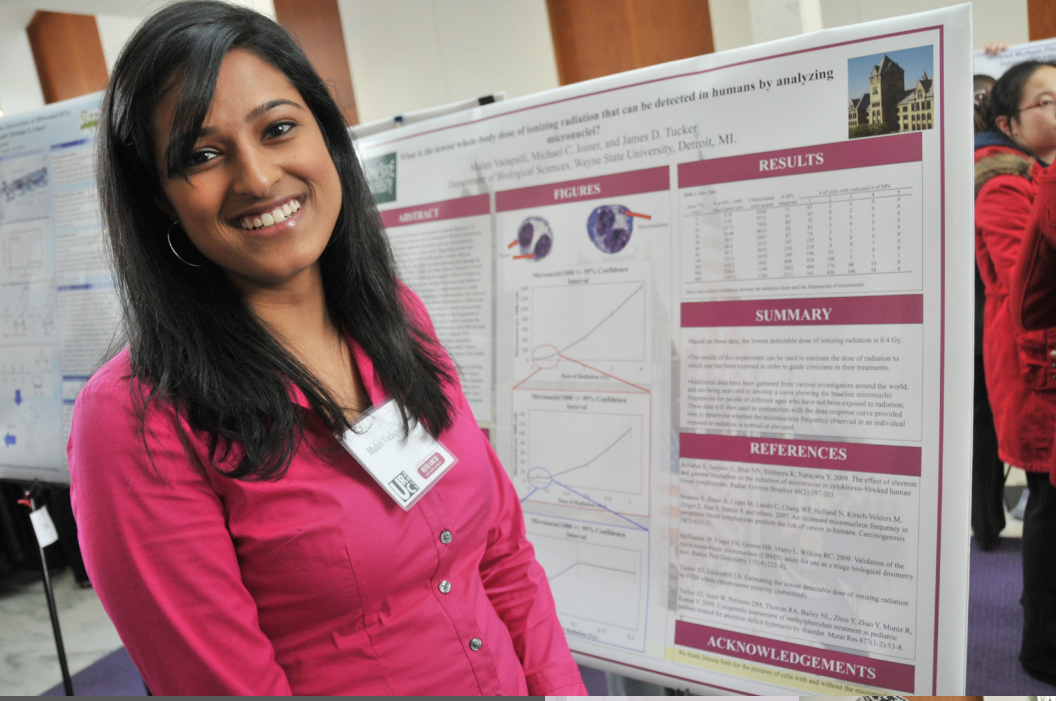

WAYNE STATE

2013 Undergraduate Research Conference

February 22 — McGregor Memorial Conference Center

The Academy of Scholars

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:

Paula Dore-Duffy
Professor, Neurology

Donald Haase
Associate Dean, College of Liberal Arts and Sciences

Gloria Heppner
Associate Vice President for Research

Renu A. Kowluru
Professor, Ophthalmology

Jeanne Lusher
Distinguished Professor, Pediatrics

Harry Maisel
Professor, Anatomy

Arthur Marotti
Distinguished Professor Emeritus

Michael McIntyre
Professor, Law

Boris Mordukhovich
Distinguished Professor, Mathematics

Yaddanapudi Ravindranath
Professor, Pediatrics

Bernhard Schlegel
Distinguished Professor, Chemistry

Guy Stern
Distinguished Professor Emeritus

George Yin
Professor, Mathematics
President of the Academy of Scholars

Friday, February 22, 2013
McGregor Memorial Conference Center

7:45 a.m.	**Registration and Continental Breakfast** — Atrium
8:30 a.m.	**Welcome** — Room B/C Monica Brockmeyer, Associate Provost for Student Success Phyllis Vroom, Deputy President
9 a.m.	**Oral Session I** — Multiple locations; listed on session pages
10 a.m.	**Oral Session II**
11 a.m.	**Poster Session** — Atrium
Noon	**Luncheon** — Room L/M **Greetings** Monica Brockmeyer **Introduction of Guest Speaker** Matthew Orr, Program Coordinator, Undergraduate Research Opportunities Program **Guest Speaker** Kyla McMullen, Assistant Professor, Clemson University **Awards** Introduction: Matthew Orr Presentation: WSU Academy of Scholars **Closing Statement** Monica Brockmeyer
1 p.m.	**Additional Opportunities for Students** — Room B/C
2 p.m.	**Student Checkout**

Oral Session I
9–10 a.m.

Session 1: **Fine and Performing Arts** Room F/G/H
Moderator: **Mary Elizabeth Anderson,** Assistant Professor, Theatre

James Hittinger: *Unknown Landscapes*

Sara Kline: *Connecting the Conversation: Performance Theatre and Theatre of Players*

Aeisha Reese: *Embodying Archetypes Using Russian Acting Techniques*

Session 2: **Disease** Room E
Moderator: **Judith Whittum-Hudson,** Professor, Immunology and Microbiology

Michael Chrusciel: *Bad Blood: A Hematological the Analysis of the Effects of an OPP-Rich Diet on the White Blood Cell Profiles of Transgenic Pancreatic Cancer Mice*

Treesa Antony: *Antibody Responses Against Chlamydiae After Immunization with Genus-Wide Peptide Vaccine Candidates*

Carol Noronha: *Disordered Modulation By Supplementary Motor Area in Childhood-Onset Schizophrenia During Motor Function*

Session 3: **Climate, Industrialization and Health** Room B/C
Moderator: **Brad Roth,** Professor, Political Science

William Ahee: *Human Rights and Climate Change*

Luke Moore: *Detroit and Liverpool: The Impact of Race, Industry and Culture on Urban Centers in Detroit, Michigan, and Liverpool, UK*

Toni Lupro: *Breathe Easy: The Interrelationship Among Sociodemographic Characteristics and Childhood Asthma Morbidity*

Session 4: **Engineering** Room I
Moderator: **Marcis Jansons,** Assistant Professor, Mechanical Engineering

Oksana Blowytsky: *Improving Chitosan Fibers for Use as Non-woven Fibrous Scaffolds: Effects of Fiber Processing on Mesenchymal Stem Cell Growth*

Justin Walls: *Development of Proton Selective Membranes for Efficient and Economical Vanadium Redox Flow Batteries*

Rebecca Ball: *Evaluating the Effect of Cross-Linking Chitosan Polymer Chains by Looking at the Mechanical, Cyclic, Degradation and Cell Adhesion Properties of Thiolated Chitosan*

Session 5: **Bioinformatics** Room J
Moderator: **Robert Akins,** Associate Professor, Biochemistry

Sakeena Fatima: *Determining the Gene Responsible for Leg Identity in Oncopeltus Fasciatus*

Jordan Grashik: *Dendrimer-siRNA Nanocarriers in Propellant-based Inhalers: A Novel Approach for Non-Invasive Gene Knockdown in the Lung Epithelium*

Kevin Lay: *Acquired Genes in Strains of Gardnerella Vaginalis and Their Correlation with Symptomatic Bacterial Vaginosis*

Oral Session II
10–11 a.m.

Session 1: **Drug Development** Room J
Moderator: **Robert Akins,** Associate Professor, Biochemistry

Tayson Lin: *Quantify the Efficacy of Nanodevices as Drug Delivery Systems for Chlamydial Infections Using Immunohistochemistry and Transcriptional Analysis*

Jasmine Vickery: *Antifungal Resistance in Candida Albicans*

Radomir Dimovski: *Membrane-Bound Immunomodulators as Adjuvants in a Cell Culture-based Avian Influenza Vaccine*

Session 2: **Economics and Politics** Room B/C
Moderator: **Brad Roth,** Professor, Political Science

Wenwan Li: *New Michigan Corporate Tax System Good for Businesses — Maybe — But at What Cost?*

Matthew Dzieciolowski: *Occupy Wall Street: A Frame Analysis*

Dominic Nanni: *Mexico's Mixed Election System*

Session 3: **Rare Earth Metals in Magnetic Resonance Imaging and Catalysis** Room I
Moderator: **Matthew Allen,** Assistant Professor, Chemistry

Adam Crowe: *Influence of Structural Changes on the Physiochemical Properties of Eull-Cryptates*

Joshua Fischer: *Synthesis of a New Chiral Precatalyst for the Mukaiyama Aldol Reaction*

Session 4: **Environmental Chemistry** Room F/G/H
Moderator: **Lawrence Lemke,** Associate Professor, Geology

Taghreed Mahmoud: *Reductive Splitting of Carbon Dioxide*

Erwyn-Rommel Tabasan: *A World of CO2: Improving CO2 Utilization*

Additional Opportunities for Students
1-2 p.m.
Room B/C

Henry Robinson, Director of the Office of Federal TRIO, The McNair Scholars Program: Pathways to the Professoriate in STEM

Aubrey Agee, Senior Program Coordinator, Blackstone LaunchPad at Wayne State University

Amanda Rosales, Associate Director of Graduate Admissions, Graduate School Admissions Process

Poster Session
11 a.m.

Asmaa Abada: *Purification and Optimization of ZupT: a Bacterial ZIP Family Metal Transporter*

Jeremy Amayo: *Acute Cardiovascular Stress and Quality of Patient Care*

Prabjot Batth: *A Unique Monomer of Adiponectin Is Exclusive to the Secreted Form*

Rohan Bhalla: *Dynamic Causal Modeling Reveals Distinct Working Memory Networks in Fetal Alcohol Spectrum Disorders*

Patrick Bresnahan and Anthony Pellegrino: *Selling to a Younger China: An Analysis of Changing Trends in Consumption Behaviors Among the Young Chinese*

Alexander Buzzalini: *Exploring the Symbolic Structure of a Consumer Culture Through Artistic Production*

Emily Davis: *Proteasome Inhibition by Metal Complexes as a New Route for Anticancer Therapy*

Kirtan Desai: *Cocaine-induced Behavioral Sensitization Is Associated with Increased Striatal Neuroactivity as Measured by Manganese Enhanced Magnetic Resonance Imaging (MEMRI) in Freely Moving Rats*

Jacob Dombrowski: *Evaluating the Recovery of Rana Pipiens (Northern Leopard Frog) Following Remediation Efforts*

Michael Doyle: *Historical Trace Element Distribution in Sediments from the Lower Clinton River and Lake St. Clair, Michigan*

Kristin Gallik: *Comparing Different Antidepressants on Serotonin In Vivo with FSCV*

Amy Graham: *Detecting Alcohol Detection Limits for Ethyl Glucuronide (EtG) in Women of Childbearing Years*

Najaah Hussain: *Ventilatory Long-term Facilitation in Wild Type and Tryptophan Hydroxylase 2 Knockout Mice*

Herbert Jones: *A Queueing Theoretic Analysis of the Impact of Polling Machine Failure in Election Outcome*

Samantha Kaufman: *Investigating the Extent of SUMO-2/3 Modification at the Mitotic Kinetochore in Cancerous Versus Non-Cancerous Cell Lines*

Julia Maiuri: *The Abstract Figure*

Ryan Marchand: *Toxicity Analysis Methods for Unknown Chemicals*

Xiaofan Mi: *Identification of Differentially Expressed Genes Between Homeostatic and Healing Rat Corneal Epithelial Cells*

Swathi Nallapa: *Cloning, Characterization and Functional Analysis of the EGF-Like Module Deletion Mutant Construct, and Its Effect on SPARC-Mediated Signaling in Temozolomide*

Daniel Neville: *Topography of Metal Forms*

Nino Papale: *Increased dACC Modulation of Fronto-Parietal Cortices in Schizophrenia During Cognitive Control*

Tudor Puiu: *Effects of Internalizing and Externalizing ADHD Symptom Dimensions upon dACC Modulation During Working Memory*

Gurnoor K. Rathore: *Structural and Functional Interactions Between Lipid Droplets and Mitochondria in Cardiac Muscle Cells*

Eboni Reed: *Differentiating Live from Dead: Verification of Ballast Water Treatment Technologies Using Fluorescein Diacetate*

Nataliya Sachovska: *Verifying Ballast Water Treatment*

Bharat Sampathi: *Retinoic Acid (RA) Signaling in Homeostatic Synaptic Plasticity*

Sonya Sandhu: *The Impact of Clinical Symptoms on Working Memory in ADHD*

Anuj Shah: *Use of Raman Detection for Candida Species*

Sonali Sharma: *Cell Cycle and Apoptosis Related Protein-1 in Bone Cells: Differential Regulation of PTH in Osteoblasts*

Sukhdeep Singh: *Automated Assessment of Microscopic Organisms in Environmental Samples Using Fluorescein Diacetate*

Molly Sloan: *Fabricating the Way*

Bryan Toma: *In Vitro Characterization of Phenotypic Differences that Account for In Vivo Host Niche-Specificity of a Superfamily of Candida Albicans Strains*

Megha Trivedi: *Metabolomic Analysis of Brain Tumor Grade with Proton Magnetic Resonance Spectroscopy: Focus on Sample Heterogeneity*

Anita Vasudevan: *Genotyping Study of Bronchopulmonary Dysplasia (BPD) in Very Low Birth Weight (VLBW) Newborns*

Anshu Wadehra: *Effect of Viscosity on Magnetic Hyperthermia in Water-Glycerol Mixtures*

Adam Waller: *Caging of a Peptidomimetic Nitrile inhibitor with a Ruthenium Bispyridine Caging Complex*

Jinqiao Wang: *Two-Color-Ratio Thermometry*

Jessica Wildman: *Seven Screens*

Presenters

Asmaa Abada
Faculty mentor: **Bharati Mitra**

Purification and Optimization of ZupT: A Bacterial ZIP Family Metal Transporter

This concise and comprehensive poster presentation details what is currently known about ZupT and ZIP family metal transporters; the lab's experimental scheme; the project's data and results; and the importance of the research conducted.

William Ahee
Faculty mentor: **Brad Roth**

Human Rights and Climate Change

Climate change poses a standard, remediable threat to a multitude of human rights and, quite significantly, to the Human Rights Project in general. As the Human Rights Project has developed, its scope of influence and concern has expanded in order to more effectively accomplish the goals of the project as a whole. Despite being rooted in controversy, I argue that the right to a safe and healthy environment is central to the survival of the Human Rights Project through the 21st century. Furthermore, as climate change fundamentally involves claims — both intragenerational and intergenerational — of equity and justice, a lack of international agreement about these claims has been a primary impediment to the formation of sufficient climate policies. Therefore, as human rights are internationally recognized, though perhaps routinely unfulfilled, a human rights approach to climate change provides a framework for assessing these claims and a benchmark for evaluating proposed climate policies.

Jeremy Amayo
Faculty mentor: **Karin Przyklenk**

EM Physician Allostatic Load and Patient Care: A Pilot Study

Physicians are subjected to severe work stress on a chronic basis. Stress has been shown to cause psychological and physiological morbidities such as depression, stroke, heart attack and high blood pressure, among others. Physician work stress has also been shown to negatively impact the quality of patient care. This project aims to objectify the relationship between stress and the quality of patient care. Before and after each shift, various analyses are performed on 40 EM residents. Blood and saliva samples are taken and analyzed for stress biomarkers. Residents are asked to complete pre- and post-shift work stress surveys. Quality of patient care is objectively evaluated by an attending physician. Correlations between psychological stress, physiological stress and quality of patient care are analyzed.

Treesa Antony
Faculty mentor: **Judith Whittum-Hudson**

Antibody Responses Against Chlamydiae After Immunization with Genus-Wide Peptide Vaccine Candidates

Chlamydiae are mainly known for causing sexually-transmitted infections in humans. Experiments were conducted to test the ability of several peptides to induce immune responses in mice. The selected peptides are potential vaccine candidates that are mimics of chlamydial bacteria. Serum was taken from mice which were previously immunized with the experimental peptides to test for antibodies (immune response) to peptides and chlamydial bacteria. Results showed that these peptides successfully induced immunity to Chlamydia in mice that had never before encountered the actual chlamydial bacteria. These results show that these peptides could potentially be used in the future as a human vaccine as well as for veterinary species.

Rebecca Ball
Faculty mentor: **Howard Matthew**

Evaluating the Effect of Cross-linking Chitosan Polymer Chains by Looking at the Mechanical, Cyclic, Degradation and Cell Adhesion Properties of Thiolated Chitosan

This project discusses the properties of thiolated chitosan and its applications for heart valve scaffolds.

Prabjot Batth
Faculty mentor: **Steven Cala**

A Unique Monomer of Adiponectin Is Exclusive to the Secreted Form

Adiponectin is a major protein in serum, with endocrine actions throughout the body, including major insulin-sensitizing activity. Co-translational and post-translational modifications of adiponectin are responsible for secretion of low-molecular weight trimers, medium-molecular weight hexamers, and high-molecular weight multimers (18 or more monomers). The purpose of this study was to determine cell-biological mechanisms of adiponectin secretion. The data indicate that secreted adiponectin may be regulated at the level of the monomer, prior to assembly into polymers for secretion or post assembly. As levels of adiponectin correlate with chronic disease in patients, these data point to novel biosynthetic steps that may be employed to regulate important endocrine control in insulin biology.

Rohan Bhalla
Faculty mentor: **Vaibhav Diwadkar**

Dynamic Causal Modeling Reveals Distinct Working Memory Networks in Fetal Alcohol Spectrum Disorders

Fetal alcohol syndrome (FAS) is a pattern of both mental and physical defects that develop in a fetus in response to high levels of maternal alcohol consumption during pregnancy. FAS can cause permanent central nervous system damage, especially to the brain. Developing brain cells can be malformed causing a wide range of cognitive and functional disabilities such as poor memory, attention deficits, and impulsive behavior in the child. Using functional MRI during a simple working memory task and dynamic casual modeling, researchers investigated disordered working memory related network interactions across the spectrum of the FAS disorder.

Oksana Blowytsky
Faculty mentor: **Howard Matthew**

Improving Chitosan Fibers for Use as Non-Woven Fibrous Scaffold: Effects of Fiber Processing on Mesenchymal Stem Cell Growth

Scaffold strength is an area of concern in current tissue engineering research. Because of superior molecular alignment, chitosan fibers have mechanical properties that allow them to reinforce porous chitosan and other hydrogel scaffolds. Biomaterials like chitosan are practical and favorable for use in tissue engineering; however, poor mechanical properties make these scaffolds infeasible for heart valve tissue engineering. Previous studies showed that chitosan fibers made by extruding chitosan solution into ammonia had increased mechanical strength. This project studies ways to further enhance chitosan fiber mechanical properties and to form fibers into a scaffold that has similar mechanical properties as a human heart valve.

Patrick Bresnahan and **Anthony Pellegrino**
Faculty mentor: **Attila Yaprak**

Selling to a Younger China: An Analysis of Changing Trends in Consumption Behaviors Among the Young Chinese

As the Chinese consumer-based marketplace continues to develop, a new generation of consumers is taking to the stage — the upper-educated consumer. These soon-to-be graduates will eventually join the swelling ranks of the growing middle class in China. In order for global brands to have a successful product presence in China, understanding what influences consumers to make purchases is crucial in charting the successful career of a brand. By focusing attention on what drives young, educated consumers to make consumption decisions, a brand can be well positioned for future growth in China. This research aims to determine what influences young adult Chinese citizens in their purchasing decisions, make conclusive remarks on the growing trends, and discuss how the influencers can be utilized by interested parties.

Alexander Buzzalini
Faculty mentor: **Pamela Delaura**

Exploring the Symbolic Structure of a Consumer Culture Through Artistic Production

The American cultural system is based upon the consumption of goods and the perceived ideas instilled by advertisements in shaping aspects of identity that contribute to a collective idea of culture. Investigation of the American culture through means of artistic expression is about evoking new thoughts on the viewers' subjective reality while causing a reflection and questioning of the values, beliefs and ideologies that constitute collective culture. The resulting artistic work becomes of reconstruction of the past and an affirmation of the continuing symbolic qualities that remain present in the American context today.

Michael Chrusciel
Faculty mentor: **Smiti Gupta**

Bad Blood: A Hematological Analysis of the Effects of an OPP-Rich Diet on the White Blood Cell Profiles of Transgenic Pancreatic Cancer Mice

Pancreatic cancer has established itself as one of the most lethal diseases of the modern age, with more than 40,000 new cases and 37,000 deaths affecting the American populace annually. In an attempt to investigate methods to improve the extremely low survival rate after diagnosis, researchers hypothesized that the use of oil palm phenolics (OPP) would have a positive effect on the levels of cancer-fighting natural killer (NK) cells in transgenic pancreatic cancer mice. The experimental OPP diet was shown to be more effective in increasing the average number of NK cells in both cancer and control mice than mice not on the diet.

Adam Crowe
Faculty mentor: **Matthew J. Allen**

Influence of Structural Changes on the Physiochemical Properties of EuII-cryptates

EuII-cryptates are important biologically due to their magnetic, luminescence and redox properties. These properties allow EuII-cryptates to be used as contrast agents for ultrahigh field magnetic resonance imaging, light emitting devices and oxygen sensors for biological systems. This project involves the synthesis of various cryptates, each with different functional groups or coordinating atoms. Once metalated, properties of interest are measured, allowing for a structure-property relationship to be determined. Results are expected to aid in the advancement of applications of EuII-cryptates.

Emily Davis
Faculty mentor: **Claudio Verani**

Proteasome Inhibition by Metal Complexes as a New Route for Anticancer Therapy

Before being able to develop an anticancer therapy, it is essential to know and understand the mechanisms by which the cancer was caused. This involves answering questions such as: Why does the cancer exist in the organism? What is the source or initial cause of the cancer? How was the cancer developed? and Where specifically in the cell is the cancer targeting? Once the mechanism by which the cancer was caused is solved, further research can be executed to develop an anticancer drug that specifically targets only cancer cells and not the healthy cells. This project involved testing two known toxic metals, cadmium and tin, to see if there is a linkage between the toxic metal complexes and proteasome 26S activity.

Kirtan Desai
Faculty mentor: **Shane Perrine**

Cocaine-Induced Behavioral Sensitization Is Associated with Increased Striatal Neuroactivity as Measured by Manganese Enhanced Magnetic Resonance Imaging (MEMRI) in Freely Moving Rats

This study examined the effects of chronic cocaine use on functional neural activity utilizing a novel brain imaging technique, and on behavior using a rat model of drug abuse. Cocaine-induced behavioral sensitization, which is a phenomenon characterized by increases in locomotor activity following chronic drug administration, was measured to quantify the behavioral effects of cocaine. Brain imaging in vivo was done using Manganese Enhanced Magnetic Resonance Imaging (MEMRI) at 7 Tesla to quantify neural activity in the striatum, a brain region that governs psychostimulant-induced motor activity. This combined approach of measuring behavior and brain imaging in the same animal provides mechanistic insight into brain-behavior relationships.

Radomir Dimovski
Faculty mentor: **Roy Sundick**

Membrane-Bound Immunomodulators as Adjuvants in a Cell Culture-Based Avian Influenza Vaccine

The need for improved vaccines for poultry is rising due to increased viral pathogenicity and emerging viral threats, such as avian influenza. One way to improve vaccines is to add adjuvants to the vaccine formulations. A number of studies have shown that soluble cytokines can serve as effective adjuvants. In this project, researchers developed a technology to efficiently produce inactivate whole-virus influenza vaccine bearing membrane-bound cytokines.

Jacob Dombrowski
Faculty mentor: **Donna R. Kashian**

Evaluating the Recovery of Rana Pipiens (Northern Leopard Frog) Following Remediation Efforts

The invasion of the non-native Phragmites australis (common reed) has severely reduced the abundance of other wetland plants such as Typha angustifolia (cattail). T. angustifolia provides excellent habitat and refuge for amphibian species. When compared to T. angustifolia, P. australis provides very little suitable habitat. This study examined the effects of the displacement of T. angustifolia by P. australis on the amphibian populations. Local wetlands that had large quantities of P. australis removed through prescribed burns and pesticide application in the past few years were used to study this. Surveys were conducted at these wetlands throughout the summer of 2012. Results suggest that P. australis has a negative effect on amphibian populations in these wetlands, and that its removal would benefit amphibian populations.

Michael Doyle
Faculty mentor: **Edmond Van Hees**

Historical Trace Element Distribution in Sediments from the Lower Clinton River and Lake St. Clair, Michigan

The Clinton River–Lake St. Clair interconnected system has become highly contaminated due to historic discharges from municipalities and industry throughout its basin. Correlating contaminant inventories with approximate calendar dates of sediment layers can offer a unique perspective on the sources of pollution into river and lake sediments. To assess the level and possible sources of contaminants in the Clinton River waterway, Doyle will present a reconstruction of the history of pollution into five dated sediment cores taken from the river.

Matthew Dzieciolowski
Faculty mentor: **Sharon F. Lean**

Occupy Wall Street: A Frame Analysis

On September 17, 2011, a group of several hundred demonstrators converged on New York City's financial district to protest widespread social, political, and economic inequality. In just a few short weeks the Occupy Wall Street movement would go worldwide, taking even academics and experts by surprise. The inequality detested by participants certainly is not a recent phenomenon. So why then did multitudes of people decide to take their town squares at that moment, and not sooner? To answer this question, Dzieciolowski will present a thorough analysis on the origins of the movement, highlight the mobilization processes at work, and present data collected directly from Occupy participants around the United States.

Sakeena Fatima
Faculty mentor: **Aleksandar Popadic**

Determining the Gene Responsible for Leg Identity in Oncopeltus Fasciatus

Using RNA interference (RNAi), the gene responsible for leg development in Oncopeltus fasciatus, also known as milkweed bugs, can be determined. RNAi enables the negation of the gene in question, affording the opportunity to observe how the removal of the gene affects the phenotype. This experiment entails the injection of double stranded RNA into adult milkweed females which then transfers to the embryos and results in a mutant phenotype. This study will afford greater knowledge of developmental biology and the roles of certain genes in segmental identity.

Joshua Fischer
Faculty mentor: **Matthew J. Allen**

Synthesis of a New Chiral Precatalyst for the Mukaiyama Aldol Reaction

Fischer will present the synthesis of a new water-tolerant asymmetric precatalyst for the Mukaiyama aldol reaction that will produce ß-hydroxy ketones enantioselectively. The idea for this project's precatalyst was drawn from a similar precatalyst of the Allen Laboratory, one that requires a large ratio of ligand. Because ß-hydroxy ketones are used in many pharmaceutical compounds, control of the stereochemistry of the products is important.

Kristin Gallik
Faculty mentor: **Parastoo Hashemi**

Comparing Different Antidepressants on Serotonin In Vivo with FSCV

Depression is a debilitating mood disorder that affects millions of Americans each year. In order to treat depression, antidepressants are commonly prescribed. However, their exact function is not completely clear. This lab uses an analytical technique called Fast Scan Cyclic Voltammetry to measure the effects of antidepressants on serotonin levels in the live mouse model. This project aims to better understand how the antidepressants function and how they differ from each other on a mechanistic level.

Amy Graham
Faculty mentor: **Steven J. Ondersma**

Determining Alcohol Detection Limits for Ethyl Glucuronide (EtG) in Women of Childbearing Years

Ethyl glucuronide (EtG) has shown promise as a biomarker for detecting alcohol use and could be particularly of use in research with pregnant women, since even small amounts of alcohol may place a fetus at risk. Current EtG detection thresholds are not specified by gender or age, and are based primarily on very heavy drinking. Graham will present on the ability of a commonly used EtG/EtS algorithm to detect drinking at more modest levels among women of childbearing age.

Jordan Grashik
Faculty mentor: **Sandro da Rocha**

Dendrimer-siRNA Nanocarriers in Propellant-based Inhalers: A Novel Approach for Non-Invasive Gene Knockdown in the Lung Epithelium

Utilizing siRNA, Grashik's lab is able to show that gene expression in lung cells can be successfully controlled, as well as encapsulated, solvated, and transported into the deep lungs in vitro.

James Hittinger
Faculty mentor: **James Nawara**

Unknown Landscapes

Hittinger will present his two-part research project. He first undertook objective research into oil painting materials, and then created conceptual content of a series of landscape paintings.

Najaah Hussain
Faculty mentor: **Jason Mateika**

Ventilatory Long-Term Facilitation in Wild Type and Tryptophan Hydroxylase 2 Knockout Mice

Long-term facilitation (LTF) is a form of respiratory plasticity that can be induced by exposure to intermittent hypoxia. Although it has been established that LTF can be initiated in animals including humans, the neuromodulators involved in the initiation of LTF in spontaneously breathing animals have not been identified. More specifically, the role that serotonin produced in the central nervous system (CNS) has in the initiation of LTF is unclear. Thus, the purpose of this project was to examine whether serotonin produced within the CNS is required to initiate or maintain LTF. Results from these studies will be a first step in identifying the sites and neuromodulators responsible for initiating LTF in intact spontaneously breathing animals.

Herbert Jones
Faculty mentor: **George Yin**

A Queueing Theoretic Analysis of the Impact of Polling Machine Failure in Election Outcome

This project is an investigation into the effects of reduced voting ability to the outcome. Researchers analyzed the impact of polling machine failure combined with other measurable factors in election outcomes. Predictions and modeling output are presented in graphical format.

Samantha Kaufman
Faculty mentor: **Xiang-Dong Zhang**

Investigating the Extent of SUMO-2/3 Modification at the Mitotic Kinetochore in Cancerous Versus Non-Cancerous Cell Lines

Small ubiquitin-related modifiers (SUMOs) are essential proteins in eukaryotic cells. They are covalently linked to other proteins to regulate a variety of cellular processes. As a result of such a wide range of activity, SUMO proteins have been shown to have a role in the cellular pathways of many human disorders, including cancer. To address the role of SUMO modification in cancerogenesis, Kaufman shows how immunofluorescence can be used to visualize the localization of SUMO in dividing cells in cancerous and non-cancerous cell lines. This method not only shows potential differences in SUMO modification between healthy and diseased cells, it also sheds light on the regulation of SUMOylation during the multiple stages of cell division.

Sara Kline
Faculty mentor: **Mary Elizabeth Anderson**

Connecting the Conversation: Performance Theatre and Theatre of Players

Etuding, an improvisational rehearsal technique originated in Russia at the turn of the century by Konstaintin Stanislavski, is invaluable to modern theatre artists involved in experimental theatre such as Performance Theatre (U.S.) and the Theatre of Players (Russia). After studying a rare etuding technique during the Month in Moscow Program offered by Wayne State's Department of Theatre, Kline and a group of Wayne State student actors reconstructed Anton Chekhov's "Ivanov" through the use of etuding. This one-act play was performed at the end of January in the Studio Theatre at Wayne State and proved to be a successful experiment within a collaborative, nontraditional theatre structure.

Kevin Lay
Faculty mentor: **Robert Akins**

Acquired Genes in Strains of Gardnerella Vaginalis and Their Correlation with Symptomatic Bacterial Vaginosis

Bacterial vaginosis (BV) is a polymicrobial condition in which the normal vaginal flora, predominantly Lactobacillus, is replaced by other bacteria, most commonly Gardnerella vaginalis. Known sequences of G. vaginalis demonstrate high gene variability. To determine whether possessing certain BV-associated genes influences G. vaginalis' virulence, researchers designed PCR primers for multiple candidate genes. Quantitative PCR was performed using DNA prepared from crude lavages and primers designed to amplify some of the candidate genes; this method allows the quantification of titer and incidence. Researched have confirmed thus far that some of the variable genes identified in the whole genome sequencing were detected in strains from some women but not from others. They have also identified with statistical significance ($p<.01$) that these strains are preferentially found in symptomatic BV patients and at higher titers than healthy women. These results have implications for new diagnostic testing and pharmaceutical development.

Wenwan Li
Faculty mentor: **Antonie W. Y. Walsh**

New Michigan Corporate Income Tax System Good for Businesses — Maybe — But at What Cost?

Changes to Michigan's tax system went into effect in the later part of 2011 and early 2012. The Michigan Business Tax was replaced by the Corporate Income Tax. The new income tax that applies to businesses is a more simplified calculation and lesser flat tax rate with the intent to attract new businesses. But how does Michigan account for the loss in tax revenue generated by businesses? The Income Tax Act was amended and, in particular, pension and retirement income have become taxable. The tax burden seems to have shifted onto retirees and begs the question of whether older households respond to such income tax changes and if these responses are exclusive. What factors do retirees consider when evaluating the desirability of a state? Furthermore, has unemployment decreased and has Michigan's population grown?

Tayson Lin
Faculty mentor: **Judith Whittum-Hudson**

Quantify the Efficacy of Nanodevices as Drug Delivery Systems for Chlamydial Infections Using Immunohistochemistry and Transcriptional Analysis

Lin tested folate-targeted nanoparticles for delivering drugs to persistent Chlamydial infections that are refractory to antibiotics. Targeted and non-targeted nanoparticles loaded with Azithromycin and Rifampicin were compared to free combination antibiotics. Infected cells pulsed with targeted nanoparticles demonstrated significantly decreased Chlamydial viability based on greater reductions in both Chlamydial inclusion size and numbers when compared to non-targeted nanoparticles or free drugs. Effects on Chlamydial gene transcription and mouse studies are in progress to extend these results. The findings open the door to new Chlamydial treatments that achieve the same therapeutic effects with the use of lower drug dosages.

Toni Lupro
Faculty mentor: **Richard Slatcher**

Breathe Easy: The Interrelationship Among Sociodemographic Characteristics and Childhood Asthma Morbidity

As a research assistant in the Wayne State University Close Relationships Laboratory, Toni Lupro participated in the interdisciplinary project "Asthma in the Lives of Families Today" (ALOFT). The study aims to better understand the links between everyday family life and childhood asthma. As a student funded by the Office of Undergraduate Research, Lupro sought to expand upon this research using a sociological approach. This approach considers the effect of sociodemographic characteristics, such as education and income, on asthma morbidity and various health measures, such as clinic and hospital visits. Medical sociology serves to promote equality in treatment and better the health of our citizens.

Taghreed Mahmoud
Faculty mentor: **Stanislav Groysman**

Reductive Splitting of Carbon Dioxide

Increasing concentrations of carbon dioxide in the atmosphere have stimulated significant global research and development efforts regarding its reduction. Splitting of carbon dioxide releases carbon monoxide (CO) and the oxo [O]. At least two different metals are necessary: the softer one fixing CO, and the harder one binding the oxo [O]. Mahmoud hypothesized that a dinuclear system featuring an electron-rich soft metal (Ni(0)) and harder metal (Zn(II)) would be able to cleave CO_2, forming the bridging metal oxo complex.

Julia Maiuri
Faculty mentor: **Jim Nawara**

The Abstract Figure

Maiuri presents paintings created as a result of visiting New York City's most notable galleries.

Ryan Marchand
Faculty mentor: **Donna R. Kashian**

Toxicity Analysis Methods for Unknown Chemicals

Flame retardants are a widely used group of chemicals whose properties are highly protected by industry, making it difficult to gather toxicity data on this potentially hazardous group of chemicals. Unknown chemicals often undergo a traditional set of tests by which a common group of organisms are used to determine the toxicity of a substance. The problem with this technique is that not all chemicals affect a given species as expected. Marchand will propose a methodology for quickly gaining toxicity data that is not easily accessible without years of field testing. His technique may compliment or replace the conventional testing techniques for unknown chemicals, as it exposes the chemicals to a larger group of organisms.

Xiaofan Mi
Faculty mentor: **Fu-Shin Yu**

Identification of Differentially Expressed Genes Between Homeostatic and Healing Rat Corneal Epithelial Cells

The cornea epithelium is an important barrier against noxious environmental threats. Compared to other tissue, corneal epithelial closure is a simple biological process and serves as a perfect model for studying wound healing. To elucidate the differential gene expression between homeostatic and healing rat corneal epithelial cells, Mi completed a comprehensive analysis of their gene profiles, identifying 1811 genes with significantly different expression levels involved in the actions of cell adhesion, migration, proliferation, differentiation and death. These novel gene expression signatures provide new insights into the mechanisms underlying epithelial wound healing and new therapeutic targets for accelerating delayed healing.

Luke Moore
Faculty mentor: **M.L. Liebler**

Detroit and Liverpool: The Impact of Race, Industry and Culture on Urban Centers in Detroit, Michigan, and Liverpool, UK

Comparing and contrasting the effects of race and industrialization on Detroit and Merseyside is a topic that has seldom, if ever has been researched. The similarities between the two cities are profound, and the need for research and historical representation can be beneficial in understanding the past and preparing for the future. Detroit's history is thought to be something of an anomaly with parallels able to be drawn to no other cities. However, across the Atlantic 3,600 miles east, the city of Merseyside shares a remarkably similar history. The deeply rooted racial tensions between immigrants, African Americans and Caucasians, industrialization and decentralization had and still have a large impact on the cities.

Swathi Nallapa
Faculty mentor: **Sandra Rempel**

Cloning, Characterization and Functional Analysis of the EGF-like Module Deletion Mutant Construct, and Its Effect on SPARC-Mediated Signaling in Temozolomide

Glioblastoma (GBM) patients live about 15 months after diagnosis due to the highly infiltrative nature of these brain tumors. The current treatment regimen is surgery, followed by radiotherapy and temozolomide (TMZ) chemotherapy. Nallapa's lab has shown that Secreted Protein Acidic and Rich in Cysteine (SPARC) is upregulated in gliomas and induces glioma invasion, and that SPARC promotes survival signaling in the presence of TMZ. SPARC is a matricellular protein with three domains: the Acidic, Follistatin-like, and Extracellular-Calcium binding domains. In this study, researchers performed a transfection to produce SPARC mutants deleted for the Acidic Domain, Export signal, EF hand or EGF-like Module. After cloning, characterizing and selecting representative deletion mutant clones, researchers were able to demonstrate that the domains have different functions.

Dominic Nanni
Faculty mentor: **Sharon F. Lean**

Mexico's Mixed Election System

Maurice Duverger was the first to assert a relationship between election systems and political parties. In the 1950s, Duverger published a work called "The Political Parties," in which the seminal law associated with his name can be found: "The simple majority, single ballot system favours the two-party system." Since Duverger, the study of election systems has become an integral part of political science. This research project is a study formed in the light of Duverger's Law. It is a study of Mexico's mixed election system and the extent to which it has impacted Mexico's political parties. This study uses qualitative and quantitative research, including two weeks of independent field work in Mexico City.

Daniel Neville
Faculty mentor: **Evan Larson-Voltz**

Topography of Metal Forms

The goal for this research is to learn primitive and unexplored metal forming techniques, offer information to the larger community of metalsmiths, and to contribute to departmental knowledge. With the application of stress, a vessel can gain real estate without the need of additional metal or materials. The significance of this unexplored technique could innovate a technical or industrial building operation that calls for specific measurements of weight and volume.

Carol Noronha
Faculty mentor: **Vaibhav Diwadkar**

Disordered Modulation by Supplementary Motor Area in Childhood-Onset Schizophrenia During Motor Function

Childhood-Onset Schizophrenia (COS) is a particularly debilitating sub-type of schizophrenia with a highly detrimental course. COS onset occurs early in adolescence (<13 years), has a very low incidence and follows an extremely regressive course. This project demonstrates disordered functional interactions in the COS brain during a simple motor task.

Nino Papale
Faculty mentor: **Vaibhav Diwadkar**

Increased dACC Modulation of Fronto-Parietal Cortices in Schizophrenia During Cognitive Control

This research focuses on cognitive control mechanisms of the brain in relation to schizophrenia and healthy control subjects. Cognitive control is generally defined as the ability to inhibit or facilitate responses as a function of specific context. It has been shown in previous studies that the schizophrenia brain demonstrates impaired regional responses during tasks requiring cognitive control, with abnormally reduced cortical activation documented in frontal regions specifically the

dorsal anterior cingulate cortex (dACC), one of which is essential for control and executive function. Results of this project show activation in the dACC, as well as increased signaling by the dACC, believed to reflect the inefficiencies native to schizophrenia.

Tudor Puiu
Faculty mentor: **Vaibhav Diwadkar**

Effects of Internalizing and Externalizing ADHD Symptom Dimensions upon dACC Modulation During Working Memory

With Attention Deficit Hyperactivity Disorder (ADHD) being a prevalent disorder among children and adolescents, this project utilizes functional Magnetic Resonance Imaging (fMRI) as a non-invasive tool to reveal functional brain network abnormalities during a working memory task. Functional brain connectivity was performed by choosing a seed region, in our case the dorsal anterior cingulate cortex (dACC), and examining its effects (modulation) upon other brain regions during our task. Specifically, we investigated the effects of internalizing (social withdrawing, depression) and externalizing (aggression, impulsivity) ADHD symptom dimensions on dACC modulation.

Gurnoor K. Rathore
Faculty Mentor: **James Granneman (Vickie Kimler)**

Structural and Functional Interactions Between Lipid Droplets and Mitochondria in Cardiac Muscle Cells

Increased fat accumulation in the heart is related to cardiovascular disease. The fat supply is stored in cardiac muscle cell lipid droplets (LD) which, if overloaded with neutral lipids, may cause inefficient heart function. Mitochondria are responsible for burning of fatty acids from the LD which, in excess, are toxic to the cell and must be stored in LD. This project focuses on the physiological interactions between LD and mitochondria in heart cells of mice using transmission electron microscopy (TEM).

Eboni Reed
Faculty mentor: **Jeffrey Ram**

Differentiating Live from Dead: Verification of Ballast Water Treatment Technologies Using Fluorescein Diacetate

Non-native species have invaded the Great Lakes via ballast water from foreign ships; these non-native species have caused great harm to the Great Lakes. In response to the recent invasions, regulations to sterilize ballast water before its discharge have been implemented. Sterilization of ballast water can be achieved by heat treatments, chlorine treatments, and ultraviolet radiation. If ballast water treatments are effective, then they should be able to eliminate the source of at least half of the invasive species in the Great Lakes. By using preexisting technology — FDA assays — researchers can verify the effectiveness of ballast water treatments.

Aeisha Reese
Faculty mentor: **Mary Elizabeth Anderson**

Embodying Archetypes Using Russian Acting Techniques

In Russian dramatic literature, the "Iurodstvo" is the "holy fool" archetype — a character who appears to be mad, but is, in fact, completely sane. Ilya Ilych Telegin, a character from Anton Chekhov's "Uncle Vanya," is a prime example of the Iurodstvo archetype. Exploring this character using Russian acting techniques learned at the Moscow Art Theatre School, this presentation demonstrates how embodiment serves as a form of research, revealing new aspects of the "Iurodstvo" through performance.

Nataliya Sachovska
Faculty mentor: **Jeffrey Ram**

Verifying Ballast Water Treatment

Currently, the methods of ballast water sterilization involve treatment with high heat, chlorine or acid. There is not a method for confirming the effectiveness of these treatments. This project aims to develop a system for testing the efficacy of current ballast water sterilization methods. The system outlined in this project can easily be employed by ship board members to test their ballast water treatments and help reduce the spread of invasive species throughout the Great Lakes.

Bharat Sampathi
Faculty mentor: **Lu Chen**

Retinoic Acid (RA) Signaling in Homeostatic Synaptic Plasticity

The brain is perhaps the most complex organ of the human body. Therefore, continuing to understand the mechanisms by which the brain functions with the other organs is essential in gaining a deeper understanding of the human body. Sampathi conducts research in a lab that works to elucidate neurons and their synapses. By studying the molecule, retanoic acid (RA), and its receptor, the lab has made important discoveries that allow further synapse research to be conducted. Sampathi's presentation will include descriptions of the plasmid constructs I created for RA analysis, results on how signal blockades lead to RA synthesis, where and when RA is synthesized within the cell, and which cells are capable of RA synthesis triggered by neural activity blockade. The presentation will also include data analysis and outline future steps to reach the lab's goals.

Sonya Sandhu
Faculty mentor: **Vaibhav Diwadkar**

The Impact of Clinical Symptoms on Working Memory in ADHD

ADHD is known as a disorder marked by a diverse range of symptoms, characterized on several dimensions. Previous studies within this laboratory have found prevalent inefficiencies in regard to working memory function among adolescents diagnosed with ADHD. Here, through the manipulation of both clinical behavioral data and fMRI imaging, researchers look for the possible role that internalizing and externalizing behaviors play among such working memory discrepancies.

Anuj Shah
Faculty mentor: **Nitin Chouthai**

Use of Raman Detection For Candida Species

Fungal infections are the leading cause of death due to infectious disease in the NICU. This research uses Raman spectroscopy to look at a more effective and efficient way to determine if a preterm newborn is infected.

Sonali Sharma
Faculty mentor: **Nabanita Datta**

Cell Cycle and Apoptosis Related Protein-1 in Bone Cells: Differential Regulation of PTH in Osteoblasts

Bone mass is dependent on osteoblast proliferation, differentiation and lifespan of osteoblasts. PTH control of osteoblast cell cycle regulatory proteins and suppression of mature osteoblasts apoptosis has been previously demonstrated in the process of bone formation both in vitro and in vivo. Cell Cycle and Apoptosis Regulatory Protein (CARP)-1 (aka CCAR1) is a novel regulator of apoptosis signaling by diverse agents including cell growth and differentiation factors. This project's findings are indicative of a role for CARP-1 in apoptosis signaling pathways in osteoblasts and possibly in osteocytes, proposing it as a regulator that may be an important target gene of the PTH and PTHrP response.

Sukhdeep Singh
Faculty mentor: **Jeffrey Ram**

Automated Assessment of Microscopic Organisms in Environmental Samples Using Fluorescein Diacetate

Singh will illustrate what was done over the course of his work in Professor Ram's lab, including the building of a device, presenting the background, methods and results of the research. Notable experiments will be explained in detail, and plans for future work will be covered.

Molly Sloan
Faculty mentor: **Evan Larson-Voltz**

Fabricating the Way

Sloan's presentation will consist of poster board to show the structures she made and how they performed in weight tests.

Erwyn-Rommel Tabasan
Faculty mentor: **Stanislav Groysman**

Synthesis of Ligands and Complexes for CO_2 Utilization

Global warming, which is primarily caused by the burning of fossil fuels to produce carbon dioxide, is a major problem facing society. This project aims to help reduce carbon dioxide levels by exploring more economical means of using carbon dioxide as a starting material to produce oxalic acid, a compound that is used in bleaches but may also serve as a starting material for other organic reactions. Tabasan will present the method known as "reductive coupling" as an economical means of using carbon dioxide as well as the compounds that will be used in this process.

Bryan Toma
Faculty mentor: **Robert Akins**

In Vitro Characterization of Phenotypic Differences that Account for In Vivo Host Niche-Specificity of a Superfamily of Candida Albicans Strains

Toma's presentation explains the phenotypic differences in the host niche-specificity of the superfamily of Candida albicans strains. He will cover the many assays performed over the past year and the results obtained from them.

Megha Trivedi
Faculty mentor: **Matthew Galloway**

Metabolomic Analysis of Brain Tumor Grade with Proton Magnetic Resonance Spectroscopy: Focus on Sample Heterogeneity

This study involves an analysis of the neurochemical profile of cancerous glial tissue and demonstrates characteristic correlations between tumor grade and absolute concentrations of certain metabolites and metabolite ratios. Information about tumor grade (i.e, cancer aggressiveness) is necessary for prognosis and directing patient-specific treatment. Utilizing high resolution-spectroscopic technique, 14 tumor tissue samples, including eight "high-grade" tumors and six "low-grade" tumors were assessed. Glycine, myo-inositol, glutamate and N-acetyl aspartate were targeted for analysis in this particular study.

Anita Vasudevan
Faculty mentor: **Nitin Chouthai**

Genotyping Study of Bronchopulmonary Dysplasia (BPD) in Very Low Birth Weight (VLBW) Newborns

Bronchopulmonary Dysplasia (BPD) is a lung disease common in Very Low Birth Weight (VLBW) newborns, and it is routinely treated with thiazide diuretics. This study examines the possibility of a genetic link that can predict the development of BPD in VLBW newborns. The genes examined in this study were selected based on previous studies that have established which specific genes affect the efficacy of thiazide diuretic treatment in adults with hypertension.

Jasmine Vickery
Faculty mentor: **Robert Akins**

Antifungal Resistance in Candida Albicans

Pathogenic fungi are the cause of many life-threatening infections. The resistance of these fungi to antifungal drugs is becoming a major problem in the management of several diseases. By making more copies of various genes of C. albicans, a common fungal pathogen, than it would under normal conditions we have observed changes in its resistance to many antifungal drugs. A specific fragment of DNA that caused this antifungal resistance which has two adjacent zinc finger proteins was excessively copied and inserted into C. albicans cells. Researchers then compared the resistance of the original high genomic copy C. albicans with the new C. albicans cells that have the insertion and made conclusions about each resistance profile and regulatory genes.

Anshu Wadehra
Faculty mentor: **Ratna Naik**

Effect of Viscosity on Magnetic Hyperthermia in Water-Glycerol Mixtures

Magnetic nanoparticles are small particles which dance in an alternating magnetic field releasing energy as heat. This property of magnetic nanoparticles can be useful in providing therapeutic benefits to cancer patients. If the local temperature of tumor tissues is elevated to 42°C-45°C, cancerous growth is arrested. Temperature elevation is caused by the flip of the internal magnetic moment of the nanoparticles and by the physical rotation of the nanoparticles in the suspended media. Wadehra investigated the effects of varying viscosity of the media on the observed temperature elevation.

Adam Waller
Faculty mentor: **Jeremy Kodanko**

Caging of a Peptidomimetic Nitrile Inhibitor with a Ruthenium Bispyridine Caging Complex

Caspases are cysteine activated, aspartate-directed proteases, which play crucial roles in inflammation and cell apoptosis. When these enzymes become dysfunctional, a number of serious medical conditions result. Caspase inhibitors are being developed actively as treatments for a variety of medical conditions. Waller's research is focused on garnering spatial control of the activity of caspase-1, which is primarily involved in the regulation of inflammatory cytokines. This research focused on the caging of a peptidomimetic nitrile inhibitor using a RuII(bpy)2 complex. The premise is that after the inhibitor is bound to a ruthenium complex it will be inert. The photoreactivity of ruthenium will allow the inhibitor to be released with the selective targeting of light, and the inhibitor will then be free to inhibit the activity of caspase-1.

Justin Walls
Faculty mentor: **Steve Salley**

Development of Proton Selective Membranes for Efficient and Economical Vanadium Redox Flow Batteries

Flow Redox Batteries (FRBs), especially the Vanadium Redox Flow Battery (VRFB), provide a promising chemistry for storing intermittent renewable energy on a very large scale. However, none of the FRB technologies has seen significant market penetration because the technology is still very expensive and unreliable due to the ion exchange membrane (IEM). The membranes need to possess good ion conductivity while maintaining high mechanical and chemical stability, but suffer from decreased energy efficiency. This project is focused on decreasing the vanadium ion diffusion through the membrane by modifying the membrane. A small scale VRFB system was constructed to test the performance of these modified membranes, and efficiency and reliability of the system as a whole was measured.

Jinqiao Wang
Faculty mentor: **Marcis Jansons**

Two-Color Ratio Thermometry

This project focuses on instantaneous in-cylinder wall temperature measurement with two-color method on an optically accessible compression ignition diesel engine.

Jessica Wildman
Faculty mentor: **Evan Larson-Voltz**

Seven Screens

Wildman presents a series of photographs representing her experiments and their outcomes.

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