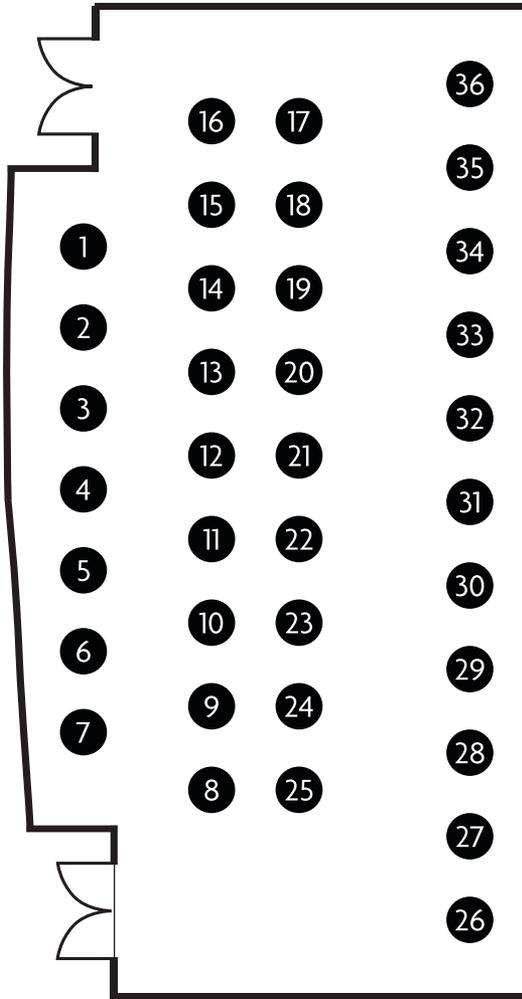
Kaitlin Martinelli - *Bernardo Grosser: Jewish Rescuer in Fascist Italy*

William Weis - *Carolingian Political Culture in the Mirror of Carolingian Historical Manuscripts in Vienna*

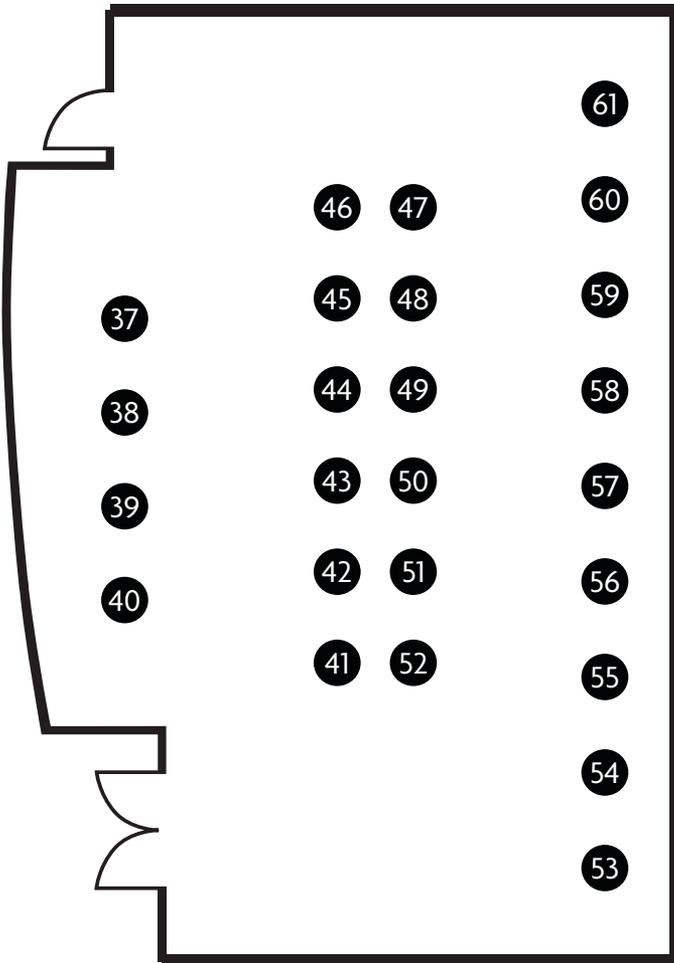
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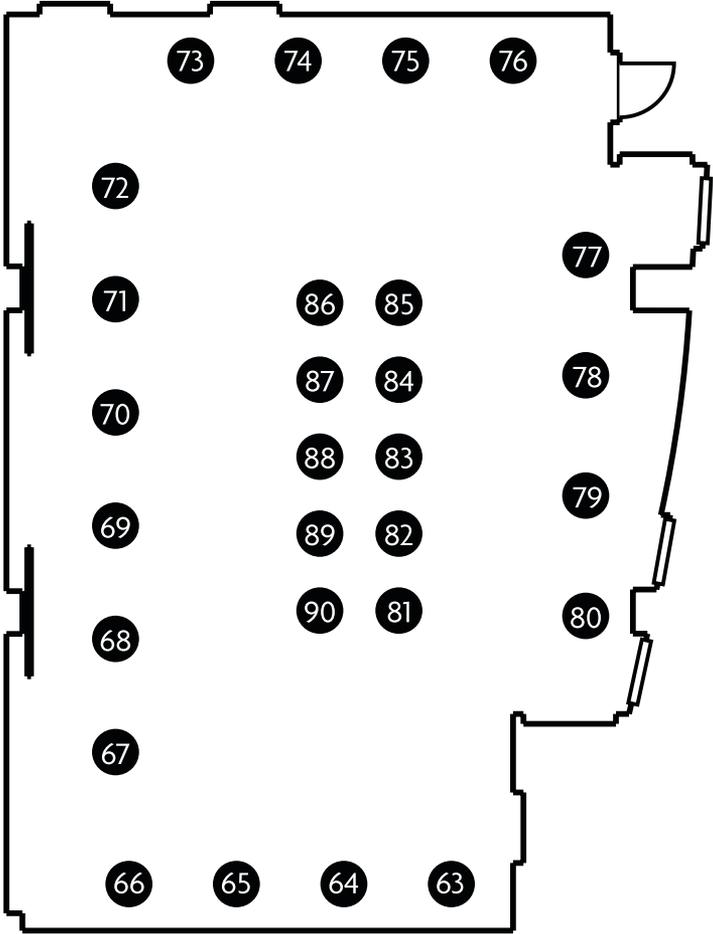
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Student Center Building room 20
Life Sciences



Student Center Building room 25
Engineering and Physical Sciences



Student Center Building room 10
Behavioral and Social Sciences and Arts and Humanities

■ Zainab Ahmed | Faculty Mentor - Mohammad Mehrmohammadi

“Photoacoustic Imaging for Safe and Point-of-Care Bone Dosimetry in (preterm) Neonates”

During the third trimester of pregnancy, large amounts of minerals are transmitted to the baby. Premature infants often do not receive adequate amounts of calcium and phosphorus, both essential for developing strong bones. Furthermore, x-ray radiation is unsafe for infants. This research project focused on the proof of concept of developing a safe, low-cost device for evaluating the bone status in preterm infants. The data measured the transformation in bone density of bones demineralized in acetic acid throughout multiple weeks. This was possible by collecting sound waves received from laser excitation on the bone. Overall, in theory, this process could revolutionize preterm diagnosis.

■ Samia Alkatie | Faculty Mentor - Leela Arava

“Structured Liquid Crystalline based Electrolyte for Long Lived Batteries”

Lithium ion batteries are a favored form of energy in everyday uses, such as in portable devices like cellphones and laptops. While these batteries have a high energy density, they can experience safety hazards due to cell failure and short circuiting caused from dendrite formation. This formation discourages the electrolyte to proceed with its necessary electrochemical reactions which allow the battery to run properly. Here, Ionic Liquid Crystals are used as the electrolyte to suppress dendrite formation by using their anisotropic properties to differ the ordering pattern of dendrite growth allowing for a slower and more controlled formation.

■ Afrah Arif | Faculty Mentor - Nardhy Gomez- Lopez

“Phenoptics of Decidual Macrophages in Acute Atherosclerosis”

Acute atherosclerosis is a uteroplacental lesion associated with multiple pregnancy complications. It is characterized by an accumulation of macrophages in the uterine spiral artery walls, but the phenotypic characteristics of these infiltrating macrophages are poorly understood. In this study, we characterized and localized the decidual macrophages present in acute atherosclerosis. We found pro-inflammatory M1-like macrophages, and inflammatory MOX and artheroprotective Mhem macrophage subsets, using multi-immunofluorescence staining technology and phenoptics. M1-like macrophages were also present in transformed and non-transformed vessels. This indicates that acute atherosclerosis has a decidua-wide effect, which suggests that there is an intravascular origin for decidual macrophages in acute atherosclerosis. Our findings helped unveil the first molecular characterization of the phenotype of decidual macrophages in acute atherosclerosis.

■ **Ashi Arora** | Faculty Mentor - Heather Dillaway

“Menstruation, Reproductive Health, and Housing: Reports from Women Living in a Transitional Homeless Shelter”

This study focuses on the menstrual and other reproductive health experiences of women who lack access to stable housing - a national and global issue. The vast majority of homeless people report having at least one unmet health need, higher rates of poor health status, mental illness, poor birth outcomes, and maternal mortality, and lack access to preventative and reproductive health care including prenatal care, mammograms, and pap tests. The purpose of this qualitative study is to highlight the everyday menstrual and reproductive health experiences of one group of impoverished women in one midwestern city, in order to help shelters better understand their residents' needs and develop interventions that might sustainably serve homeless women.

■ **Neha Bhagirath** | Faculty Mentor - Leela Arava

“Ionic Liquid Crystalline Electrolytes for Li-Ion Batteries: An Effect of Anisotropic Mass Transport”

Batteries are electrochemical cells with basic components, such as electrodes that create a cell potential (voltage) and electrolytes, which allow transport of ions between electrolytes. For future efficient battery performance, optimization and design of different battery components is crucial for a longer and more stable life cycle. One issue that needs to be addressed is the instability of Li metal in traditional organic liquid or polymer gel electrolyte systems, due to the formation of Li dendrites at the electrode/electrolyte interface which causes reduced battery life due to problems such as short circuiting. This project explores the effects of anisotropic properties of ionic liquid crystals to be used as electrolyte in Li metal batteries, and how they affect performance of Li ion batteries and dendrite growth.

■ **Obaidah Bitar** | Faculty Mentor - Shooshan Danagoulian

“Cost-Effectiveness Analysis of Air Pollution Mitigation in Southwest Detroit”

This research project intends to assess the air pollution health impacts of residents residing within specific geographical locations in Detroit, particularly the Southwest Detroit area. With this micro-level analysis, we will assess regional air quality disparities by obtaining data on air pollutant measurement recordings from monitoring stations located within Southwest Detroit and other areas in Detroit. We will also analyze death certificate records to identify potential differences in death rates from cardiopulmonary illnesses that may be attributable to air pollution for individuals residing in Southwest Detroit and the rest of Detroit. This descriptive analysis will provide a quantitative comparison to assess the burden of air pollution on Southwest Detroit and also identify a correlation between health outcomes and air pollutant measurement recordings.

■ **Rachel Bruinsma** | Faculty Mentor - Annmarie Cano

“Effects of Specific Pain-Related Emotional Disclosure and Partner Responsiveness in Chronic Pain Couples”

Chronic pain is a serious issue impacting many individuals. Interpersonal relationships, like romantic partnerships, have been found to impact how individuals experience pain. Situational relationship satisfaction has been found to reduce pain. However, it has not yet been determined what exactly contributes to situational relationship satisfaction. This study examined pain-related emotional disclosures and partner responses in couples in which one individual had chronic pain and the other did not. By examining these emotional disclosures and responses, I hoped to determine what specific forms of disclosures and responses contribute to situational relationship satisfaction, thus reducing pain.

■ **Nicole Burson** | Faculty Mentor - Shane Perrine

“Effects of a Histone Deacetylase Inhibitor on Object Recognition and Anxiety-Like Behaviors in Male and Female Rats”

Class IIa histone deacetylases modulate gene transcription, and inhibitors of these enzymes enhance gene transcription and affect learned behaviors. This research investigated how a class IIa histone deacetylase inhibitor affects anxiety-like behavior and object recognition memory in male and female rats. Our results show that manipulating gene transcription in this way decreases anxiety-like behavior in males and may improve object recognition memory in females. These data confirm reports that class IIa histone deacetylases are involved in memory, suggest a role for them in anxiety like behavior, and show sex-dependent regulation.

■ **Timothy Burton** | Faculty Mentor - Mohammad Mehrmohammadi

“Development of a Combined Ultrasound and Photoacoustic Endoscope for Gynecologic Cancer Imaging Applications”

Methods commonly used to measure early stage gynecological cancer can be expensive or inaccurate for physicians. Due to the possibility of the early stages of this cancer being symptomless, there is a need to develop an inexpensive method to gain structural, functional, and molecular information of the region in order to reveal cancers in the early stages of their development. To attempt to combat this, I have worked on the development of an endoscope that uses ultrasound (US) and photoacoustic (PA) imaging modalities to create a method to effectively image gynecological cancer.

■ **Kristina Curtiss** | Faculty Mentor - Sharon Lean

“Elections, Election Monitors and Venezuela’s Political Crisis”

Political chaos is dominating Venezuela. In “Elections, Election Monitors and Venezuela’s Political Crisis,” we seek to understand what events lead up to this chaos, and if election monitoring may have been able to prevent the current political climate we see today.

■ **Lydia Denman** | Faculty Mentor - Thomas Killion

“Revising Schliemann-Ancient Scholars and their Influence on Archaeological Research and Teaching”

The purpose of this research project is to develop an up-to-date and realistic course module for ANT 3200 “Lost Cities and Ancient Civilizations” for professors who teach this course at Wayne State University. This module will convey how classical texts are used to find archaeological sites in combination with the latest archaeological methods for conducting exploratory research to yield better results and modules for teaching.

■ **Allison Diehl** | Faculty Mentor - Yongli Zhang

“The Fate of Microplastics in the Water Treatment System”

The widespread presence of microplastics in aquatic environments is a pressing challenge for ecological and human health. A number of studies indicate the presence of microplastics throughout the drinking water infrastructure from source to tap. However, no information is available regarding how these microplastics act during water treatment processes. In order to address this critical knowledge gap, the fate of microplastics throughout sedimentation and filtration were evaluated individually.

■ **Amelia Doree** | Faculty Mentor - Andrea Tangari

“Influences of Italian Culture and Structural Issues that Impact Consumer Automotive Decisions”

Influences of Italian Culture and Structural Issues that Impact Consumer Automotive Decisions” based off of observational and secondary research of the Italian car buying market. The infrastructure in Italy, along with the culture, is different than America which results in different ways that the automobile market operates in these different markets. This research explores different factors that guide the Italian consumer in making their automobile buying decisions.

■ **Revelle Gappy** | Faculty Mentor - Brittany Stewart

“Implementation of an Outpatient Pharmacy Transitional Care Clinic (Tcc): The Pharmd/Ed Collaboration to Improve Hypertension and Access to Primary Care for Urban Underserved Patients”

High blood pressure is a major public health concern that affects one in three US adults with only 54% achieving goal blood pressure targets. This disease is more prevalent in African Americans than in non-African Americans and tends to begin earlier and be more severe. Moreover, patients in Detroit face numerous health disparities and barriers to accessing health. Typically, the Emergency Department is used as the primary care resource for blood pressure management. Faculty from Wayne State University from both the Pharmacy and Emergency Medicine departments collaborated on a research project to decrease long term adverse health effects as result of uncontrolled blood pressure. Interventions included drug therapy, lifestyle modifications counseling, and medication adherence discussion. Overall, blood pressure decreased in a clinically significant manner.

■ **Nelson Stockdill Garay** | Faculty Mentor - Barry Lyons

“So we had to Unite: The Testimonio of Pilar Garay Marroquin”

This project is about documenting and retelling the stories of immigrants in the United States. The specific story being featured is that of my grandmother Pilar, who came in the 1980s from El Salvador seeking political asylum in the US. I chose to showcase her history through the use of a website, which contains a series of transcripts from interviews I conducted with her over a period of several months. These interviews are divided into different sections that detail the phases of her journey, from the union work in El Salvador that made her a target to her life in America today. My goal is to provide an honest portrayal of immigrant struggles, and demonstrate how much people like her have to offer our society.

■ **Anna Gretzinger** | Faculty Mentor - Penelope Higgs

“Characterizing proteolysis of a developmental transcriptional regulator in Myxococcus xanthus”

The basis of this research project is focused on understanding how bacteria regulate multicellular behaviors and studies the model organism *Myxococcus xanthus*, which undergoes a multicellular behavior upon nutrient starvation. This specific research project has focused on characterizing the proteolytic pathways that regulate a key transcription factor known as MrpC, which governs multicellular behavior. I have worked with a graduate student to design a screening method that will allow us to identify regions of the MrpC protein structure that are targeted by an unknown protease and allow for the degradation of MrpC.

■ **Jamil Haddad** | Faculty Mentor - Stanislav Groysman

“Bioinspired Heterobimetallics for Carbon Monoxide Oxidation”

Carbon monoxide, is a toxic by-product of gasoline combustion in automobile engines and is removed from the exhaust gas by oxidation to carbon dioxide in catalytic converters. Currently, efficient oxidation of Carbon monoxide uses both precious metal catalysts and high reaction temperatures. In nature, efficient oxidation of Carbon monoxide is carried out under mild conditions by enzymes called carbon monoxide dehydrogenases. Inspired by these systems, our goal in this project is to apply the elaborate design of nature's frame work, to bring these metals together in a synthetic system, in order to carry out this transformation using earth abundant metals under ambient temperatures.

■ **Andrew Hauk** | Faculty Mentor - *Shane Perrine*

“Effect of MDMA on Acute Fear Extinction Learning”

Human research has shown a high success rate in treating post-traumatic stress disorder (PTSD) when psychotherapy is combined with 3,4 methylenedioxyamphetamine (MDMA; “Ecstasy”), which is known for its psychoactive effects and often considered a drug of abuse. Becoming more open to repressed memories, feeling more comfortable in a therapeutic setting, and improving the capability to extinguish fearful memories are all reported effects of MDMA when used with therapy to treat PTSD. This study aimed to understand the behavioral effects of MDMA on extinguishing fearful memories in a rodent model. Our findings show that MDMA does not enhance extinguishing of a fearful memory in normal rodents. Future studies will investigate the role of MDMA in extinguishing fear memories in a rodent model of PTSD.

■ **Autumm Heeter** | Faculty Mentor - *Christine Rabinak*

“Bilateral Symmetry in Skin Conductance Responses: Are Both Sides Equal?”

Pavlovian fear conditioning is widely used to understand fear-related learning and the pathogenesis of anxiety and posttraumatic stress disorder. Common outcome measures of conditioned fear responding include physiological recordings, i.e. skin conductance responses (SCRs), which are typically recorded from the non-dominant hand (commonly left). However, previous research using this methodology shows that an overwhelming amount of participants are excluded for being “non-responders”. Additionally, it is unknown if these participants would be classified as “responders” if SCRs were instead recorded from the right hand. This could greatly impact the generalizability of results, and study power. To address this, the present research will report on symmetry of SCRs (recording from both hands) as well as demographic factors (i.e., age, race/ethnicity, gender, and trauma exposure).

■ **Aneesh Hehr** | Faculty Mentor - *Christine Rabinak*

“Effects of Duration and Midpoint of Sleep on Cortico-Limbic Circuitry in Children and Adolescents”

The goal of this research project was to determine the effects of sleep duration and timing of sleep on brain circuitry involved in regulating emotions in children. National surveys show that as children grow older, their sleep duration decreases, and they sleep at later times. Changes in sleep duration and timing have been associated with altered emotion-related neurocircuitry. Disruptions in emotion regulation circuitry have been linked to the development of psychiatric disorders (i.e., anxiety and depression). Furthermore, the transition into adolescence is marked by an increased onset of emotion-related problems. Therefore, we used functional magnetic resonance imaging, a self-reported sleep journal, and self-reported questionnaires to test the hypothesis that variations in duration and sleep timing would alter neural circuitry and emotional health measures in a sample consisting of children and adolescents.

■ **Hannon Hylkema** | Faculty Mentor - Andrew Newman

“Urbanization Processes: Sociocultural Influence and Dynamic Residential Infrastructure Outside Accra, Ghana”

While living and studying at a university several miles north of Accra I became acquainted with residents in a neighboring town who agreed to share information with me about their lives. I was initially interested in the relationship shared between residents and their homes. After spending extended periods of time with residents I gathered evidence about the aforementioned relationship but also observed spoken themes about the town's economy and public infrastructure, the main roadway in particular. I decided to shift the focus of my project to examine the roadway as a material body which shapes and is shaped by residents. In my presentation I discuss the road in relation to the sociocultural and economic contexts of residents, providing suggestions based from resident-supplied information.

■ **Sarosh Irani** | Faculty Mentor - Robin Boyle

“An Equitable Approach to Bus Shelter Placement in Detroit”

Bus shelters are valuable assets to transit agencies as they provide riders with protection from the elements, improve public perception of transit, and increase rider satisfaction by reducing perceived wait times. In Detroit, bus shelters are distributed in an inefficient manner. Using data on current bus shelters, the number of boardings at individual bus stops, and route schedules, a person-minute model is developed to optimize distribution of bus shelters throughout the city of Detroit. It would improve the efficiency of the shelter system by 77% simply by redistributing current shelters, and increase the number of riders covered by 817%.

■ **Rebecca John** | Faculty Mentor - Mohammad Mehrmohammadi

“Photoacoustic Imaging for Safe and Point-of-Care Bone Dosimetry in (preterm) Neonates”

During the third trimester of pregnancy, large amounts of minerals are transmitted to the baby. Premature infants often do not receive adequate amounts of calcium and phosphorus, both essential for developing strong bones. Furthermore, x-ray radiation is unsafe for infants. This research project focused on the proof of concept of developing a safe, low-cost device for evaluating the bone status in preterm infants. The data measured the transformation in bone density of bones demineralized in acetic acid throughout multiple weeks. This was possible by collecting sound waves received from laser excitation on the bone. Overall, in theory, this process could revolutionize preterm diagnosis.

■ **Marsalis Jolley** | Faculty Mentor - Thomas Pedroni

“Youth Perspective on Urban Discipline Policy”

The purpose of research was to assess the opinion of urban public high school students regarding punishment and establishment of community within school settings as it relates to thoughts on functionality. A 40-question Likert Scale was administered to 100 public high school students; data was collected from 64 samples. Students were participants from Wayne State University's APEX and Math Corps programs. Five dimensions were assessed on the survey; dimensions were as follows: (1) teacher administration role in deviant behavior, (2) positive opinion while attending school setting, (3) Management of problematic behavior in schools, (4) Community establishment with school settings, (5) the experience and/or witnessing of deviant behavior while in school settings. Responses from the questionnaire were assigned a numeric value ranging from -2 to 2.

■ **John Karns** | Faculty Mentor - Matthew Allen

“Designing Hydroximate Antenna Ligands for Lanthanide-Based Luminescence”

Lanthanide ions are used in a variety of materials ranging from cell phones, to uses as imaging agents in medicine. These ions are attractive as optical imaging agents because of their thin and characteristic emission bands as well as their long lifetimes. These factors allow for the obvious discrimination between the lanthanide signal and background fluorescence. However, lanthanide ions by themselves have low absorption due to their shielded f-orbital valence electrons which undergo a forbidden transition. Therefore, the use of chelating “antenna” ligands are rather common to excite these metal ions and create the desired luminescence. I am focused on harnessing the optical imaging capability of lanthanide ion complexes; specifically looking at hydroximate antenna ligands and their remarkable ability to excite these lanthanide ions.

■ **Taimoor Khan** | Faculty Mentor - Francesca Pernice

“Integrated Healthcare in Psychiatric Clubhouses”

Dr. Pernice and I investigated the healthcare methods and practices that were implemented in Clubhouses across metro Detroit. These methods included work-ordered days, cooperative decision making, assistance in community-based education, and assistance in securing safe, affordable housing.

■ **Steven Kopeck** | *Faculty Mentor - Shirley Papuga*

“Ecohydrology of Green Infrastructure Retrofitting for Stormwater Management: A Case Study in Detroit, MI”

Stormwater management is an increasingly complex and pressing issue in urban environments, especially in cities, such as Detroit, with vast, aging, and outdated stormwater infrastructure that needs to be updated, but cannot, due to economic constraints. Green infrastructure has been identified as a cost-effective, environmentally friendly, and socially pleasing measure to reduce stormwater management risks. However, once this green infrastructure is put into place, they are left to their own devices, and not much is known about their impact on water flow patterns and how they react and sustain themselves in their environment. Our team's research focuses on a bioswale constructed inside Parking Lot 12 to determine what green infrastructure needs to be developed and engineered to thrive in a post industrial urban environment.

■ **Ashton Lewandowski** | *Faculty Mentor - Yongli Zhang*

“Optimal Exposure Conditions for Microplastic Nile Red Dye Staining”

Microplastics can be viewed when using Nile Red Dye under a certain type of light. Using a microscope, the number of plastics found in water samples can be determined. This project focuses on finding the best conditions for viewing plastics using Nile Red Dye and this microscope.

■ **Dayzsa Lewis** | *Faculty Mentor - Matthew Allen*

“Stability of Divalent Metals with Tertiary Amine Complexes”

The purpose of this experiment is to determine three-dimensional structures of the tertiary amine complexes of lanthanide metals and analyze the magnetic and crystallography of the metals in the +2-oxidation state. The plan is to make a tertiary amine complex with different ligands and reduce them to chelate low valent metals of the lanthanide series. We are working on the synthesis of two new ligands based on a poly-tertiary amine framework to be used with strongly reducing metals. The syntheses were performed in two or three steps starting with commercially available chemicals. A chlorobenzamide derivative is reacted with 1,4,7,10-tetraazacyclododecane to yield a poly amido framework. The product was then reduced to the desired tertiary amine framework with lithium aluminum hydride. Metal complexes with these ligands will be made with unconventional oxidation states and investigated by magnetic measurements and single crystal x-ray crystallography.

■ **Kaitlin Martinelli** | Faculty Mentor - Aaron Retish

“Bernardo Grosser: Jewish Rescuer in Fascist Italy”

This research project is an account of my journey to Washington DC and New York City to study Jewish resistance of Nazism and refugee aid groups in Italy during World War Two. I use the story of Bernardo Grosser, a Jewish refugee who worked for an aid group to save 20,000 Jews, as a case study to understand the role of Italy in the larger picture of the Holocaust.

■ **Bohdan Matsko** | Faculty Mentor - Karen Beningo

“Mechanically Inducing Invasion by Altering Integrin beta-3 Expression in Cancer Cells”

In metastasis, the cancer cells originating from the primary tumor are able to travel in the circulatory system to other tissues in the body to form new tumors elsewhere. Cell invasion plays a crucial step in this process and is influenced by a specific mechanical stimulus, known as the transient tugging, which exerts its force on the extracellular matrix fibers through integrin beta-3. While this protein has been observed to be downregulated in highly invasive fibrosarcoma cells in response to stimulation, this same effect is not observed in other cell types such as the mouse breast cancer cell line series. This study looks into the importance of the integrin beta-3 on mechanically inducing cell invasion.

■ **Stephanie Morgan** | Faculty Mentor - Christine Rabinak

“Preliminary Study on Genetic Variation in The Pacapergic System and Limbic-Based Functional Organization in Youth”

A small change in the DNA sequence of a receptor for PACAP, a neurohormone and neurotransmitter, has been linked to neural and behavioral changes in women, specifically related to PTSD symptoms. This relationship has not been thoroughly looked at in youth, and this project aims to study effects of this genetic variation on neural organization in youth.

■ **Sandra Nasser** | Faculty Mentor - Stanislav Groysman

“Design and Synthesis of Chelating Bis (Alkoxide) for Chromium Catalyzed Synthesis of Carbodiimide”

The project focused on synthesizing new and improved Cr catalyst for catalytic formation of carbodiimides. While the synthesis of the original proposed complex is still being pursued we were successful in developing an alternative complex Chromium complex (9). The preliminary catalytic study of the Cr complex shows reactivity with different aryl and adamantyl azide. We will be screening different azides to understand the reactivity of the chelating complexes in comparison with the complex containing monodentate alkoxides.

■ **Rebecca Neely** | Faculty Mentor - Evan Larson

“Creative Exploration of Additive Processes Through Experimental Inclusion Casting”

The goal of this creative project was to build a body of work with cast art jewelry while exploring techniques in wax modeling and inclusion casting. Various plants, fungi, and corals were used as inspiration for designs, which were modeled in wax using additive processes. Several pieces include wax set stones or multiple metals. Models were cast into bronze, silver, shakudo, and variations of shibuichi through the lost wax method with a vacuum casting machine.

■ **Logan Nguyen** | Faculty Mentor - Michael Rybak

“Evaluation of Meropenem (MEM) in Combination with Colistin (COL) Against Colistin Resistant Extensively Drug Resistant (XRD) Gram-Negative Bacteria”

With extensively drug resistant bacteria becoming more commonplace within the clinical setting, there is the need to develop new treatment approaches. The combination therapy””the use of multiple antibiotics or therapeutics””of both Meropenem and Colistin against extensively drug resistant gram-negative bacteria was investigated in this study.

■ **MacKenzie Olbrys** | Faculty Mentor - Christine Chow

“Modifying Peptide with Cell-Penetrating Oncocin Sequence for Cellular Delivery”

Antibiotic resistant bacteria have become a great threat to people around the world. Many antibiotics used to treat bacterial diseases are no longer effective; therefore, new developments must be made to circumvent this rising issue. This research project focuses on the development and testing of a novel method to kill bacteria with a potential antibacterial peptide modified by a sequence of amino acids known to permeate the protective cell membrane of bacteria.

■ **Megan O’Meara** | Faculty Mentor - Jiemei Wang

“The Role of G Protein Coupled Receptor 39 in Regulation of Endothelial Progenitor Cell Function.”

This research project aims to determine GPR39 and IRE1’s role in regulating endothelial progenitor cell function. EPC dysfunction is found in many cardiovascular risk conditions. Our previous studies have shown that IRE1 is essential to angiogenesis and that GPR39 has been implicated in endothelial function and cell survival. Over the past semester, we have conducted cell functional tests such as migration, proliferation, and network formation to try and better understand their role in EPC function.

■ **Lauren Oppenheiser** | Faculty Mentor - Stanislav Groysman

“Synthesis of Cobalt and Iron Bis(alkoxide) Complexes towards Diazoalkanes and Diazoesters towards Novel Carbene Complexes.”

Transition metal complexes have an important role for many organic reaction transformations. The main metals pursued in this project are iron and cobalt, which are both first-row transition metals that are readily available and environmentally friendly. This project works with low-coordinate complexes (metal centers that have a low number of groups attached) in order to create reactive species. The complexes in this project use diazoalkanes that follow a foundational group transfer mechanism that is explored within this study. These varying reactivities of the metal complexes are the core of this study as we seek to understand the effects of the groups as unique characteristics involved in the reaction mechanism.

■ **Anna-Maria Petriv** | Faculty Mentor - Tracie Baker

“The Occurrence of Microplastics in Drinking Water and the Consequential Impact on Human Health”

Recent public interest on the issue of environmental plastic pollutants has also brought attention to the increasing prevalence of microplastics (<5 mm) in the environment, and as a result contamination of drinking water. Despite intensifying concern regarding the effects of microplastic (MP) toxicity on ecological and human health, few studies are using environmentally relevant concentrations in the investigation of both acute and chronic exposures. With the use of zebrafish (*Danio rerio*), an accepted National Institute of Health model for human health and disease, the WATER Lab studies the dose-response mechanism of MPs along with the possible associated health risks with ingestion.

■ **Diona Podushkina** | Faculty Mentor - Edward M. Golenberg

“Utilizing Multiple Fluor-LAMPs to Spotlight Simultaneous Gene Expressions”

In situ gene expression identification is the best way to detect temporal and spatial differences in gene expression. With current methods, it is difficult to detect genes with low expression patterns due to low signal and multiple intermediate steps which degrade thin sectioned specimens. There are also limited protocols available to detect expression patterns from multiple genes on a single tissue sample. We have developed and tested a novel in situ protocol using Loop-Mediated Isothermal Amplification (LAMP) to overcome these limitations. LAMP greatly amplifies the signal of expressed genes and can use multiple sets of primers and differential fluorescent probes to produce multiplex gene detection.

■ Ali Ramzan | Faculty Mentor - Stephanie Brock

“Assembly of Co₂-xFeP Nanoparticles into Three Dimensional Architectures through Sol-gel Assembly”

In this work, we aim to assemble Co_{0.7}Fe_{1.3}P and CoFeP nanoparticles into three dimensional architectures by using an oxidation-induced sol-gel assembly method. We hypothesize that the interconnected network can impart enhanced and synergistic properties for MR. The synthesis of Co₂-xFeP nanoparticles is carried out following a previously reported method by Brock group with some changes.² Essentially, octadecene and oleylamine are combined in a Schlenk flask and the system is degassed to remove any moisture or oxygen. It is then purged with Argon. After this, CoFe nanoparticles are prepared by injecting a mixture of Co₂(CO)₈ and Fe(CO)₅, dissolved in octadecene, into the system. Trioctylphosphine is then injected and the solution is allowed to age. After the aging process is complete, the nanoparticles are purified.

■ Isabelle Rios-Colon | Faculty Mentor - Annmarie Cano

“The Function of Implicit Bias in Doctoral Admissions Decision-Making Processes”

This study examines how implicit bias impacts first generation college students in the graduate admissions process. The research utilizes an experimental design to test whether instructions given to faculty on application assessments influence departmental faculty decision-making when first generation students apply to doctoral programs.

■ Chelsea Roberge | Faculty Mentor - Susanne Brummelte

“TREATment to Entice Maternal Care: A Translational Rat Model Resembling Skin-to-Skin Contact”

Skin-to-skin contact has shown to decrease responses to pain-induced stress in infants, however, it is unclear how this occurs physiologically. The goal of this project is to determine the effect increased maternal care has on levels of stress-hormones (corticosterone) in male and female rat pups. To explore this relationship, we assessed the correlation between the amount of time a rat spent licking her pups and the pups' blood corticosterone levels using a novel technique to encourage maternal care-covering the pups in Nutella®. The ability to increase maternal care and consequently affect corticosterone levels is an indicator of how this model could effectively translate to studying how skin-to-skin contact works on the body's stress-response mechanism.

■ Jyoti Saha | Faculty Mentor - Andrew Newman

“Cultural Implications of Food Consumption and Subsequent Health in Detroit”

This research study investigates the interplay between food, culture, and health within the changing social dynamic of the city of Detroit. Many of these changes can be attributed to social phenomena such as gentrification, which in turn have affected the ways in which “health” and “healthiness” are now perceived. Detroit's historic food culture, especially in relation to the consumption of traditional soul-food, is at risk of being supplanted by novel cultural ideals. By examining behaviors and attitudes of Detroit residents towards these sociocultural transformations, this study aims to understand how both culture and health play an integral role in the food we eat, and the communities that produce it.

■ **Josue Salas** | Faculty Mentor - Caroline Maun

“Cat’s Cradle: Vonnegut’s Anti-Parable”

I examine the idea of a traditional and nontraditional parable. First, I establish “The Book of Jonah” as a traditional parable, a fictitious short story that emphasizes a moral or religious principle; then I establish Cat’s Cradle as a non-traditional parable, that being a parable with no apparent moral or religious principle. I argue that Vonnegut does not provide the reader with an explicit moral. Instead, Vonnegut encourages the reader in an exercise of self-reflection, wherein they must construct their own moral from the text. I conclude that this is Vonnegut’s process of critiquing the idea of a traditional moral as a passive consumption of ideas and beliefs. The result of this passivity is a failure of moral responsibility. In other words, moral laziness.

■ **Rebecca Schultz** | Faculty Mentor - Alana Conti

“Neuronal Reconstruction and Analysis of Changes in Neuron Structure Following TBI”

Millions of traumatic brain injuries (TBIs) are sustained in the United States annually. Many of these TBIs can cause temporary or permanent brain damage, resulting in learning and memory deficits which may be caused by structural changes in brain cells (neurons). To gain a deeper understanding of the cellular damage caused by TBI, we need to assess neuronal structure more accurately. This project focuses on the development of a more reproducible and reliable method for the assessment of neuron structure using automatic methods of evaluation.

■ **Emily Seirfert** | Faculty Mentor - Shirley Papuga

“Ecohydrology of Green Infrastructure Retrofitting for Stormwater Management: A Case Study in Detroit, MI”

Stormwater management is an increasingly complex and pressing issue in urban environments, especially in cities, such as Detroit, with vast, aging, and outdated stormwater infrastructure that needs to be updated, but cannot, due to economic constraints. Green infrastructure has been identified as a cost-effective, environmentally friendly, and socially pleasing measure to reduce stormwater management risks. However, once this green infrastructure is put into place, they are left to their own devices, and not much is known about their impact on water flow patterns and how they react and sustain themselves in their environment. Our team’s research focuses on a bioswale constructed inside Parking Lot 12 to determine what green infrastructure needs to be developed and engineered to thrive in a post industrial urban environment.

■ **Noor Suleiman** | Faculty Mentor - Kang Chen

“Understanding and Harnessing the Function of B Lymphocytes to Prevent Preterm Birth”

Pre-term birth occurs following pre-term labor and remains an intractable cause of infant death. Despite its significance in infant mortality, it is not properly understood. This research project seeks to understand and harness the function of B lymphocytes by investigating the mechanism by which defects in B cell biology promote PTL as well as the related protein PIBF-1 and its protective function against PTL.

■ **Bilal Syed** | Faculty Mentor - Timothy Dittrich

“Development of Sorption Technology for Extracting Rare Earth Elements from Coal Fly Ash”

Rare Earth Elements (REEs) are elements with many high tech uses (e.g., smartphones, electric cars, advanced weaponry) and have been identified by the DOE to be critical to the US economy. Currently, China supplies over 85% of REEs resulting in an undiversified market and susceptibility to supply shock and economic insecurity. To address this susceptibility, this research aims to develop an economic and environmentally-friendly method of extracting REEs from nascent, plentiful sources such as coal and coal by-products like fly ash.

■ **Siddharth Tirumala** | Faculty Mentor - Benjamin Kidder

“Reprogramming of Human Fibroblasts to an Adult Stem Cell Fate”

Multipotent stem cells are stem cells able to differentiate into many types of cells in the same cell line. In mammals, the precursors of the specialized cells of the placenta are multipotent stem cells called trophoblast stem (TS) cells, and they mediate the physiological exchange between the fetus and the mother during pregnancy. Recent research has showed that differentiated cells can be reprogrammed into induced trophoblast stem (iTS) cells. However, iTS cells have never been derived in humans. The goal of this project is to generate iTS cells by overexpressing trophoblast-specific transcription factors in adult human fibroblasts. This would exhibit a reprogramming mechanism that has, thus far, only been demonstrated in mice.

■ **Anthony Victor** | Faculty Mentor - Fatmir Menkulasi

“Engineering the Economics of Affordable Urban Housing through the Utilization of High Performance Materials”

This research project was performed as part of the Richard Barber Interdisciplinary research program. The objective was to quantify not only gains in rentable floor space by using ultra high-performance concrete, but to also quantify other economical benefits to an area or region surrounding the building.

■ **Adeline Walsh** | Faculty Mentor - Kidada Williams

“Comparing Museum Management, The United States vs the United Kingdom”

This research involves an analysis of the differences between private non-profit and public non-profit museums with a focus on financial structures of both institutions. I compared Greenfield Village at the Henry Ford Museum in Dearborn, Michigan, with St. Fagans National Museum of History in Cardiff, Wales. This study aims to discover whether two museums with drastically different management and financial structures can be successful while still teaching, connecting with their audiences, and preserving history all at the same time.

■ **Leah Warren** | Faculty Mentor - Marsha Richmond

“The Impact of the Great Potato Famine on Irish Public Health”

From 1845 to 1849, Ireland suffered through the worst famine experienced in Europe during the 19th century. As successive potato crops failed, the Irish population was reduced from 8.4 million to 6.6 million by 1851. Although most assume starvation was the main cause of death during the Great Famine, many more died due to infectious diseases. This poster presentation explores ignorance within the medical field during the famine, specifically surrounding infectious diseases. Through studying this subject, historians and doctors alike will have a better understanding and appreciation of the significant role physicians play in times of emergency. This poster aims to examine how doctors were trained, the medical knowledge they possessed, and the influence of commissions and health boards on their ability to render treatment.

■ **Matthew Wegener** | Faculty Mentor - Helen Durand

“Cyberattack Detection and Effects on EMPC Design”

The research is focused on the detection of cyberattacks on chemical process control systems and the sensitivity of Economic Model-Predictive Control to changes in initial condition, initial guess, and the conditions that contribute to the imperceptibility of changes in state measurement during an attack. The conclusion of this project should enable additional research by theorizing what conditions must be included in a detection algorithm to induce sensitivity to problematic state measurements during an attack.

■ **William Weis** | Faculty Mentor - Hans J. Hummer

“Carolingian Political Culture in the Mirror of Carolingian Historical Manuscripts in Vienna”

Over the summer, I examined two Carolingian manuscripts from the 9th century, Codices 473 and 451, attempting to investigate their implications about early medieval politics and how it was expressed in a written format. Specifically, I traced the first manuscript back to the reign of Charles the Bald (in the middle of the ninth century) and discussed the implications for this document, and then hypothesized that the second manuscript should be dated to the court of Charles the Fat (at the end of the ninth century).

■ **Rachel Zelenak** | Faculty Mentor - Emily Grekin

“Anger and Alcohol Craving: Moderation by Emotion Regulation Strategies”

The present study examined whether two emotion regulation strategies, cognitive reappraisal and emotion suppression, affect the relationship between anger and alcohol craving. Participants, recruited through Amazon's Mechanical Turk, reported, at minimum, weekly alcohol use or monthly binge drinking. They completed self report questionnaires assessing emotion regulation and alcohol craving, as well as a laboratory task designed to induce anger. Task-induced anger and the use of emotion suppression were positively associated with alcohol craving. In contrast, the use of cognitive reappraisal was negatively associated with alcohol craving. Emotion regulation strategies did not moderate relationship between anger and alcohol craving. Emotion regulation strategies may be modifiable risk factors for alcohol craving.



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