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SYMPOSIUM

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THE NINETEENTH ANNUAL ELKIN R. ISAAC STUDENT RESEARCH SYMPOSIUM

ALBION COLLEGE

APRIL 23-24, 2008

SCHEDULE OF EVENTS

Wednesday, April 23, 2008

- 7:30 p.m. Elkin R. Isaac Alumni Lecture: James P. Beck, '97
"From Albion to Africa and Back Again: Reflections on Alternative Careers in Science"
- Welcome: President Donna M. Randall
Remarks: Jeffrey C. Carrier, Professor of Biology
Speaker Introduction: John F. Cawood, '08
Towsley Lecture Hall/Norris Center 101
- Reception immediately following the program
Science Complex, Mitchell Museum*

Thursday, April 24, 2008

- 8:30-10:30 a.m. Student Research Platform Presentations
See also detailed schedule of presentations on pages 4-6.
- | | |
|---|--------------------------------------|
| Forum #1
<i>Norris Center 100</i> | Forum #3
<i>Norris Center 102</i> |
| Forum #2
<i>Towsley Lecture Hall/Norris Center 101</i> | Forum #4
<i>Norris Center 104</i> |
- 10:45 a.m.-Noon Honors Convocation
Goodrich Chapel
- 1:15-4:15 p.m. Student Research Platform Presentations
See locations listed for morning session.
- 4-5 p.m. Student Research Poster Session
Science Complex Atrium
- 7 p.m. Joseph S. Calvaruso Keynote Address: Carl Hiaasen
"An Evening with Carl Hiaasen"
- Welcome: President Donna M. Randall
Conferral of Honorary Degree: President Randall and Hal H. Wyss,
Professor Emeritus of English
Speaker Introduction: Lisa A. Anderson, '09
Goodrich Chapel
- Book-signing and reception immediately following the program
Bobbitt Visual Arts Center Lobby*

ELKIN R. ISAAC ALUMNI LECTURE

James P. Beck, '97

Jim Beck is currently a program analyst in the Office of Policy, Planning, and Evaluation (PPE) in the Office of Oceanic and Atmospheric Research (OAR) of the National Oceanic and Atmospheric Administration (NOAA), based in Washington, D.C. He plays a technical support role for two high-level advisory bodies (NOAA's Science Advisory Board and Research Council) that guide NOAA on research matters concerning climate modeling, weather forecasting, ecosystem management, ocean and coastal resource management, and related issues.



Over the last 10 years, Beck has focused on international natural resource management issues in Africa with a variety of leading science-based environmental organizations, initiatives, and government agencies. From 2003 to 2007, Beck worked on land-use planning and ecosystem management projects in central Africa, first for Global Forest Watch at the World Resources Institute (Washington, D.C.) and later for the Wildlife Conservation Society (Republic of Congo). He also worked at Cornell University, where he was a research assistant on a socio-economic study related to park management in Gabon for the World Wildlife Fund.

Following his graduation from Albion, Beck served as a Peace Corps volunteer in Gabon for two years, assisting with a rural aquaculture development project, and then spent a third year with the Peace Corps as a researcher collaborating with the World Wildlife Fund and the Gabonese Ministry of Forest and Water. He has also taught at the University of Maryland.

Beck's career experiences include management of "think tank" programs seeking to strategically influence environmental policy and practice, multi-stakeholder coalition building, and grassroots rural development.

He received a B.A. from Albion College, with a biology major and environmental science concentration, and a master's in sustainable development and conservation biology from the University of Maryland at College Park. While an undergraduate, he had a special interest in marine biology, and conducted research with Albion biologist Jeffrey Carrier and at the Duke University Marine Laboratory in Beaufort, N.C. He participated in the Isaac Symposium in 1997 with a presentation on "Male Nurse Shark (*Ginglymostoma cirratum*) Movement in Relation to Mating Activities."

JOSEPH S. CALVARUSO KEYNOTE ADDRESS

Carl Hiaasen

Carl Hiaasen has carved out a career as a vocal champion of the environment, foe of corruption, and scathing satirical novelist. A bestselling author, award-winning newspaper columnist, and dogged investigative reporter, Hiaasen has been called "America's finest satirical novelist" by the *London Observer*.



Dave Barry, Hiaasen's colleague at the *Miami Herald*, described him as "one of South Florida's most vital natural resources, a relentlessly sane voice in a howling hurricane of hypocrisy, hokum, and hype." The *New York Times* compared him to Preston Sturges, Woody Allen, and S.J. Perelman. Hiaasen has been nominated three times for a Pulitzer Prize, and he received the Damon Runyon Award for his journalism and commentary from the Denver Press Club in 2003-04.

Tourist Season, published in 1986, was Hiaasen's first solo novel. *GQ* magazine called it "one of the 10 best destination reads of all time." Since then, Hiaasen has published a string of successful books in 33 languages, including *Strip Tease*, *Stormy Weather*, *Lucky You*, *Sick Puppy*, *Basket Case*, *Skinny Dip*, and *Naked Came the Manatee*, which featured different chapters written by several well-known Florida authors. *Strip Tease* became a major motion picture in 1996 starring Demi Moore and Burt Reynolds. Hiaasen is also the author of two novels for young readers: *Flush* and *Hoot*. *Hoot* was named a Newberry Honor book, and a film version was produced by Jimmy Buffett for New Line Cinema. Hiaasen has published a non-fiction book about the Disney empire and its grip on American culture, as well as two collections of his columns. His latest book, *Downhill Lie*, a confessional about Hiaasen's return to the fairways after a 32-year absence, will be published in May.

"In a place as wild as South Florida," Hiaasen has written, "true-life events are almost too big and too weird to be dealt with appropriately in a newspaper. The journalism feeds the imagination, which feeds the fiction."

A Florida native and graduate of the University of Florida, Hiaasen joined the *Miami Herald* at age 23 as a general assignment reporter and went on to work for the newspaper's weekly magazine and prize-winning investigations team. Since 1985, he has written a regular column, which appears on most Sundays in the *Herald's* opinion pages.

STUDENT PRESENTATION SCHEDULE—THURSDAY, APRIL 24, 2008

FORUM #1—Norris Center 100

8:30	Jacob Dumbleton (Steffenson)	Investigation of Techniques to Increase DESI-MS Signal Intensity for Peptides and Proteins
8:45	Carmen Weddell (Bollman)	That's Some Messed-Up Music! (A Mathematical Approach to N-Tone Equal-Temperament Pitch Systems)
9:00	Kristen Krum (McCurdy)	Repression of Autoreactive B Cells by TNF
9:15	Elizabeth Jewell (Saville)	Structure and Function of the Transcriptional Regulator AcrR
9:30	Andrew Fidler (Miller)	How Dishwasher Soap and Superconductors Are Related: The Structure and Dynamics of Two-Dimensional Superconducting Froths
9:45	Stacy Capehart (French)	Planaria <i>Dugesia tigrina</i> as a Model Organism to Test Novel Drugs for the Treatment of Schistosomiasis
10:00	Andrew Brusoe (McCaffrey)	Synthesis of Diimino Semiquinones for Use as Single Molecule Magnet Ligands
1:15	Paul Beach (Saville)	The Role of Netrin and Slit in the Induction of Cellular Growth and Cellular Growth Genes
1:30	Marita Hamilton (Saville)	Understanding the Repair Mechanism of DNA Double-Strand Breaks of <i>Drosophila melanogaster</i>
1:45	Lisa Anderson (Harris)	Anti-Cancer Drug Discovery: A Green Chemistry Approach
2:00	Rachel Lippert (McCaffrey)	Exploring the Extreme: Enzyme Analysis of the Thermophilic Bacterium <i>Thermotoga maritima</i> —Structure and Function Studies of ADP-Glucose Pyrophosphorylase
2:15	Danielle Lord (B. Lincoln)	A Geochemical Analysis of Absaroka Volcanics from Dead Indian Hill, Northwest Wyoming
2:30	Meagan Bosket (Wilch)	Explosively Erupted Hydrovolcanic Deposits at Minna Saddle, Antarctica: Results of 2007-08 Field Analysis
2:45	Rasleen Saluja (Saville)	Development of a Novel Genetic Assay to Measure Reverse Transcriptase Fidelity
3:00	Elizabeth Weage (Olapade)	Comparisons of Antibiotic Resistance Patterns of Bacterial Isolates from the Kalamazoo River
3:15	Shauna Paradine (French)	A Novel and Straightforward Synthesis of Dibenziodolium and Bis-dibenziodolium Salts Using <i>m</i> -CPBA as a Versatile Oxidant
3:30	Jacob Skeans (Harris)	Getting Ahead of the Game: The Degradation of ([EMIM][BF ₄])
3:45	Andrew Brusoe (McCaffrey)	Synthesis of Cannabimimetic Indoles for Use as Cannabinoid Receptor Ligands
4:00	Erica Tauzer (Skean)	Mapping the Distribution of <i>Zanthoxylum</i> (Rutaceae), the Prickly-Ashes, in North America

FORUM #2—Towsley Lecture Hall/Norris Center 101

8:30	Catherine Fontana (Pheley)	The Development of America's Environmental Conscience: Actualizing Secondhand Nature at Walden Pond State Reservation and through U.S. Environmental Policy
8:45	Johnathan Jordan (Vaughn-Southard)	Dance and Technology
9:00	Shelby Davis (Wahl)	"A New Mirror": Collaborations in Beauty; Photographic Investigations of Perceptions of Beauty and Confidence
9:15	Allison Gessner (Van de Ven, Ball)	Classical Improvisation: Writing Three Original Cadenzas for W.A. Mozart's Oboe Concerto K. 314
9:30	Jason Sebacher (MacInnes)	"Ay me!": Psychoanalysis and the Narrative of Grief in <i>Lycidas</i>
9:45	Ben Evans (Wickre)	Philip C. Curtis: An Analysis of Gender and Intentionality in the Work of an American Surrealist
10:00	Meredith Whitehouse (Mourad)	God-Loving Liberals: Why the Religious Left Gets Left Out
10:15	Claire Furness (Wickre)	The Gender of Genius: The Paradox of Camille Claudel
1:15	Lauren Karcz (Brown)	"Number Thirty-Eight, Temple" (A Novel)
1:30	Ashley Larimer (Abbott, Balke, Ball)	"Chi il bel sogno di Doretta" from <i>La Rondine</i> and "Quando M'en Vo'" from <i>La Bohème</i> by Giacomo Puccini
1:45	Angela Zito (Crupi)	Run Down by a Company of Rogues: The Exclusion of the Works of John Wilmot, Second Earl of Rochester, from the Canon of English Literature
2:00	Amy Everhart (Henke)	Educators' Roles in Child Abuse Intervention: A Comprehensive Look at Child Abuse and Its Related Policies and Effects

2:15	Lisa Shanks (Abbott, Jenson-Abbott, Ball)	Maurice Ravel: Piano Concerto in G Major, Adagio assai
2:30	A'Lana Bates (MacInnes)	“To Stay and Belong to You”; L.M. Montgomery’s <i>Anne</i> Series as an Interrogation of Community
2:45	Jason Sebacher (Hoffland)	On Playwriting
3:00	Mark Anthony Arceño (Morrow)	Conversion to Christianity: The Medieval Cult of Saints in Central Africa
3:15	Megan Lupek (McCurdy)	Nesting Ecology of the Wood Turtle, <i>Glyptemys insculpta</i>
3:30	Jeff Stephens (McCurdy)	Movement Patterns and Habitat Use by Female Wood Turtles, <i>Glyptemys insculpta</i>
3:45	Megan Fitzpatrick, Ashley Ozelski (White)	Incubation in House Wrens: Testing the Effects of Ambient Temperature on Nest Attentiveness and the Clutch-Cooling and Egg-Viability Hypotheses

FORUM #3—Norris Center 102

8:30	Nick Bismack (Jechura)	Placebos, Nocebos, and Variance in Psychosomatic Plasticity: Personality Correlates of the Thin-Boundary Individual
8:45	Mallory Below (Wickre)	Through Autistic Eyes: A Visual Case Study
9:00	Ian Mondrow (Jechura)	The Effects of Sleep Deprivation on Attraction
9:15	Sarah Moilanen (Franzen)	(De) Constructing Pedophilia
9:30	Stephen Sanney (M. Walter)	The Influence of Right-Wing Authoritarianism and Social Dominance Orientation on Motivations for Voting
9:45	Megan Roberts (Jechura)	Unihemispheric Sleep in the Bearded Dragon throughout the 24-Hour Period and under Threat Conditions
10:00	Rachelle Cantin (Keyes)	The Impact of Skin Color Lessons on the Racial Attitudes of Fourth Grade Students
1:15	Cameron Harris (Wieth)	Time of Day Effects on Problem Solving
1:30	Lake Sweet (J. Walter)	Behavioral Manifestations of Social Competence in Juvenile <i>Homo sapiens</i>
1:45	Cynthia Cardwell (Wilson)	Excitation and Inhibition Asymmetry: A Failure of the Rescorla-Wagner Learning Theory
2:00	Amanda Tilot (Jechura)	Effects of Continuous Phase Shifts on Pregnancy and Offspring in <i>O. degus</i>
2:15	Michael Cole (Elischberger)	Directed Forgetting of Real-Life Events in School-Age Children: A Laboratory Experiment
2:30	Dorela Shuboni (Jechura)	The Effect of Incremental Changes in Light Onset on the Reentrainment Rate of 12-Hour Phase Shifted <i>Octodon degus</i>
2:45	Sarah Morris (Wieth)	The Effects of Expertise on Functional Fixedness
3:00	Kaycee Rashid (Jechura)	Time-Dependent Spatial Learning in <i>O. degus</i> with the Radial Arm Maze
3:15	Keith Zabel (Christopher)	Conscientiousness and Work Ethic Ideology: A Facet-Level Analysis
3:30	Amy Salmeto (Wilson)	Impact of a Depressive-like State on a Spatial Memory Task
3:45	Shannon Taylor (J. Walter)	Emotional Expression: Reasons and Methods for the Expression of Negative Affect in Children

FORUM #4—Norris Center 104

8:30	Jaime Green (Hagerman)	The Porajmos: The Gypsy Holocaust
8:45	Scotty Bruce, Lindsay Guise, Sarah Jose, Chelsea Knoop (Frandsen)	Google Online Marketing Challenge
9:00	Paul Gehres (Dick)	Michigan’s Faith in Ethanol
9:15	Danielle Joseph (Ariza)	Belonging: Ethiopian Jewry
9:30	Dayna Cleland (Mullin)	Study Abroad or Party Abroad? Experiential Learning, International Students, and Their Hosts
9:45	Jessica Jakubik (Grossman)	A Case Study Analysis of the USA Patriot Act
10:00	Bethany Coston (Melzer)	A Day at the Movies: Cinematic Violence and Its Effects on Masculine Self-Perception and Patriarchal Ideology among College-Aged Men

(continued on next page)

1:15	Lauren Sayig (Schlewitz)	Sweet Cherry Summers: The Lives of Migrant Farm Workers in Northwestern Michigan
1:30	David Geer (Franzen)	Gay and Its Discontent: Reading Race, Gender, and Sexuality within the Discourse Production of Post-Stonewall Activism
1:45	Sara Wycoff (Grossman)	The Department of Homeland Security: A Risk-Based Analysis of Its Priorities and Sustainability
2:00	Caroline Honour (Lamouria)	Lesbian Vampires and Other Femmes Fatales in Nineteenth-Century British Literature
2:15	Arielle Carter (Grossman)	Conventional Arms Transfers and the Implications for Political and Civil Rights
2:30	James Harris (Hagerman)	The Politics of Command: An Analysis of the German General Staff during the First World War
2:45	Michael Stout (Cocks)	Modern Fighting Power: Comparing the German and American Armies of World War II
3:00	Grace Ficker (Renkin)	We Are Everywhere: Chilean Lesbians
3:15	Ani Hagopian (Cocks)	The Forgotten Genocide: The History of the Armenian Genocide and the Diaspora's Efforts for Recognition
3:30	Andrew Brennan (Dick)	God's on Both Sides: White Protestants and the Civil Rights Movement
3:45	Emily Archer (Grossman)	The Failure of Humanitarian Intervention: International Response to the Rwandan Genocide

POSTER PRESENTATIONS—Science Complex Atrium, 4:00-5:00 p.m.

Lisa Anderson (Harris)	Anti-Cancer Drug Discovery: A Green Chemistry Approach
William Andert (French)	Progress toward a Chiral Hypervalent Iodonium Ylide
Christina Andries (Bartels)	A New Approach to Dinosaur Ichnology Studies: Using GIS for the Analysis and Interpretation of Theropod Dinosaur Trackways
Mallory Below (Wickre)	Through Autistic Eyes: A Visual Case Study
Nick Bismack, Andrew Rhodes (M. Walter)	Strange Behaviors in Strange Situations: An Empirical Examination of the External Validity of the Social Psychological Experiment
Kris Doty (Christopher)	Ambivalent Sexism and Work Ethic Ideology
Christopher Henes (Rohlman)	Engineering a Steady-State FRET Assay for the <i>Twort</i> Group I Ribozyme
Sarah Kelley (McCaffrey)	Substituent Effects on Electron Exchange in Phenoxide-Bridged Dimanganese Complexes
Kristen Krum (Schmitter)	Reduction of Uranium (VI) to Uranium (IV) by Microbes at Multiple Depths with the Addition of Electron Donors
William Lewis (White)	Analysis of the Vocalizations of the Northern Cardinal
Rachel Lippert (McCaffrey)	Exploring the Extreme: Enzyme Analysis of the Thermophilic Bacterium <i>Thermotoga maritima</i> —Structure and Function Studies of ADP-Glucose Pyrophosphorylase
Alexander McKelvy, Megan Roberts (Jechura)	Time-Dependent Spatial Learning in <i>O. degus</i> with the Radial Arm Maze
Alexander Parker (Mullin)	Information's Impact on Childhood
Laura Pollum, Reid Smith (Lewis)	Iodine in Clathrate Hydrate Cages
Philipp Roosen (French)	<i>ortho</i> -Positioning Modifications of Chiral Iodoarenes
Amy Salmeto (Wilson)	Amygdala Volume in a Genetic by Environment Rodent Model of Depression
Jennifer Sims (Johnson)	Childhood Perceptions of Physical Fitness, Health, and Nutrition
Elizabeth White (Olapade)	The Abundance and Compositional Variations of Surface-Associated Bacterial Populations in Teeth Plaque Assemblages in Response to Food Consumption
Keith Zabel (Christopher)	Protestant Ethic Ideology: Its Multifaceted Relationship with Just World Beliefs, Social Dominance Orientation, and Right-Wing Authoritarianism
Genomics Class Robert Bailey, Molly Estill, Jim Geary, Marita Hamilton, Cameron Harris, Elizabeth Jewell, Emily Leatherman, Rachel Lippert, Rasleen Saluja, Amanda Tilot (Saville)	Genomics at Albion

ABSTRACTS OF STUDENT PRESENTATIONS

LISA ANDERSON, '09

Anti-Cancer Drug Discovery: A Green Chemistry Approach

Faculty Sponsor: Clifford Harris

Major: Biochemistry
Hometown: Cadillac, Mich.

Green chemistry is the initiative that promotes sustainable technical solutions to industrial and environmental problems by reducing or eliminating waste in the design, manufacture, and use of chemical products. This approach was put into practice in the recent development of a potential new anti-cancer drug. Specifically, these compounds were prepared using an extremely efficient method called a multicomponent reaction. Advantages over more traditional methods include reduction of waste, conservation of energy, ease of use, and increased safety. A variety of new compounds were synthesized using this technique and then screened to determine their effectiveness against various types of cancer. The most effective compound discovered in this study rivals the anti-cancer drug etoposide in preliminary tests. This research has been published in the *Journal of Organic and Biomolecular Chemistry*, was presented in fall 2007 at the Society for the Advancement of Chicanos and Native Americans National Conference, and was presented in April 2008 at the American Chemical Society national meeting.



Supported by: National Science Foundation Research Experiences for Undergraduates. This research was conducted at New Mexico Institute for Mining and Technology under the guidance of Alexander Kornienko, Department of Chemistry, Snezna Rogelj, Department of Biology, and Scott Shors, Department of Biology.

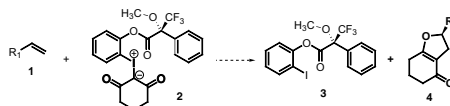
WILLIAM ANDERT, '09

Progress toward a Chiral Hypervalent Iodonium Ylide

Faculty Sponsor: Andrew French

Major: Chemistry
Hometown: Stevensville, Mich.

The French research group has been interested in the synthesis and evaluation of chiral hypervalent iodine reagents (CHIRs) for the past decade. These reagents have been shown to add asymmetrically to olefins and enolizable ketones with moderate enantioselectivity. Recent results have shown that ether-based CHIRs are capable of reacting catalytically. We wish to extend this chemistry to esters. The research presented herein describes the synthesis of the Mosher's ester of 2-iodophenol. It is our hope to form iodonium ylides using this iodine-based ester and evaluate its stereoselectivity in cycloaddition reactions. Thus far, these compounds seem promising, and work on them is continuing.



Supported by: FURSCA-Robson Fellowship

CHRISTINA ANDRIES, '08

A New Approach to Dinosaur Ichnology Studies: Using GIS for the Analysis and Interpretation of Theropod Dinosaur Trackways

Faculty Sponsor: William Bartels

Major: Geology
Hometown: Camp Hill, Pa.

Ichnological (trace fossil) studies of dinosaur trackways typically use traditional compass and tape methods to map and analyze track sites. This process involves creating a grid overlaying the track site, collecting measurements, and analyzing the track site by hand. Though effective, this method is labor-intensive and leaves room for human error. My study uses ArcMap, a GIS (Geographic Information Systems) computer program, as an alternative to traditional interpretation methods.



Theropods include all predatory dinosaurs. They were small (<1m) to large (>15m) obligate bipeds with tridactyl feet and a digitigrade stance (walked on their toes). They had sharp, recurved claws on their feet and splaying toes giving them distinctive footprints similar to those of their avian descendants. Theropod trackways are the most common dinosaur tracks due to their gracile feet (leaving distinct deep footprints), their active lifestyles as predators, and the presence of several species in all dinosaur faunas.

Theropod trackways from several localities were imported into ArcMap where shapefiles of individual trackways were created. To test the efficacy of this program, measurements such as stride (same foot), pace (left to right foot), angulation (angle from trackway midline to each footprint), and footprint length were taken to calculate speed and assist in the identification of the track maker.

Results indicate that different species of track makers can be more easily identified when GIS parameters are analyzed. Theropod dinosaur speeds are also more easily, and perhaps more accurately, estimated using GIS shape analyses.

MARK ANTHONY ARCEÑO, '10

**Conversion to Christianity:
The Medieval Cult of Saints in
Central Africa**

Faculty Sponsor: Kara Morrow

Majors: French, International Studies
Hometown: Southfield, Mich.

The late Middle Ages saw an era of expansion that would introduce the Age of Discovery in the fifteenth and sixteenth centuries. As devout interest in Christianity escalated, church officials used the cult of saints to obtain and maintain ecclesiastical and political power. The cult of saints aided in the conversion of indigenous people to Christianity as it began to spread beyond the boundaries of Europe.

Today, Christianity continues to play a strong role in Central African culture. As such, the subject of this talk is centered on specific cults in this region and their development from medieval Europe to indigenous tribes in Central Africa. Especially visible through the cults of Saint Anthony and the Virgin Mary, Christian imagery and symbols in artwork were transformed as they were introduced to new, non-European audiences. I suggest that these variations have direct links to the conversion and acceptance of Christianity among indigenous peoples. Thus, I focus my research on the development of Christian art between Europe and Africa over time, detecting specific cults that have been transplanted and reinvented since the late 1400s. These traditions therefore suggest a rich history of the medieval cult of saints in Central Africa.



EMILY ARCHER, '08

**The Failure of Humanitarian
Intervention: International
Response to the Rwandan Genocide**

Faculty Sponsor: Andrew Grossman

Major: Political Science
Hometown: Dearborn, Mich.

One of the most catastrophic human rights tragedies of the past quarter-century is undoubtedly the 1994 Rwandan genocide. In a period of just over three months, it is estimated that anywhere between 500,000 and 1.1 million ethnic Tutsi lost their lives in an attempt by the ruling Hutu government to eliminate the Tutsi population from Rwanda. While this was occurring, the United States, United Nations, and other world leaders stood back and did nothing to stop the horrific massacres taking place in Rwanda, despite indications that various national intelligence agencies were aware of the genocide and that military and diplomatic options for stopping the flow of blood were available. The puzzle, then, is why did the world do nothing? Is it not the responsibility of those nations around the world that are considered world leaders to take action in times of egregious human rights violations? These are the questions I have attempted to answer, and although no one can know for certain why nothing was done, I hope to shed some light on possible reasons for inaction. In doing so, I hope to demonstrate that the lessons learned from Rwanda can be applied to current and future policy regarding Africa as well as human rights policies.



A'LANA BATES, '08

**“To Stay and Belong to You”:
L.M. Montgomery’s *Anne* Series as
an Interrogation of Community**

Faculty Sponsor: Ian MacInnes

Major: English
Hometown: Mason, Mich.

L.M. Montgomery’s beloved children’s series beginning with *Anne of Green Gables* is preoccupied with community, from the persistent place names of the titles (Green Gables, Avonlea, The Island, etc.) to the heroine’s struggles to belong while remaining true to herself. Using my own close readings of the novels and a variety of contemporary critical sources, I argue that Anne Shirley’s early twentieth-century adolescence in conservative Prince Edward Island represents a balancing act full of compromise and conflict. She succeeds in balancing her unique personality with the demands of the community by modeling herself after the behavior of those closest to her while refusing to compromise her imagination and morals. Through the course of the eight novels in the series, Anne develops as a character whose decisions may fall into place with the expectations of her time but whose motivations remain entirely her own.



ROBERT BAILEY, '08

(See Genomics Class)

PAUL BEACH, '08**The Role of Netrin and Slit in the Induction of Cellular Growth and Cellular Growth Genes**

Faculty Sponsor: Kenneth Saville

Major: Biology

Hometown: Sturgis, Mich.

Nervous system development requires an immense amount of organizational capability. Netrin and slit are two of several signaling molecules responsible for guiding neurons to their respective targets. Though netrin and slit have been well studied for their roles as attractive and repulsive neural guidance signals, recent studies have implicated their activity in the development and maintenance of cancer. Knowing fully netrin's and slit's effects, or non-effects, on cellular growth genes and cell size along with their roles as guidance molecules is integral to better understanding development as well as advancing new treatments for neurodegenerative diseases and cancers. However, no studies have been performed to determine the effects of netrin and slit on cellular growth genes and individual cell size.



Using the model system of *Drosophila melanogaster*, or the fruit fly, several experiments were performed to show that netrin signaling, but not slit signaling, upregulates the cellular growth genes, *myc*, *cyclin D*, and *PCNA* in the developing fly wing. Corroborating evidence was yielded from studies on individual cell size given the absence of netrin signaling in the wing disc. It was found that loss of netrin signaling elicited a statistically significant decrease in cell size, a result conducive to decreased activation of cellular growth-stimulating genes. Netrin, then, not slit, appears to have a definitive role in activation of cellular growth through its downstream effects, a role necessary in the development of cancer.

Supported by: FURSCA-Gardner Fellowship

MALLORY BELOW, '08**Through Autistic Eyes: A Visual Case Study**

Faculty Sponsor: Bille Wickre

Major: Psychology

Hometown: Rochester Hills, Mich.

This project allowed for the combination of the disciplines of psychology and art, inspired by a boy with autism.

During summer 2007, I had the chance to visit a child weekly to observe and work with him during his therapy time with his at-home therapist. This therapy lasted a large portion of the day and has become part of a daily routine. The intensive therapy sessions allowed me to become familiarized with different techniques and approaches used with ABA (Applied Behavior Analysis) therapy.

I have compiled a large collection of observational notes, reference materials, and art work over the last several months. These materials were developed and organized into a visual case study, magnifying a few components of life that affect or are affected by an autistic viewpoint. I developed five themes to be represented: family, food, focus, faith, and fear. These themes are a core part of the body of work created using both image and text. The images are enlarged replications of line drawings made by the child and were created using the watercolor monoprint process. The text is a balancing aspect of each image, encouraging the viewer to look further into what the image represents. Each broadside is able to be viewed individually. However, the multifaceted approach of viewing the entire collection gives more insight into autism, allowing us to see through autistic eyes.

Supported by: FURSCA



NICK BISMACK, '08**Placebos, Nocebos, and Variance in Psychosomatic Plasticity: Personality Correlates of the Thin-Boundary Individual**

Faculty Sponsor: Tammy Jechura

Major: Psychology

Hometown: Rochester Hills, Mich.

While the influential relationship between mind and body has been well established, the increasing focus on holistic medicine has resulted in the emergence of new health-related psychological phenomena. One such phenomenon is psychosomatic plasticity, or the extent to which an individual can turn a suggestion or belief into a physiological change. This study seeks to address why we vary in terms of the strength of our mind-body relationships and what differences account for this variance.

Under the impression that they were participating in a study regarding the effects of "ATP pheromones," participants were informed that they were going to be exposed to a selective pheromone type which was typically used in a clinical setting for pain management. Additionally, participants were told that recent research suggests that the pheromones have an effect on neurological reaction time and that they also could potentially experience various health side effects (e.g., dizziness, nausea, difficulty concentrating, etc.) as a result of the pheromones. In reality, ATP pheromones are a fictional chemical family, and participants were only being exposed to a clove oil placebo which did not contain pheromones. Participants were assessed for reaction time, pain tolerance, and symptom prevalence before and after being exposed to the fictional ATP pheromones. Any changes in these variables would be due to a person's expectations or beliefs. Psychosomatic plasticity was measured by looking at changes in these variables and was then correlated with various personality factors, creating a personality profile of the highly psychosomatic individual. The results and implications of this study will be discussed.

Supported by: FURSCA



NICK BISMACK, '08

Major: Psychology
Hometown: Rochester Hills, Mich.

ANDREW RHODES, '08

Major: Psychology
Hometown: Walled Lake, Mich.

Strange Behaviors in Strange Situations: An Empirical Examination of the External Validity of the Social Psychological Experiment

Faculty Sponsor: Mark Walter

Considering the longstanding debate over the external validity of laboratory behavior in psychological experiments, this study sought to empirically evaluate these claims in terms of the manipulations and methodological strategies associated with them.



Rhodes

A comparison of helping behavior between responses in a laboratory setting, a laboratory setting with deception, and a field study were used to determine the external validity of the laboratory experiments and the effectiveness of deception. Chi-square analysis indicated significant differences in helping behavior between laboratory and field conditions, $\chi^2(1) = 4.69, p < .05$, and between self report, laboratory deception, and field conditions, $\chi^2(2) = 17.00, p < .05$. The results from this study suggest that the demand characteristics present in laboratory settings are too salient for reproducing genuine helping behavior and that deception alone is not sufficient for generating external validity in laboratory settings.

MEAGAN BOSKET, '09

Explosively Erupted Hydrovolcanic Deposits at Minna Saddle, Antarctica: Results of 2007-08 Field Analysis

Faculty Sponsor: Thomas Wilch

Major: Geology
Hometown: Eureka, Mont.

During December 2007 and January 2008, I participated in the second field season of the NSF-funded project, "Collaborative Research: Late Cenozoic Volcanism and Glaciation at Minna Bluff, Antarctica:



Implications for Antarctic Cryosphere History." Minna Bluff, a peninsula that extends 50 kilometers eastward from Mount Discovery into the Ross Ice Shelf, was built by volcanic eruptions from at least 11-7 million years ago. The overall objective of the project is to use volcanic and glacial stratigraphic records to reconstruct past ice fluctuations in Antarctica.

As part of the broader Minna Bluff project, I completed a detailed mapping project of a series of layered volcanoclastic deposits that comprise a small nunatak in the saddle between Mount Discovery and Minna Bluff. Fieldwork included measuring a stratigraphic section on the east side of the outcrop, detailed sampling of the outcrop, and mapping structural components using a GPS. Deposits include both planar and cross-bedded units, as well as fine-grained layers rich in ash-coated volcanic lapilli. Muddy damage zones along fault planes and soft sediment deformation of the surrounding deposits suggest that the deposit was wet when faulting occurred. Offset of faults ranged from one meter to greater than 30 meters. Large spoon-shaped deposits were interpreted to be the result of slumping of water-saturated material, which created angular unconformities with the surrounding layers in the outcrop. The characteristics of the deposits and the deformation suggest that water had a significant impact during and after the eruption. A likely source of water is meltwater from the

surrounding ice sheet. Future research will focus on establishing the eruption style and environment by dating and detailed description of the rock samples.

Supported by: National Science Foundation

ANDREW BRENNAN, '08

God's on Both Sides: White Protestants and the Civil Rights Movement

Faculty Sponsor: Wesley Dick

Major: English
Hometown: Milford, Mich.

In his play *Blues for Mister Charlie*, James Baldwin repaints Money, Mississippi and the murder of Emmett Till, dividing the small



town's population into "Whitetown" and "Blacktown" with church leaders directing the opposing parties—an image that mirrors both the Jim Crow South and many contemporary urban centers, metropolitan Detroit being a prime example. The involvement of black religious leaders in the struggle for civil rights in America is well-known. What is not well-known is the passivity, reluctance, and resentment with which the white church approached America's civil rights movement. Despite similar—often theologically identical—religious views, many white religious leaders were hesitant to support the civil rights movement out of a lack of conviction, paternal racism, or fear for their jobs and lives, and most white church leaders shied away from the issue for over a decade.

A cross-denominational summer research project on the role of white Protestants in the civil rights movement revealed that in defiance of progressive clergy and church officials, it was the white laity who pressured their respective religious institutions toward apprehension, inactivity, and, occasionally, whites-only policies. For those clergy who chose to oppose the racism of their congregation, jobs and lives were at risk. As the civil rights movement progressed from non-violent civil disobedience to combative, black power retaliation, white Protestants' approach to black civil rights shifted from institutional exclusion to paternal, token

inclusion—the state in which many traditionally white Protestant denominations remain today.

Supported by: FURSCA

SCOTTY BRUCE, '08

Major: Economics and Management
Hometown: Ellsworth, Mich.

LINDSAY GUISE, '09

Majors: Economics and Management,
Communication Studies
Hometown: Brighton, Mich.

SARAH JOSE, '09

Major: Economics and Management
Hometown: Canton, Mich.

CHELSEA KNOOP, '09

Major: Economics and Management
Hometown: Dearborn, Mich.

Google Online Marketing Challenge

Faculty Sponsor: Michael Frandsen



Bruce



Guise



Jose



Knoop

Interactive marketing is an evolving trend in which companies put more effort into listening to their customers' wants and needs, and then incorporate their findings into their strategy. This approach develops more of a relationship between the company, its

customers, and the product or service it is attempting to market. There are several components to this form of marketing, the prominent one being online. Given the growth of interactive marketing and its prospects for the future, we wanted to learn more about it. As part of that investigation, we participated in the Google Online Marketing Challenge.

The Google Online Marketing Challenge is designed to be a hands-on exercise for undergraduate or graduate students in classes such as advertising, e-commerce, integrated marketing communication, management information systems, marketing, and new media technologies. The goal of the competition is to have student teams work with a local business to organize, manage, and evaluate an interactive, online marketing campaign using Google's AdWords application. Google AdWords is a keyword-targeted advertising program utilized by businesses all over the world.

The local business we selected was Bellissima Bridal in downtown Albion. Through this campaign, Bellissima Bridal will achieve a new Web site design, will get more exposure via a new interactive marketing strategy, and will gain a broader audience. To achieve this goal, we will complete marketing research, competitive analysis, and testing of the different keywords.

Supported by: Google

ANDREW BRUSOE, '08

Synthesis of Diimino Semiquinones for Use as Single-Molecule Magnet Ligands

Faculty Sponsor: Vanessa McCaffrey

Major: Chemistry
Hometown: Toledo, Ohio

The work toward the synthesis of the free radical containing 2,5-diimine-3,6-dialkylsemiquinone ligands is reported. These free radical-containing ligands are of interest due to their potential use in single molecular magnets (SMMs),



which combine the magnetic properties of organic-centered free radicals and metal-centered unpaired electrons. The aim of SMMs is the reduction of magnetic domain size, which could increase digital storage density by a factor of 10,000. The reduced forms of the desired ligands have been synthesized in varying yields. Ideal oxidation conditions of these precursors, which proceed through a dehydrogenation, remain elusive. Upon completion, the ligands can be coordinated with various metals and can be measured for their magnetic susceptibility.

Supported by: FURSCA

ANDREW BRUSOE, '08

Synthesis of Cannabimimetic Indoles for Use as Cannabinoid Receptor Ligands

Faculty Sponsor: Vanessa McCaffrey

Major: Chemistry
Hometown: Toledo, Ohio

Synthetic cannabinoids may play a large role in treating symptoms associated with AIDS, various cancers, Alzheimer's, anorexia nervosa, glaucoma, and other prevalent diseases. The syntheses of new derivatives of 1-alkyl-3-arylylacetylindoles are reported. These molecules are of interest because previous studies have shown that 1-pentyl-3-phenylacetylindoles have good affinity, while maintaining selectivity, for human cannabinoid receptors.

These affinities are of interest because they allow for the continued understanding of structure activity relationships of cannabinoid receptors and their ligands, which helps in synthetic drug design.

Supported by: FURSCA

RACHELLE CANTIN, '08

The Impact of Skin Color Lessons on the Racial Attitudes of Fourth Grade Students

Faculty Sponsor: Barbara Keyes

Major: Psychology
Hometown: Fenton, Mich.

Previous research (e.g., London, Tierney, Buhin, Grego, and Cooper, 2002) found that multi-cultural education reduced adherence to stereotypes by introducing students to positive aspects of other cultures,



openly discussing the racial dynamics of this country, and providing non-competitive interaction with members of different races/ethnicities. The current study investigated the impact of six classroom lessons about the science of skin color on children's racial attitudes. Two fourth grade teachers, one African-American and one Caucasian, gave the skin color lessons to their classrooms. The Multi-response Racial Attitude measure (MRA; Doyle & Aboud, 1995) was used to assess racial attitudes before and after the 38 participants were exposed to the lessons. Bias (rating the lighter-skinned target more positively) and counter-bias (rating the darker-skinned target more positively) was calculated and analyzed. Although results showed no difference in racial bias between the pre- and post-tests, the analysis of counter-bias scores revealed a significant interaction between time of administration and race of teacher ($p < .05$). The counter-bias scores of children in the African-American teacher's classroom increased significantly after the lessons, whereas the counter-bias scores of children in the Caucasian teacher's classroom remained unchanged. These findings stressed the importance of children's interactions with a positive minority role model from whom they can learn about racial differences.

Providing children with the opportunity to explore and discuss the origins of skin color has the potential to influence their attitudes on race.

Supported by: FURSCA

STACY CAPEHART, '09

Planaria *Dugesia tigrina* as a Model Organism to Test Novel Drugs for the Treatment of Schistosomiasis

Faculty Sponsor: Andrew French

Major: Chemistry
Hometown: Rochester, Mich.

Schistosomiasis, a parasitic disease caused by three species of *Schistosoma*, predominates in tropical, developing regions of Africa, South America, the Caribbean, Asia, and Southeast Asia. Over 200 million people are infected with



schistosomiasis, and the disease is responsible for over 200,000 deaths each year. A safe and effective drug, Praziquantel (PZQ), is currently the standard treatment for schistosomiasis. PZQ has been shown to induce contractions and disrupt calcium homeostasis in *Schistosoma*. This disruption in calcium homeostasis causes the *Schistosoma* to die and exit the circulatory system. However, PZQ does not prevent re-infection and is cost-prohibitive in third world nations. This research involves testing novel, low-cost drugs, including caffeine (stimulant found in coffee and soft drinks), capsaicin (active component of hot peppers), and curcumin (component of spice often used in Indian cooking), to determine whether or not these drugs result in similar behavioral changes in *Dugesia tigrina*, a cousin of the *Schistosoma*. The progress in determining both the effectiveness and mechanism of each of these novel drugs is presented.

Supported by: The American Society of Pharmacology and Experimental Therapeutics and Michigan State University's Department of Pharmacology and Toxicology Summer Undergraduate Research Fellowship. This research was conducted at Michigan State University under the guidance of Peter Cobbett.

CYNTHIA CARDWELL, '08

Excitation and Inhibition Asymmetry: A Failure of the Rescorla-Wagner Learning Theory

Faculty Sponsor: W. Jeffrey Wilson

Major: Psychology
Hometown: Jackson, Mich.

The Rescorla-Wagner model describes excitation and inhibition as symmetrically opposite processes and holds that learning arises when available stimuli fail to predict the unconditioned stimulus (US) accurately.



The model suggests a phenomenon we term "instatement," whereby a neutral stimulus paired with an effective conditioned inhibitor (CI) will acquire excitatory strength, despite never being reinforced (the neutral stimulus of "zero" value must gain positive strength to balance the "negative" CI and sum to zero on non-reinforced presentations). Only weak support of instatement has been demonstrated (Baker, 1974; Rescorla, 1971; but see Soltysik, 1985), yet the related phenomenon of superconditioning has enjoyed much success (e.g., Pearce & Redhead, 1995; Taukulis & Revusky, 1975).

Instatement was tested by establishing a conditioned inhibitor (X) in rats using an appetitive trace procedure wherein subjects were reinforced in the presence of the conditioning stimulus (A) except when presented with X. We then introduced the novel stimulus (B) in conjunction with X without reinforcement. Next, B was reinforced and a "savings" test was conducted to evaluate accrued excitatory strength. In Experiment 1, stimuli were presented serially such that $A \rightarrow US$, $A + X \rightarrow \text{No US}$. To eliminate the potential for additional stimulus-stimulus associations, Experiment 2 utilized simultaneous presentation of all conditioning stimuli (e.g., $A \rightarrow US$, $AX \rightarrow \text{No US}$). The results from the "savings" tests in Experiment 1 and 2 failed to support the instatement prediction, calling into question the Rescorla-Wagner model's proposed symmetry between excitation and inhibition.

Supported by: FURSCA-Metalonis Fellowship, Psychology Department

ARIELLE CARTER, '08**Conventional Arms Transfers and the Implications for Political and Civil Rights**

Faculty Sponsor: Andrew Grossman

Majors: International Studies, Political Science

Hometown: Grand Rapids, Mich.

Does the trade of conventional arms decrease the level of international security? Does the increase of national military expenditures lessen the human rights practices and status of nations?



The objective of the paper at hand is to address and shed some light on the nature of the relationship between global security and conventional arms transfers. To test the nature of this relationship, an empirical rational choice approach is utilized to understand the possible tenuous relationship between nation-state arms trade and global security, in terms of human political and civil rights. A bivariate analysis will be conducted using aggregate data from the United Nations Human Development Index of the imports and exports of conventional arms transfers along with country rankings on political/civil rights from the Cingranelli-Richards Human Rights Database for the time period of 1990 to 2004 to explore the aforementioned relationship. I would anticipate the results would reveal a statistically significant negative, but possibly weak relationship of conventional arms transfers and the status of human rights within nations.

DAYNA CLELAND, '08**Study Abroad or Party Abroad? Experiential Learning, International Students, and Their Hosts**

Faculty Sponsor: Molly Mullin

Majors: Anthropology, Spanish
Hometown: Millington, Mich.

Study abroad . . . in the shadows of a smoke-filled bar. Although this is not how the majority of students spend their time abroad, is there room for improvement? According to the Institute of International Education (IIE),



college study abroad programs have seen an increase of almost 150 percent over the last 10 years. Although there are more students abroad than ever before, the time they spend abroad is shorter. The IIE shows that 52.8 percent of students who studied abroad last year chose short-term programs while only 5.5 percent elected a full year. In addition to a shorter time, the majority of students studied in Europe (IIE). This trend toward shorter stays and study in western countries already likely to be familiar to American students raises these questions: How educational is study abroad? Can we conclude that students who go abroad truly increase their cultural awareness and learn to see the world from different perspectives?

Through in-depth interviews with program directors, students, faculty, and host families during my semester in Seville, Spain, I have analyzed the factors in the study abroad experience that contribute to learning to see the world from different perspectives. Is it the place and amount of time? Or is it experiential learning, living with host families, traveling, or a combination? Finally, I examine the relationship between study abroad companies and colleges, including implications for Albion College's off-campus policy and the opportunities available to students.

Supported by: FURSCA

MICHAEL COLE, '08**Directed Forgetting of Real-Life Events in School-Age Children: A Laboratory Experiment**

Faculty Sponsor: Holger Elischberger

Major: Psychology

Hometown: Hudsonville, Mich.

Directed forgetting (DF) is superior memory for information one was instructed to remember as opposed to information one was instructed to forget. Harnishfeger and Pope (1996) found minimal DF of word list items in



first graders, whereas fifth graders performed similarly to adults. Joslyn and Oakes (2005) established DF of actually experienced events in a sample of college students. However, no study to date has examined the developmental changes in DF of personal experiences.

In the present study, participants from the first, third, and fifth grades completed two simple science activities, specifically building a lemon battery and an electromagnet. A researcher instructed each participant to remember one of the activities and forget the other. Children's memory for both activities was assessed after a two-week delay. In order to examine potential mediators of DF, a Stroop task was administered to measure cognitive inhibition, and a picture memory task to measure differential rehearsal.

Data analyses yielded a slight age-related increase in DF of the two activities, but overall levels of DF were low. In contrast, the trend for word list DF established in the literature was replicated. While both inhibition and differential rehearsal task data followed the expected age-related trends, neither measure was associated with indices of DF.

We interpret this pattern of results as a reflection of the context sensitivity of cognitive processes in children. Regardless of the specific underlying mechanisms, DF may be a more demanding task if the stimulus material is complex and/or inherently interesting.

Supported by: FURSCA

BETHANY COSTON, '08

A Day at the Movies: Cinematic Violence and Its Effects on Masculine Self-Perception and Patriarchal Ideology among College-Aged Men

Faculty Sponsor: Scott Melzer

Majors: Sociology, Communication Studies
Hometown: Muskegon, Mich.

Men's violence in the United States is widespread. According to the Bureau of Justice Statistics, from 1993 to 2004, men perpetrated 97 percent of all intimate crimes—homicides, rapes, robberies, and assaults by



a current or former spouse, boyfriend, or girlfriend, including same sex relationships. Men aged 15-29 perpetrated the majority of this violence. Scholars have shown that men's violence is not due to popular or essentialist explanations about instincts or testosterone. Instead, this violence is a result of cultural definitions of and expectations for masculinity, power, and control.

My research focuses on the culture of patriarchy, and how it contributes to violence against women and violence in the media. I propose a synthesis of previous theories on men's intimate violence against women, with new hypotheses of the effects of cinematic violence on masculine perception and patriarchal ideology.

To study these issues, I surveyed 121 men at Albion College, and half of these men saw a short film reel displaying five of the top grossing films of 2005 and 2006: *Spiderman 2*, *Batman Begins*, *Pirates of the Caribbean: Dead Man's Chest*, *The Punisher*, and *The Departed*. Comparative analyses were done between these groups to assess the extent of movie violence's influence on certain ideological opinions and violent behaviors.

While much of the multivariate data was rendered useless due to sampling error, correlational analysis revealed interesting relationships that provide potential insight into the types of violence men perpetrate (incidental, friends vs. partners), reasons for violence (emotional, media, etc.), and

what seems to be a distinguishable difference between certain kinds of physical violence (roughhousing vs. fighting). Future research should lend itself to in-depth analysis of these issues.

Supported by: FURSCA

SHELBY DAVIS, '08

“A New Mirror”: Collaborations in Beauty; Photographic Investigations of Perceptions of Beauty and Confidence

Faculty Sponsor: Gary Wahl

Majors: Art, Economics and Management
Hometown: Detroit, Mich.

This project used the process of consultations and photographic sessions to address the interplay between interior confidence and exterior presentation. Participants took part in an interview, make-over, photographic shoot, and then a post-interview in order to give them a new vocabulary and more options to make considered choices about how they want to project themselves through their appearance. This allowed the participants to gain a new confidence in themselves and the knowledge of how to use these tools for projecting this confidence outward to open new opportunities.



I was interested in refining my control of the photographic process from set design, wardrobe, and make-up to lighting, and digital post-production and output. Transforming perceptions and personally impacting people in this manner through this accessible form of art will raise the awareness for this type of art and enhance people's experiences as a whole after being a part of this project. It will show yet another way that art is not only beautiful, but an excellent form of communication and self-expression that has a psychological impact.

Supported by: FURSCA

KRIS DOTY, '10

Ambivalent Sexism and Work Ethic Ideology

Faculty Sponsor: Andrew Christopher

Major: Psychology
Hometown: Grand Blanc, Mich.

Prior research has established a link between right-wing authoritarianism (RWA) and social dominance orientation (SDO) and different forms of prejudice. Christopher and Wojda (2008) found that RWA



was predictive of traditional employment role preference, for instance, that men and women should pursue gender stereotypical occupations. However, SDO was predictive of employment skepticism, the belief that women lack the ability to succeed in traditionally male-dominated occupations. In addition to RWA and SDO, endorsement of traditional Protestant ethic beliefs (e.g., centrality of work in one's life) has also been implicated in prejudicial feelings.

My research attempted to examine the relative contributions of RWA, SDO, and different Protestant ethic beliefs on two forms of prejudice toward women: hostile sexism (e.g., the notion that feminists are making unreasonable demands) and benevolent sexism (e.g., the notion that women are more pure and moral than are men).

I am in the process of collecting data from more than 500 respondents in the United States and England. These respondents are completing measures of RWA (e.g., “The real keys to the ‘good life’ are obedience, discipline, and sticking to the straight and narrow”) and SDO (e.g., “It is not a problem if some people have more of a chance in life than others”). In addition, these respondents are completing measures of seven different Protestant ethic beliefs, including centrality of work, belief that hard work is rewarding, avoidance of wasting time, anti-leisure sentiments, delay of gratification, self-reliance, and morality. Finally, respondents are completing measures of hostile and benevolent sexism.

JACOB DUMBLETON, '08**Investigation of Techniques to Increase DESI-MS Signal Intensity for Peptides and Proteins**

Faculty Sponsor: Daniel Steffenson

Major: Chemistry
Hometown: Northville, Mich.

Desorption electrospray ionization-mass spectrometry (DESI-MS) is an open-air surface sampling/ionization technique that combines easy sample preparation with a capability for high throughput analysis. Our group is investigating the desorption/ionization process from a variety of surfaces with the goal of elucidating ways to substantially increase desorption/ionization efficiency, and thus increase overall analyte signal intensity in the mass spectrum. In this study, we examined analytes spotted onto or separated on thin-layer chromatography (TLC) plates. The signal level of selected compounds desorbed/ionized from these plates was examined with acidic or basic modifiers added to the DESI spray solvent and TLC plate, following derivatization of the analytes on the plate, heating the plate, and heating the atmospheric sampling capillary into the mass spectrometer. We modified the spray solvent with 0.1% formic acid and 0.1% ammonium hydroxide. Peptide derivatizations were attempted using the common protein stains fluorescamine, ninhydrin, and o-phthalaldehyde.

Acidic and basic modifiers proved ineffective in increasing overall intensity except in one case, and derivatization with protein stains only further complicated the spectra. Heating of TLC plates led to a variety of results for peptides tested. An increase in signal was observed for leucine-enkephalin, and acetyl-RAYIFAVR, while the bradykinin spectra revealed more fragmentation. A series of dipeptides was tested with varying solvents at different plate temperatures, which showed more fragmentation with increasing temperature. We also heated the atmospheric sampling capillary to 140°C. For leucine-enkephalin and bradykinin, a total increase in signal was observed upon heating. More importantly, an increase in the singly protonated and doubly charged species was seen for



each peptide respectively. Of all the methods investigated, heating the atmospheric sampling capillary provided the most benefit in terms of analyte signal enhancement.

Supported by: Oak Ridge Science Semester, U.S. Department of Energy

MOLLY ESTILL, '09

(See Genomics Class)

BEN EVANS, '08**Philip C. Curtis: An Analysis of Gender and Intentionality in the Work of an American Surrealist**

Faculty Sponsor: Bille Wickre

Major: Art History
Hometown: Brighton, Mich.

My research up to this point has focused on attempting to interpret the manner in which the artist Philip Curtis addressed issues of gender and performativity in his artwork. Through the appropriation of a broad swath of Victorianaesque and post-Surrealist subjects, scenarios, and constructions, Curtis created a new sense of Americana stemming from a mesh of influences both classical and modern. Curtis' art carries a sense of currency due to its emphasis on place, a factor which is palpable in nearly all of his major works. Contextual questions arise, however, when one notes certain trends reflected in the artist's portrayal of women. Often cast in situations where they are either doomed to perform stereotypical roles or are entrapped in such a way as to limit their interaction both inside and outside of the picture plane, Curtis' women remain a difficult barrier to fully understanding the nature and message of his art and its cultural significance. I would argue that this ambiguity, upon closer examination, creates problems when trying to contextualize Curtis' work in terms of its importance in the broader American modern art canon.

Supported by: FURSCA



AMY EVERHART, '08**Educators' Roles in Child Abuse Intervention: A Comprehensive Look at Child Abuse and Its Related Policies and Effects**

Faculty Sponsor: Suellyn Henke

Major: English
Hometown: Alma, Mich.

Since the mid-1970s, when the Michigan Child Protection Law was passed, child abuse has become a more socially-discussed issue. Among its many implications, the Child Protection Law states the lawful requirement of "mandated reporters" to report suspicions or knowledge of child abuse to local child protective services (CPS) agencies. Included in these listed mandated reporters are educators: teachers, administrators, and school counselors.

As an education student and member of the Gerald R. Ford Institute for Public Policy and Service, I was interested in learning more about the relationship between policy and the everyday practice of educators in the child abuse intervention process. In addition to studying the policies associated with the Child Protection Law, I also conducted semi-structured interviews with nine persons with experience in education. Interviews focused on four subtopics: (1) detecting child abuse; (2) reporting child abuse; (3) short-term and long-term effects of child abuse; and (4) suggestions for improvement in the CPS and educational systems in order to more effectively prevent and intervene with child abuse.

All of the educators I interviewed expressed understanding that they were legally mandated to report suspected child abuse, but most of the teachers had no training on child abuse intervention and were uncertain about what happened once a report was made. Based on my research, my suggestions for further improvement in the intervention process include: (1) more detailed and intense teacher training on detecting and reporting child abuse, as well as on how to support students who have been abused; (2) increased interaction between CPS agencies and schools; (3) community-based initiatives



to support families and provide parenting classes and other support; and (4) increased counseling for students who have been abused, in order to break the cycle of abuse, mental illness, substance abuse, and future violence.

GRACE FICKER, '08

We Are Everywhere: Chilean Lesbians

Faculty Sponsor: Hadley Renkin

Major: Anthropology
Hometown: Farmington Hills, Mich.

Imagine living your whole life in public with the fear that in your own country, Chile, you could be stigmatized, assaulted, raped, or killed. Not only do you not have the same rights as heterosexuals, but you are forced to pretend to be one every day. You constantly search for others like you, for a place to escape the dominantly macho and heterosexist society which thinks of you as a bad thing, an embarrassment to Chile.



Lesbimeter, a system of common cultural symbols, is a social code that helps lesbians find each other and know when it is safe to be a little more open about who they are. Some women biweekly perform traditional lesbian and feminist protests in the streets forcing those around them to see them in public, while others work within the system and are only lesbians in private, but all are forced to hide and negate who they are in their everyday lives in order to survive and keep their jobs.

Most of the Chilean women I talked to did not even use their real names around me or had nicknames that they used only when performing their lesbian identity such as in a lesbian bar. When in groups such as at invitation-only dialogues at universities, women felt free to do things in public they would never have done otherwise, such as criticize Chile.

The interactions I had with the women I studied centered on their perception of sexuality, how discrimination has affected their lives, and what they think would help make society more just. These women suggested that the only solution to their dilemma, and

the dilemma of lesbians worldwide, would be to abolish the current sexual and gender categories of Chilean society. Until then they find a strength, power, and beauty through their shared identity and love.

Supported by: The School for International Training

ANDREW FIDLER, '08

How Dishwasher Soap and Superconductors Are Related: The Structure and Dynamics of Two-Dimensional Superconducting Froths

Faculty Sponsor: Aaron Miller

Majors: Physics, Chemistry
Hometown: Rochester, Mich.

While at first glance, it may seem that superconductors and dishwasher soap may have nothing in common, recent studies have found striking similarities between the two systems. When confining dishwasher soap bubbles between two glass slides, a two-dimensional froth consisting of polyhedra is formed. As time evolves, this structure coarsens, with some cells growing at the expense of other cells. The system of conventional two-dimensional foams, like dishwasher soap, has been a subject of intense interest and has been studied extensively. Surprisingly simple general laws that govern the overall structural evolution of the system, but ignore the chaotic nature of individual cells, have been developed. Magneto-optical imaging, a relatively new technique that allows for the visualization of the magnetic field, has shown that a remarkably similar structure is formed in superconducting lead samples when an external magnetic field is applied. In this new system, a two-dimensional structure of polyhedra is formed, except that the system is composed of a magnetic field and not matter, as in the case of dishwasher soap. My project has investigated the relation between these two systems, focusing on both the statistics of the structure and the evolution of the systems. Further, my project has shown that a form of the laws that govern conventional two-dimensional foams is applicable in the superconducting froth sys-



tem. This new type of superconducting froth could prove to greatly help the understanding of the general physics of foams, since the structure can be controlled to a much greater extent by the reversible manipulation of magnetic field and temperature.

Supported by: U.S. Department of Energy, National Science Foundation, Alfred P. Sloan Foundation

MEGAN FITZPATRICK, '08

Major: Biology
Hometown: Marshall, Mich.

ASHLEY OZELSKI, '09

Major: Biology
Hometown: Macomb, Mich.

Incubation in House Wrens: Testing the Effects of Ambient Temperature on Nest Attentiveness and the Clutch-Cooling and Egg-Viability Hypotheses

Faculty Sponsor: Douglas White

Incubation is a critical period in avian reproduction. Among single-parent incubating species, females face a trade-off between foraging (gaining energy) and incubating (losing energy, but increasing reproductive fitness). Females may need to spend more time and energy warming eggs when ambient temperatures are lower in order to maintain optimal egg temperature. Because larger clutches of eggs may cool more slowly, it may be beneficial for females in cooler climates



Fitzpatrick



Ozelski

to lay larger clutches to maximize foraging time. We hypothesized that females would take shorter warming and foraging bouts at extreme temperatures. We also predicted that females laying during periods of lower ambient temperature would tend to lay larger clutches. Using small temperature data loggers, called iButtons™, we recorded nest

box temperatures and ambient temperatures during the incubation periods of house wrens (*Troglodytes aedon*) in the Whitehouse Nature Center. Changes in nest temperature when compared to ambient temperature revealed when females entered and left the nest. The accuracy of this method was verified through video and direct observations. We found that foraging and warming bout length varied with temperature and time of day. However, ambient temperature did not significantly affect clutch size. The results of this study may help predict the response of bird species to climate change.

Supported by: FURSCA-Kresge Fellowship (Fitzpatrick), FURSCA-Robson Fellowship (Ozelski), A. Merton Chickering Endowed Professorship

CATHERINE FONTANA, '08

The Development of America's Environmental Conscience: Actualizing Secondhand Nature at Walden Pond State Reservation and through U.S. Environmental Policy

Faculty Sponsor: Alfred Pheley

Majors: English, Biology
Hometown: Dearborn, Mich.

In the 150 years since Henry David Thoreau's philosophical experiment at Walden Pond and the publication of *Walden, or Life in the Woods*, Walden Pond State Reservation in Concord, Massachusetts has served as an icon of American environmentalism. Given the social, historical, and environmental significance of this state park, and the particular threat to its ecological health caused by increasing tourism rates, Walden Pond was chosen for this experiment to understand and critique United States environmental policy and the extent of its protection of natural resources.



According to 105 CMR 445.032 and the U.S. EPA *Standard Methods for the Examination of Waste and Waste Water*, sample collection from recreational waters must occur at the locations and times of heaviest use. The Massachusetts Department of Conservation and Recreation samples water

from Walden Pond State Reservation at 8:30 a.m. on Tuesday mornings with a park capacity of less than 20 individuals. To evaluate the state's collection versus that prescribed by the federal government, water samples were collected on three Sunday afternoons at areas of highest use during full park occupancy (1,000+ individuals). *Enterococcus*, a bacterium found in mammalian feces, was enumerated using the membrane filtration method on mEI agar, and results were compared to the *Enterococci* populations of the following Tuesday.

Results indicated that bacteria levels were higher on Tuesday mornings as opposed to Sunday afternoons despite the difference in human population. This research discovered that current Massachusetts state regulation and EPA suggestions for water sampling do not consider or integrate the reproduction rates and persistence of bacteria in recreational waters when prescribing accurate sampling procedures. The presentation will also briefly discuss the public and environmental policies that result from this discovery.

Supported by: FURSCA-Killian Fellowship, Institute for the Study of the Environment

CLAIRE FURNESS, '08

The Gender of Genius: The Paradox of Camille Claudel

Faculty Sponsor: Bille Wickre

Major: Art History
Hometown: Brookfield, Wis.

The contemporary conception of the title of genius varies greatly from the original definition. In the age of the Roman Empire, the word genius referred to a spiritual guide who protected the patriarchal lineage of a family. Thus, it was associated with male procreative power. It was not until the eighteenth century that the term became associated with originality, immense creativity, and madness.

Discussions of who a genius is, and why he or she came to be, have generally excluded female figures because the word was originally associated with male creativity. Late nineteenth-century France is a focal point for the study of the relationship between gender and genius because of one case in particular. The



artist Camille Claudel has a very complicated relationship with the designation of genius. She was deemed one by male critics in a time when the general consensus was that it was physiologically impossible for a woman to be a genius. I have attempted to show that her associations with the word have been predominantly negative because of the jealousy of her brother and ex-lover, both of whom were geniuses. Also, her status as a woman of genius stripped her of her sexuality and legitimacy as woman and, in some cases, artist. Even though contemporary conceptions of genius do not exclude women in such an overt way, the term still carries the connotations of ignorance and judgment. Therefore, a different term should be used to recognize greatness regardless of gender.

Supported by: FURSCA

JIM GEARY, '08

(See Genomics Class)

DAVID GEER, '08

Gay and Its Discontent: Reading Race, Gender, and Sexuality within the Discourse Production of Post-Stonewall Activism

Faculty Sponsor: Trisha Franzen

Major: Women's Studies
Hometown: Taylor, Mich.

Re-contextualizing the Stonewall riots and their resulting activism is needed to fully understand the political and social shifts Stonewall helped instigate. At the same time Stonewall signified an ever-growing, and arguably *needed*, change in what a gay sexuality and identity encompassed and limited. It is impossible to critically engage with the history of Stonewall and post-Stonewall politics without a theoretical framework that privileges both gender and sexuality and the political and social effects of gender normativity and gender marginalization. Stonewall didn't start homosexual, gay and lesbian, or queer activism; it was part of a wide discourse that not only instigated but helped uncover the creation and expansion of identities, cultures, and politics.



I am interested in something beyond rethinking or reconsidering the history of Stonewall. I want to resituate—in multiple ways—the numerous identity-politic discourses that consumed the riots and post-Stonewall activism. Gay and lesbian politics during the post-Stonewall era constructed social and political geographies from which it is possible to begin mapping out theoretical understandings of what, historically and currently, *gay*: is/isn't, celebrates/polices, and signifies/marginalizes. Post-Stonewall activists were not only building the frameworks for future gay activism; they were also defining, policing, and resituating the political and social signifiers of *gay*—as an identity and as a political starting point. Many street transvestites at the time who identified as gay were pushed out of the parameters of gay identity by (mostly white) gay and lesbian activism and discourse. It soon became obvious to many gay street transvestites, especially those who were black and Latino, that gay identity was no longer a signifier that was comfortable to claim. In a sense, gay activism that rose out of Stonewall was part of a larger discourse that began to change who could and couldn't continue to comfortably claim gay as an identity.

PAUL GEHRES, '08

Michigan's Faith in Ethanol

Faculty Sponsor: Wesley Dick

Major: Earth Science
Hometown: Orrville, Ohio

Few sectors are more directly impacted by the ominous rise of oil prices than the transportation industry. Indeed, the incentive to develop alternatives grows with every price increase. With numerous options available, local governments and small startups alike hope to capitalize on this new market demand by developing the next major fuel source. The State of Michigan is no exception, viewing biofuels as the future of both transport and the state economy; the concept of obtaining energy independence by supporting local farmers is admittedly attractive. Already in 2008, Michigan's four existing ethanol plants are on target to produce approximately 190



million gallons annually, and if approved, current proposals will flood the market with an additional 540 million gallons from nine new plants by late 2009. Indeed the future looks prosperous. Michigan's legislature is attempting to incentivize biofuel production through the legislation of renewable portfolio standards while the Michigan Agribusiness Association discusses investment in the field of cellulosic ethanol.

But can agriculture ever function as reliably as the energy industry it is attempting to displace? Though businesses and conservation groups applaud the state's efforts, serious questions loom on the horizon. Fundamental economic issues regarding logistics, ethanol's questionable net energy value, and consequent negative externalities warrant inquiry. Meanwhile, concerns regarding biofuels' environmental impact on soil quality, water supply, urban air quality, and global warming remain unaddressed. Momentum continues to build, but what if this unified effort is fundamentally misguided?

Supported by: FURSCA-Burd Fellowship

ALLISON GESSNER, '08

Classical Improvisation: Writing Three Original Cadenzas for W.A. Mozart's Oboe Concerto, K. 314

Faculty Sponsors: Rebecca Van de Ven, James Ball

Major: Music Performance
Hometown: LaGrange, Ky.

Wolfgang Amadeus Mozart was born in Salzburg in 1756, and was a child prodigy. He toured Europe with his family as a *wunderkind* who could improvise a melody on the piano, then play variations on the same melody on the violin or viola. Mozart composed some 600 pieces before his death in 1791, including operas, symphonies, string quartets, piano sonatas, and solo concertos. The Oboe Concerto, K. 314 in C Major was written in 1777, shortly before Mozart moved to Vienna, for the Salzburg orchestra's new young oboist, Giuseppe Ferlendis.

A cadenza was traditionally improvised before the closing of each movement,



but since the modern emphasis on musical creativity has become accurately re-creating the written music, the practice of improvising cadenzas has fallen out of style. Most modern performers use existing cadenzas, and only the professional performers create their own. I have been studying this piece for about three years, and as part of a summer FURSCA project and my senior honors thesis, I have written my own original, historically accurate cadenzas for each of the three movements of this concerto. These cadenzas will be presented in context on Sunday, April 27, 2008 with the Albion College Symphony Orchestra.

JAIME GREEN, '08

The Porajmos: The Gypsy Holocaust

Faculty Sponsor: Christopher Hagerman

Major: History
Hometown: Auburn Hills, Mich.

The Gypsies, or Roma, have lived in Europe since the fifteenth century and have been social outcasts since their arrival. The plight of the Gypsies worsened in the nineteenth century with the development of eugenics theories and Social Darwinism. The Nazi regime, led by Adolf Hitler, sought to destroy the entire Gypsy race because it was thought their alien blood was a threat to Aryan racial purity. The Porajmos, or 'devouring,' is the name given to the specific phenomenon of Gypsy genocide during the Holocaust. The Gypsy experience in the Porajmos is often marginalized within the greater historiography of the Holocaust because of longstanding prejudice against the Roma.

Initially, the Nazis put Gypsies into internment camps and began compulsory sterilization programs. Gypsies were considered asocial, meaning that they were predisposed to criminality and laziness. The classification of asocial was later considered a hereditary racial trait by Nazi scientists, which condemned the Gypsies to a death sentence. Thereafter, Gypsies were transported across the German occupied territories to concentration camps. The Gypsy population of Europe suffered great losses at the



hands of Hitler and his associates. The cruel treatment of Gypsies during the Holocaust was not just a product of the extremist racial ideologies of the Nazis; it was also fueled by the public's abhorrence for Gypsies and their lifestyles. Even today, Roma in Europe continue to be persecuted based on centuries-old stereotypes. The Porajmos was a colossal and virulent display of anti-Gypsyism, but it was not a historical anomaly.

LINDSAY GUISE, '09

(See Scotty Bruce, '08, Lindsay Guise, '09, Sarah Jose, '09, Chelsea Knoop, '09)

ANI HAGOPIAN, '08

The Forgotten Genocide: The History of the Armenian Genocide and the Diaspora's Efforts for Recognition

Faculty Sponsor: Geoffrey Cocks

Major: Economics and Management
Hometown: Northville, Mich.

The history of the Armenian people, and especially of the Armenian Genocide, is engraved into the memory of all Armenian youth beginning at an early age. After years of being active in the Armenian Apostolic Church, I have realized how even though this event is an integral part of our world's history, it is still denied by many. The Armenian Genocide was the first genocide of the twentieth century. Carried out by the government of the Ottoman Empire during World War I, the Armenian population was almost entirely destroyed. The annihilation of the Armenian nation was planned and implemented, but covered up by the war's destruction. It was on April 23-24, 1915 that Armenian intellectuals and leaders were arrested and put to death. Shortly after, the rest of the Armenian population faced deportation, rape, and other acts of torture.



Ninety years later, the Armenian people are still fighting for recognition of this horrid event. Even though many countries, including Turkey, completely deny the existence of the genocide, many are taking steps to put it on a page of their history. Through House Resolution 106, also known as the Armenian

Genocide Bill, the United States government is currently taking action toward proper recognition. Even though the resolution has been questioned in the past, the efforts by the Armenian diaspora continue to grow stronger. With triumph comes struggle, and the diaspora will not rest until the Armenian Genocide earns its place in history.

MARITA HAMILTON, '08

Understanding the Repair Mechanism of DNA Double-Strand Breaks of *Drosophila melanogaster*

Faculty Sponsor: Kenneth Saville

Major: Biology
Hometown: Flint, Mich.

My primary research interest is a transposable element called *hobo* and its association with repair of DNA double-strand breaks. A transposable element is a specific piece of DNA that has the ability to jump into and out of chromosomes.



As the transposable element jumps out of a chromosome it causes DNA damage called a double-strand DNA break. The double-strand break is normally repaired by a cellular DNA repair mechanism, involving either homologous recombination or non-homologous end-joining (NHEJ). The inability to repair similar DNA breaks in mammals leads to severe combined immune deficiency (SCID) and a high susceptibility to cancer. Through previous research, it has been found that *hobo*-generated damage is repaired with a strong inclination for the NHEJ system. However, in previous experiments a suitable template (e.g., another chromosome) wasn't available for homologous recombination. My research focuses on a mutant allele of the vestigial gene. Through previous studies it has been found that this mutant is caused by the presence of the *hobo* element inserted within it. The main focus of my research is to determine the DNA sequence of the vestigial gene which can act as a template for repairing the DNA double break caused when *hobo* jumps out of this gene.

MARITA HAMILTON, '08

(See Genomics Class)

CAMERON HARRIS, '08

Time of Day Effects on Problem Solving

Faculty Sponsor: Mareike Wieth

Majors: Psychology, Biology
Hometown: Portage, Mich.

Research has shown time of day effects on memory, focus, working memory, and alertness. It has been proposed that during a person's non-optimal time of day the ability to focus attention and screen out irrelevant information



is reduced compared to his or her optimal time periods (Hasher, Zacks, & May, 1999). In this study, participants completed two different tasks: the Luchins water jar task, which induces focus or mental set, and the creative uses task, which encourages flexibility and creativity. It was hypothesized that a lack of focus during participants' non-optimal time of day compared to their optimal time of day will lead to a reduction in mental set and better performance on the Luchins water jar task. For the creative uses task, however, a lack of focus was predicted to hurt performance.

Results showed that participants were more likely to break mental set and less likely to return to set during their non-optimal time of day than their optimal time of day, suggesting that mental set is more easily overcome during a participant's non-optimal time of day. Results for the creative uses task showed that participants listed fewer uses for objects during their non-optimal time of day than their optimal time of day suggesting that participants are more creative during their optimal time of day. These findings not only indicate that mental set and creativity are influenced differently by time of day, but also point at differences in how time of day influences different problem-solving processes.

Supported by: FURSCA

CAMERON HARRIS, '08

(See Genomics Class)

JAMES HARRIS, '08

The Politics of Command: An Analysis of the German General Staff during the First World War

Faculty Sponsor: Christopher Hagerman

Major: History

Hometown: Bloomfield Hills, Mich.

I propose that, during their respective tenures as minister-president of Prussia and head of the Prussian general staff, Otto von Bismarck and Helmuth von Moltke, the elder demonstrated the ideal civilian-military relationship, as demonstrated by three successful wars. Bismarck was responsible for all political and diplomatic decisions (i.e., when war was necessary, the timeline for war, and war aims), and Moltke was responsible for executing that war within the political guidelines handed down to him by Bismarck. With a minor exception during the Franco-Prussian War, this model worked well to serve Bismarck's grand foreign policy aims.

Leading up to and even more so during the Great War, the *Großer Generalstab* and the German Imperial Chancellor Theobald von Bethmann-Hollweg did not fit into this model. Complete deviation from this model led to interpersonal squabbling between various leaders of the general staff and Bethmann-Hollweg, which I have dubbed "the politics of command," and ultimately negatively impacted the German military situation in World War I. In this paper, I argue that if you take any head of the German general staff during the course of World War I, you can see examples of how the "politics of command" was a constant problem.

I will focus on Falkenhayn and Hindenburg, as their leadership was full of examples of the "politics of command." These two phases of the war were full of cases of generals overstepping their role as military decision-makers, and attempting to insert themselves into political and diplomatic decisions, which was not the case in the Bismarck-Moltke model.

Supported by: FURSCA



CHRISTOPHER HENES, '08

Engineering a Steady-State FRET Assay for the *Twort* Group I Ribozyme

Faculty Sponsor: Christopher Rohlman

Major: Chemistry

Hometown: Birmingham, Mich.

RNA, a nucleic acid, is similar to DNA in that both consist of nitrogenous heterocyclic bases, a ribose sugar, and a phosphate group, and both can form complex three-dimensional structures. RNA differs from DNA because uracil is substituted for thymine, which is found in DNA. The Rohlman lab is studying the structure, folding, and catalytic behavior of RNA. For the past three years I have been studying the *Twort* group I self-splicing intron. Group I introns or ribozymes are catalytic RNAs that are capable of performing a variety of phosphotransesterification reactions including self-splicing and RNA cleavage. Much of our understanding of group I introns is based on the studies of *Tetrahymena*, a group I self-splicing intron. Previous reports have described the application of fluorescence resonance energy transfer (FRET). FRET works by using a donor (fluorescein) and an acceptor (rhodamine), and through the signal strengths measured between the donor and acceptor we can better understand the dynamics of the ribozyme. Also, we have developed mobility shift assays that allow us to measure the ribozyme substrate ligand binding along with the ribozyme activity. Better understanding of this molecule will help us make connections between other group I self-splicing introns under study and will serve as a model system that will lead to better understanding of RNA self-splicing, three-dimensional folding, and catalytic behavior.

Supported by: FURSCA-Hyde Fellowship



CAROLINE HONOUR, '08

Lesbian Vampires and Other Femmes Fatales in Nineteenth-Century British Literature

Faculty Sponsor: Lanya Lamouria

Major: English

Hometown: Schoolcraft, Mich.

During the nineteenth century, a blanket of silence fell over sexuality in Victorian England. Sexuality became an unacceptable subject for people to talk about. Instead, sexuality was confined behind closed doors, and sex was only supposed to apply to the monogamous, heterosexual, married man and woman, who were to engage in sex to achieve procreation. Because openly discussing sexuality wasn't allowed, new types of discourse and ways of exploring sexuality were invented.

Fiction became one of the most prominent ways to explore through an indirect means. Literature became a discourse on the most potent cases of sex and sexuality. In order to write about sex while adhering to Victorian societal standards, authors often turned to the fantasy embedded in horror. By using such figures as the demonic and beautiful femme fatale and the aggressive female vampire—creatures that didn't actually exist in Victorian England—authors could safely and slyly bring sexuality to the forefront of Victorian literature and culture.

Based on analysis of works by Coleridge, Keats, Le Fanu, and Stoker, I argue that Victorian authors used lesbian vampires and other femmes fatales to explore female sexuality, alternatives to heterosexuality, and the male-oriented fears that surrounded female desire. Thus, in order to understand what sexuality meant to the Victorians, one must delve into the world of Victorian horror fiction.



JESSICA JAKUBIK, '08**A Case Study Analysis of the USA Patriot Act**

Faculty Sponsor: Andrew Grossman

Major: English
Hometown: Whittemore, Mich.

September 11, 2001 was the first attack by a foreign party on U.S. soil since Pearl Harbor and the previous attack on the World Trade Center Towers in 1993. This surprise attack left many citizens and political leaders fearful of what could happen next. It is during this time of fear and crisis that new public policies were put into action that may have been rash, unnecessary, and intrusive. The objective of this paper is to complete a case-study analysis on the recent revisions to the USA Patriot Act. Specifically, I will focus on the ways in which the act is written to benefit political/governmental leaders more than the general public. Instead of protecting the citizenry, the USA Patriot Act allows for more intrusive action that benefits leaders over constituents.



ELIZABETH JEWELL, '08**Structure and Function of the Transcriptional Regulator AcrR**

Faculty Sponsor: Kenneth Saville

Majors: Biology, Music
Hometown: Stevensville, Mich.

The aim of this research was to reveal important residues for multidrug recognition in an *Escherichia coli* transcriptional regulator, AcrR. AcrR regulates the transcription of AcrAB, the multidrug efflux pump in *E. coli* responsible for multidrug resistance. With the help of the X-ray structure of AcrR determined by Edward Yu's lab at Iowa State University, site-directed mutagenesis was used to identify key residues for drug binding and how signals transmit the regulatory domain to the DNA-binding domain of AcrR. Out of the six residues chosen from the multidrug binding domain for further investigation, three were successfully mutated to alanine from their respective starting amino acids and one, site 67, was fully investigated using fluorescence polarization. Another residue, 106, was mutated and partially analyzed. Site 67 in the binding pocket of AcrR, when mutated, has significant effects on the binding affinity of the drugs proflavin, rhodamine 6G, and ethidium bromide. Mutating site 106 has been shown to severely affect the expression level of the protein.

Supported by: National Institutes of Health and National Science Foundation Computational and Systems Biology Summer Institute. This research was conducted at Iowa State University under the guidance of Edward Yu.



ELIZABETH JEWELL, '08

(See Genomics Class)

JOHNATHAN JORDAN, '08**Dance and Technology**

Faculty Sponsor: Heather Vaughan-Southard

Major: Political Science
Hometown: Holland, Mich.

The synthesis of dance and technology is becoming an ever-advancing tool for choreographers. It is the purpose of this research to show how valuable digital technology has become within the field of dance, as well as showing where multimedia projects appear to be heading in the future.



SARAH JOSE, '09

(See Scotty Bruce, '08, Lindsay Guise, '09, Sarah Jose, '09, Chelsea Knoop, '09)

DANIELLE JOSEPH, '08**Belonging: Ethiopian Jewry**

Faculty Sponsor: Diana Ariza

Major: History
Hometown: Birmingham, Mich.

In 1948 Israel became the official nation state for Jews. Persons could claim Israeli citizenship if they could prove genetic Jewish heritage and practiced the Jewish faith. This requirement excluded Ethiopian Jews who were not considered Jewish under Israeli law until 1975. Today, the state of Israel remains conflicted and questions Ethiopian Jews' legitimacy for citizenship.

Through Operation Solomon in 1984, Israel began a massive campaign for Ethiopian Jews to migrate to Israel because of persecution they faced in Ethiopia. The Ethiopian Jews were willing to be separated from their families in order to have an opportunity in a new "accepting" land. Once they arrived, however, they were treated as second-class citizens; even their Judaism was



questioned, unlike other immigrants from Europe and Russia. Today, statistics show that Ethiopians have higher poverty and unemployment rates than other immigrant populations. Their difficulties are often attributed to cultural and language differences; however, race may be just as significant a factor as language and culture.

Through this project I hope to gain an understanding of these racial and ethnic divisions among Jews, especially in Israel. Through interviews and research, I will investigate their underlying causes. In conducting this work, I hope to acknowledge the Ethiopian Jews' continuing struggle and to examine problems they continue to face.

LAUREN KAR CZ, '08

"Number Thirty-Eight, Temple" (A Novel)

Faculty Sponsor: Danit Brown

Majors: English, Anthropology
Hometown: Farmington Hills, Mich.

This ongoing novel project, begun in fall 2007, is based in part on a semester of study in Athens, Greece. In the novel, Cynthia was a chronic traveler, leaving her family behind and letting her sister Aurelia down. In the hospital after a car accident, Cynthia wills her Athenian house to Aurelia before she dies. Months later, Aurelia finally agrees to travel from the United States to her house across the Atlantic. She travels alone to a country where not only the language but even the very alphabet is different. When things become familiar to her in this foreign place, Aurelia comes to understand Cynthia's love of this home and to forgive her. But can she forgive herself?



SARAH KELLEY, '09

Substituent Effects on Electron Exchange in Phenoxide-Bridged Dimanganese Complexes

Faculty Sponsor: Vanessa McCaffrey

Major: Chemistry
Hometown: Negaunee, Mich.

A series of dinuclear metal complexes are being prepared in order to examine the correlation between superexchange interactions and the charge/spin polarization associated with the bridging atom(s). A macrocyclic ligand derived from the condensation of 2,6-diformyl-4-methylphenol and bis(2-aminoethyl)-N-methylamine in the presence of Mn(OAc)₂ results in the formation of a dinuclear metal complex in which the oxygen atoms of two phenoxyl groups propagate antiferromagnetic exchange between two high-spin MnII ions. The goal of this research is to determine the extent to which the measured exchange interaction correlates with charge density (as gauged by the Hammett parameter of the para substituent) and/or spin density of the bridge. The synthesis of several complexes where methyl is substituted for other R groups along with preliminary results from variable-temperature magnetic susceptibility measurements will be presented.



Supported by: FURSCA-Kresge Fellowship

CHELSEA KNOOP, '09

(See Scotty Bruce, '08, Lindsay Guise, '09, Sarah Jose, '09, Chelsea Knoop, '09)

KRISTEN KRUM, '08

Repression of Autoreactive B Cells by TNF α

Faculty Sponsor: Dean McCurdy

Major: Biology
Hometown: Sturgis, Mich.

Autoimmune diseases such as systemic lupus erythematosus (SLE) result from a breakdown in tolerance mechanisms that typically prevent the host from mounting an immune response to "self" proteins and nucleic acids. In the case of SLE, autoreactive B cells specific for DNA, histones, and components of the snRNP complex become dysregulated and secrete autoantibodies. The Vilen laboratory (University of North Carolina at Chapel Hill) has previously reported that during innate immune responses dendritic cells and macrophages maintain autoreactive B cells in an unresponsive state through their secretion of IL-6, CD40L, and TNF α . Although recombinant IL-6 (rIL-6) and recombinant soluble CD40L (rsCD40L) repress 60-70 percent of autoantibody secretion, recombinant TNF α (rTNF α) only represses 30 percent.

In this study, I assessed if the inefficient repression and large amount of rTNF α protein required to repress immunoglobulin secretion reflected low bioactivity of the commercial product. To accomplish this we cloned and expressed murine TNF α in Chinese hamster ovary (CHO) cells. Extensions of this work have quantified levels of TNF α from supernatants by ELISA and test the CHO-expressed TNF α product for its ability to repress Ig secretion by autoreactive B cells. This will allow researchers to determine if a highly bioactive TNF α represses more than 30 percent of autoantibody secretion. The CHO-expressed TNF α will also allow us to accurately define the amount of TNF α required to repress immunoglobulin secretion by autoreactive B cells.

Supported by: National Science Foundation Research Experiences for Undergraduates. This research was conducted at the University of North Carolina at Chapel Hill under the guidance of Barbara Vilen, Department of Microbiology and Immunology.



KRISTEN KRUM, '08**Reduction of Uranium (VI) to Uranium (IV) by Microbes at Multiple Depths with the Addition of Electron Donors**

Faculty Sponsor: Ruth Schmitter

Major: Biology
Hometown: Sturgis, Mich.

Metal contamination of environments is detrimental to all living organisms. Uranium is a metal both radioactive and toxic, which can cause numerous health problems if consumed. The reduced form, U (IV), is less toxic than the oxidized form, U (VI). My project looked at uranium (VI) reduction rates in soil samples from different depths when electron donors were added. Microcosms were created with soil from five different depths and groundwater from the Natural and Accelerated Bioremediation Research Field Research Center at site Y-12. Electron donors, ethanol, methanol, or ethanol + pyruvate, were added to different microcosms. Samples were collected throughout the experiment to look at nitrate concentration, U (VI) concentration, and the microbial community of each microcosm. Ion chromatography was used to measure nitrate concentrations, which is important: if nitrate is present in the sample then uranium reduction cannot occur. A kinetic phosphorescence analyzer was used to measure the U (VI) concentration. The microcosms with pyruvate reduced U (VI) at a higher rate for samples from most depths. This higher rate of uranium reduction was expected, because it is believed that the pyruvate moves U (VI) from the soil into the fluid phase. In fluid, microbes have easier access to the uranium, and thus reduction of uranium is facilitated. The microcosms containing ethanol reduced uranium, but in this experiment methanol did not promote reduction of U (VI). This research provides a mechanism for remediation of many uranium-contaminated areas throughout the United States and elsewhere.

Supported by: U.S. Department of Energy

ASHLEY LARIMER, '08**“Chi il bel sogno di Doretta” from *La Rondine* and “Quando M'en Vo” from *La Bohème* by Giacomo Puccini**

Faculty Sponsors: David Abbott, Maureen Balke, James Ball

Major: Music Education
Hometown: Traverse City, Mich.

Born in 1858, Giacomo Puccini was a composer of the Romantic Period. His work, greatly influenced by Verdi and Wagner, was driven by both melody and text. Each of the arias is an example of Puccini's mastery of this style.



Puccini's opera *La Rondine* is very much centered around the text. The selected piece, “Chi il bel sogno di Doretta,” is a narration of a girl who is kissed by a student. The composition translates the text into a dream-like setting in which the character is swept away into her fantasy of love. She ends by proclaiming that riches are unimportant because they cannot compare to her passion. In this selection, the soloist moves the piece as emotion is moved, and the sweeping piano accompanies the singer in her daydream.

A second example of textual and melodic centering can be found in the piece “Quando M'en Vo” from *La Bohème*. This song, also known as Musetta's Waltz, is filled with appropriate tempo changes and style markings. Each line is carefully matched to the text in an almost recitative form. However, the aria maintains a gorgeous melody throughout which is brought out by both the soloist and the pianist. In this particular scene Musetta is teasing a past lover. She taunts him in describing how everyone on the street stares and enjoys her beauty. This style changes and becomes more *marcato* toward the end of the aria when Musetta admits she delights in seeing her lover upset.

EMILY LEATHERMAN, '08

(See Genomics Class)

WILLIAM LEWIS, '08**Analysis of the Vocalizations of the Northern Cardinal**

Faculty Sponsor: Douglas White

Major: Biology
Hometown: Houghton, Mich.

Male northern cardinals (*Cardinalis cardinalis*) use regionally distinctive repertoires of variable song types. I sought to understand how songs functioned in cardinal communication by comparing songs given in different



contexts. I recorded the songs of cardinals in the Whitehouse Nature Center in Albion, Mich., during both the spring (March-early May) and summer (late May-July) of 2006. I classified songs based on season and on whether they were given spontaneously or made in response to songs from other males. Using Avisoft SASLab-Pro, I distinguished song types and the length and number of notes used in each type. For song types used for male-male aggression, I expected songs to be longer and have more notes when given in spring and in response. For song types used for spontaneous advertising, I expected no seasonal or contextual differences. Nine main song types occurred in the Albion population. Two types were used primarily for male-male aggression while only one was used primarily for spontaneous advertising; no consistent association existed between song function and complexity (number of different note types per song). Effects of context and season were inconsistent among song types, perhaps because song length and number of notes varied greatly both between and within song types. Context may have influenced song variations I wasn't able to quantify. In the future, more cardinals could be banded to follow males throughout a breeding season and to determine the influence of individual variation or nesting stage.

Supported by: FURSCA

RACHEL LIPPERT, '08

Exploring the Extreme: Enzyme Analysis of the Thermophilic Bacterium *Thermotoga maritima*—Structure and Function Studies of ADP-Glucose Pyrophosphorylase

Faculty Sponsor: Vanessa McCaffrey

Majors: Chemistry, English
Hometown: Clyde, Ohio

ADP-glucose pyrophosphorylase (ADPGlc PPase) catalyzes the conversion of glucose-1-phosphate and ATP to ADP-glucose and PPi. As a key step in glucan synthesis, the ADPGlc PPases are highly regulated by allosteric activators



and inhibitors in accord with the carbon metabolism pathways of the organism. Within the *Thermotoga maritima* genome, two *glgC* genes code for this enzyme whereas most bacteria only have one *glgC* gene. The larger subunit His₆-glgC2 (47 kDa) displays increased activity and activation by fructose-1,6-bisphosphate (FBP) when in a complex with the His₆-glgC1 protein. Amino acid alignment and modeling studies indicated that Asp-244 may play a role in catalysis. To probe the role of this residue in the His₆-glgC2 enzyme, the D244N mutation was generated and the recombinant protein purified using a heat step and nickel affinity chromatography. The V_{max} of the His₆-glgC2 D244N enzyme was found to be reduced greater than 200-fold compared to wild-type, while the S_{0.5} values for ATP and Mg were similar to wild-type. Preliminary experiments indicated that the His₆-glgC2 D244N enzyme activity was not stimulated by *in vitro* addition of His₆-glgC1 and was also insensitive to FBP activation, implying a loss of subunit interaction. In an attempt to verify this, the His₆-glgC2 D244N and wild-type His₆-glgC1 were co-expressed and purification of the complex attempted. In contrast to the wild-type complex purification, very little complex was isolated as measured by denaturing polyacrylamide electrophoresis. These

data indicate that Asp-244 is critical for both catalysis and subunit interactions.

Supported by: National Science Foundation Research Experience for Undergraduates. This research was conducted at California State University, Fullerton under the guidance of Christopher Meyer.

RACHEL LIPPERT, '08

(See Genomics Class)

DANIELLE LORD, '08

A Geochemical Analysis of Absaroka Volcanics from Dead Indian Hill, Northwest Wyoming

Faculty Sponsor: Beth Lincoln

Major: Geology
Hometown: Indianapolis, Ind.

Geochemical analyses of fault-emplaced volcanics in the Absaroka volcanic province (AVP) of northwestern Wyoming expand current geological maps. The AVP covers an area exceeding 23,000 km² with a volume of approximately 30,000 km³, and is composed of Eocene subduction-generated volcanic rocks and Heart Mountain fault blocks. Study rocks are from the AVP's northwestern border. Thirty-five samples, 14 from the top of hill 8038 and 21 from a volcanic ridge approximately 1 mile away, suites 1 and 2 respectively, were analyzed using x-ray fluorescence to obtain major and trace element abundances. Results show typical calc-alkaline trends and that the suites are chemically and compositionally distinct. Suite 1 is uniformly trachyandesite with little variance within the suite. Suite 2 is a continuous series ranging from trachyandesites to rhyolites, though dominantly dacites. The mineral assemblage of andesine, hornblende, augite, Fe-Ti oxide, and alteration dominates both suites. Major mineral variations between suites include more abundant olivine, pyroxene, and matrix alteration in suite 1 and more abundant plagioclase and amphibole in suite 2. Comparisons to published data for four major AVP volcanic centers suggest that these volcanic suites are compositionally similar which implies that suites 1 and 2 were faulted



from within the AVP to their current resting place. The chemical variations between the two suites suggest that they may have originated at different volcanic centers or they may have erupted at different times.

MEGAN LUPEK, '08

Nesting Ecology of the Wood Turtle, *Glyptemys insculpta*

Faculty Sponsor: Dean McCurdy

Major: Biology
Hometown: Utica, Mich.

Turtle populations are declining globally, facing threats such as the pet trade, agricultural practices, logging, nest predation, and flooding of nests. Gaining an understanding of nesting behavior of turtles can aid in the conservation efforts to help threatened populations. In this study, I examined the factors related to nest site-selection by turtles, including: height above water, sediment size, distance to water, distance from other nests, and vegetative cover. Overall, I found that turtles showed a high degree of selection of nesting sites (preferring sites with low vegetative cover and finer sediments). I also conducted an experiment using simulated nests of turtles to assess whether temperatures at nest-depth differed between nests with predator excluders over them versus unprotected nests. Simulated nests with predator excluders had a lower overall mean, mean range, and mean maximum temperature than simulated nests without excluders, which has implications for hatching success of turtle eggs within northern populations.



Supported by: FURSCA-Hyde Fellowship, McDonald's of Canada, Ltd.

ALEXANDER MCKELVY, '10Major: Biology
Hometown: Midland, Mich.**MEGAN ROBERTS, '10**Majors: Psychology, Biology
Hometown: Roseville, Mich.**Time-Dependent Spatial Learning in *O. degus* with the Radial Arm Maze**

Faculty Sponsor: Tammy Jechura

O. degus is a diurnal rodent species endemic to the western slopes of the Andes Mountain range in South America. A burrowing animal, degus forage for food during the day amongst rocky outcroppings and small bushes. The radial arm maze is a spatial task consisting of a central chamber and six radial arms leading from it. In this experiment, degus were trained to find food rewards in the radial arm maze in different locations at two different times of day. The location of the rewards was dependent on the time of day, so the animals had to use their internal clocks, or circadian rhythms, to determine the correct arms at a particular time of day. Circadian rhythms are innate patterns of physiological and behavioral activity that regulate the active and resting periods of all living things. We predicted that the degus would be able to perform this task because of the nature of their native environment and the necessity to find food sources at varying times of day. We will discuss the animals' ability to learn the location of rewards in a spatial task as well as the ability to learn a more complex time-dependent task.



McKelvy



Roberts

Supported by: FURSCA

SARAH MOILANEN, '08**(De) Constructing Pedophilia**

Faculty Sponsor: Trisha Franzen

Major: Women's Studies
Hometown: Empire, Mich.

Discourse involving pedophilia is widely concerned with the biological and psychological anomaly of adults who are sexually attracted to prepubescent children. While a type of hysteria over this issue pushes states to institute sex offender registries, advertisers and the popular media promote sexualized images of young girls and sometimes boys. The result of these contradictory forces is a silencing of any discussion about cross-generational sexual attraction and the complex issues of agency, consent, and power. Additional consequences are that all such attractions are labeled as criminal and pathological, and there is no differentiation between those who act on their attractions and those individuals who don't. As a result, most information on pedophilia comes from male offenders convicted of child sexual abuse.

My project uses past empirical research and a wide range of other academic materials on the topic of cross-generational sexuality. I examine ways that psychology and biology contribute to shaping pedophilic identities. In addition, I consider instances of adult-child relationships across cultures and history. From this, I hope to see the ways in which this research helped and failed in explaining pedophilic identities.

Research involving pedophilia is mostly male-centered, and contemporary information is mostly available from populations that have committed child sexual offenses. This suggests that pedophilia must be further deconstructed, and also should be repositioned in society without direct consequence of being openly pedophilic. This will move toward more accurately understanding pedophilia.

IAN MONDROW, '08**The Effects of Sleep Deprivation on Attraction**

Faculty Sponsor: Tammy Jechura

Major: Psychology
Hometown: West Bloomfield, Mich.

Pheromones are olfactory chemicals that are secreted by animals, including humans, which have a large impact on communication between individuals. Previous research has shown that pheromones can play a role in attraction, but little research has been completed on what can affect pheromones. This study examines the effect of sleep deprivation on the attractiveness of one's pheromones. We predicted that sleep deprivation would negatively affect the attractiveness of pheromones. Donors were used to collect pheromone samples, following a night of full rest and a night of deprived sleep. After each night of scheduled sleep, donors showered and wore a clean t-shirt for two hours while relaxing. College-recruited participants later rated the attractiveness of the samples. Data will be discussed in terms of the effects of sleep deprivation and its effects on pheromone production.

*Supported by: FURSCA*

SARAH MORRIS, '08

The Effects of Expertise on Functional Fixedness

Faculty Sponsor: Mareike Wieth

Major: Psychology
Hometown: Grass Lake, Mich.

Experts are able to navigate problem-solving in a different manner than are novices (Glaser & Chi, 1988; Blessing & Anderson, 1996). They organize their domain knowledge such that it is “accessible, proceduralized, integrated, and principled,” which enables them to quickly access qualitative and abstract solutions to domain-specific problems (Wiley, 1998). However, it has also been shown that experts’ problem-solving suffers when they cannot put to use their domain knowledge (Chase & Simon, 1973; Voss, Vesonder, & Spilich, 1980). Experts are more likely to be restricted by mental set, the inability to adopt an alternate approach, procedure, or strategy to solve a problem (Wiley, 1998). Further, they are less effective at describing the exact procedure they used to complete a task (Beilock, & Carr, 2001). For these reasons, it was expected that experts would suffer more functional fixedness—the inability to see an alternate use for an object—than would novices in item-use identification tasks. For the purpose of the current experiment, expertise was defined by gender. Several items, which in a preliminary study were shown to be either male- or female-oriented, were presented to undergraduate participants. Participants were asked to generate an exhaustive list of uses for the given objects. Responses were evaluated on amount, variety, and creativity of identified uses. Results indicated that females were more affected by functional fixedness for female-oriented objects than were males, and that males were more affected by functional fixedness for male-oriented objects than were females.



ASHLEY OZELSKI, '09

(See Megan Fitzpatrick, '08, Ashley Ozelski, '09)

SHAUNA PARADINE, '08

A Novel and Straightforward Synthesis of Dibenziodolium and Bis-dibenziodolium Salts Using *m*-CPBA as a Versatile Oxidant

Faculty Sponsor: Andrew French

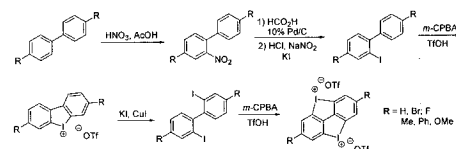
Major: Chemistry
Hometown: Schoolcraft, Mich.

Since the preparation of the first iodonium salt in 1894, a great variety of aryl, alkenyl, alkylnl and alkyl salts have been prepared, and the chemistry of biaryliodonium salts in particular is well established. However, the reactivity of heterocyclic biaryliodonium salts, specifically dibenziodolium salts, differs greatly from their acyclic counterparts, and until recently has been seen as relatively uninteresting. Dibenziodolium salts have been found to be reactive toward a number of nucleophiles, resulting in synthetically interesting substituted biaryls, which are useful as precursors to a number of pharmaceutical products.

Very recently, a new method was developed by Olofsson for the preparation of acyclic biaryliodonium triflates, greatly simplifying the synthesis of these compounds. The one-pot procedure involves treatment of an aryl iodide and an arene along with *m*-CPBA and triflic acid, taking as little as ten minutes for completion of the reaction. This procedure affords a great variety of substituted biaryliodonium salts, making it a versatile method for the preparation of these salts. The research presented here shows that this method can be applied toward the preparation of heterocyclic biaryliodonium



salts with similar efficiency, affording a variety of substituted dibenziodolium triflates in high yields under mild conditions. The synthesis can be extended via reaction with nucleophilic iodine resulting in the preparation of bis-dibenziodolium triflates, which are a virtually untouched set of compounds that are structurally interesting and can produce further substituted biaryls.



Supported by: FURSCA, DAAD-RISE Scholarship, American Chemical Society

ALEXANDER PARKER, '11

Information's Impact on Childhood

Faculty Sponsor: Molly Mullin

Major: Chemistry
Hometown: Ann Arbor, Mich.

One of the many challenges of parenthood is protecting children from information for which they are not yet ready. As the efficiency of information technology improved, this task of guarding children from certain kinds of information became increasingly difficult, but it has also changed the way modern youth identify themselves as people.

I examined how information technology has impacted three generations in my family. The speed at which information is shared has evolved a great deal over that time period. The radio, television, and Internet have all changed how people share information. This has impacted the way children are taught—through mass media instead of just by their parents.

My results indicated that, as mass media became a normal part of childhood, people across the nation were learning the same values from the same programs. My father's generation grew up learning right from wrong not only from their parents, but from a few television programs as well. As a result, an entire generation held relatively similar values, and had a very unified voice that they used to spark social change.



This increase of available information also poses a threat to what we now consider childhood, a sort of innocence through ignorance of grimmer world realities. Now that almost any idea is simply a mouse click away, our society has to find new ways to protect children from information before they are ready for it.

LAURA POLLUM, '10

Major: Chemistry
Hometown: Ubyly, Mich.

REID SMITH, '09

Major: Biochemistry
Hometown: Bloomfield Hills, Mich.

Iodine in Clathrate Hydrate Cages

Faculty Sponsor: Lisa Lewis

The synthesis and characterization of a possible iodine clathrate will be presented. Clathrates are highly ordered cages of hydrogen-bonded water molecules that are stabilized by the van der Waals forces between the water and guest molecules. The size of the guest molecule defines the morphology of the clathrate hydrate.

Chlorine and bromine form stable sII clathrates (5^{12} and $5^{12}6^4$ cages in a 2:1 ratio); however, clathrates containing iodine have only been synthesized in the presence of a second guest molecule. We present our work that suggests iodine can form a stable ice structure that mimics the physical properties of clathrates.



Pollum



Smith

KAYCEE RASHID, '09

Time-Dependent Spatial Learning in *O. degus* with the Radial Arm Maze

Faculty Sponsor: Tammy Jechura

Major: Psychology
Hometown: Midland, Mich.

The purpose of this experiment was to learn more about a diurnal Chilean rodent's (*Octodon degus*) spatial memory skills and its ability to apply its sense of time of day to a task. We tested whether the animals can learn and remember two spatial memory tasks that are dependent on the time of day. Degus were taught two separate spatial memory tasks in a six-arm radial arm maze that were dependent on the time of day, morning or evening. Each degu was initially trained to complete one task either in the morning or in the evening. Once the degu was able to complete that task with 80 percent accuracy over three consecutive sessions, the degu was trained to perform another task at the alternate time of day. Eventually, the degus were tested in the morning and evening with two different memory rules using food treats at the end of correct arm choices as a reward. Results of the experiment will be discussed in terms of the animals' ability to complete the radial arm maze and their ability to perform the time-dependent tasks.



Supported by: FURSCA

ANDREW RHODES, '08

(See Nick Bismack, '08, Andrew Rhodes, '08)

MEGAN ROBERTS, '10

Unihemispheric Sleep in the Bearded Dragon throughout the 24-Hour Period and under Threat Conditions

Faculty Sponsor: Tammy Jechura

Majors: Psychology, Biology
Hometown: Roseville, Mich.

Unihemispheric sleep is a form of behavior that allows half of the brain to sleep while the other half is awake, allowing an animal to perform important behaviors and sleep at the same time. It has been observed in dolphins, which must continually surface to breathe even while sleeping, and in birds, possibly as a means to recover sleep while flying long distances during migration over large bodies of water. It can be observed through the monitoring of unilateral eye-closure (both eyes open, one eye open, both eyes closed) as well as electroencephalographic (EEG) analysis between hemispheres.

The bearded dragon, *Pogona vitticeps*, is a diurnal lizard from eastern and central Australia. We predicted that the bearded dragons would perform unihemispheric sleep both during the day, when they are napping, and at night to enable them to watch for predators while basking and sleeping. In this study, recordings of eight bearded dragons were made using a five-video camera setup during a 24-hour period, and scored by judging eye-state at one-minute intervals. Presence of unihemispheric sleep was defined as distinct periods during which one eye is open and the other is closed. Data indicate that the bearded dragon does engage in unihemispheric sleep during the day. Data from night-time behavior and in the presence of a predator threat will also be discussed, along with the evolutionary implications of unihemispheric sleep in lizards.



MEGAN ROBERTS, '10

(See Alexander McKelvy, '10, Megan Roberts, '10)

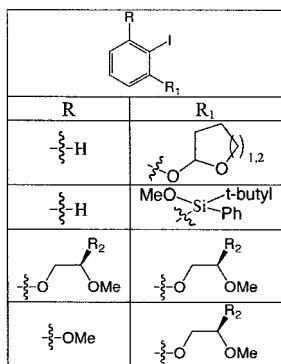
PHILIPP ROOSEN, '08 *ortho*-Positioning Modifications of Chiral Iodoarenes

Faculty Sponsor: Andrew French

Major: Biology

Hometown: Beverly Hills, Mich.

The development of chiral hypervalent iodine reagents for stereospecific reactions has recently been of growing interest. Iodine's environmentally benign chemistry and catalytic potential could allow for the replacement of certain heavy metal catalysts. For a decade now, the French research group has been working to improve specific oxidation reactions through organocatalyst modifications. The presented data describes attempted chiral synthetic amendments to the position adjacent (*ortho*) to iodine on benzene.



Supported by: FURSCA

AMY SALMETO, '08

Impact of a Depressive-like State on a Spatial Memory Task

Faculty Sponsor: W. Jeffrey Wilson

Major: Psychology

Hometown: Brighton, Mich.

Depression is a mental illness with a variety of negative impacts upon an individual's life including psychosocial and occupational impairments (Kulkarni & Dhir, 2007). Studies have shown that depressive-like behavior can impact the processes of learning and memory differentially between the sexes (Sun & Alkon, 2006). The open-space swim task (OSST) is a procedure developed by Sun & Alkon to create a depressive-like state in rodents and involves forced swimming for 15 minutes without escape.



The present study was conducted with 90-day-old male and female Sprague Dawley rats. The experimental procedure consisted of 3 days OSST/control, 3 days/4 trials per day training in the Barnes maze which is a test of spatial learning and memory, 1 day OSST/control, and 1 day/4 trials of testing in the Barnes maze.

Results of the effect of stress on learning and memory are inconclusive. Though there were significant findings for escape latency on particular trials, an overall effect of stress on learning was not uniformly observed. One result that suggests that stress may have impacted the rats was the latency to first hole visit for trial 1 on day 1 of Barnes maze training. Rats exposed to OSST prior to training in the Barnes maze took longer to approach a hole for investigation. In order to elucidate the effects of OSST on learning in the Barnes maze, it would be advantageous to replicate procedures with a larger group of rats.

Supported by: FURSCA, Psychology Department

AMY SALMETO, '08

Amygdala Volume in a Genetic by Environment Rodent Model of Depression

Faculty Sponsor: W. Jeffrey Wilson

Major: Psychology

Hometown: Brighton, Mich.

Major depression is a chronic mental illness characterized by feelings of sadness, hopelessness, and loss of motivation. Four primary risk factors have been identified for depression: genetic load, sex, disease recurrence, and early life stress. Specifically, variations in serotonin transporter (SERT) levels impact the risk for developing depression in humans and increase depressive-like behaviors in mice. In a behavioral study conducted in the laboratory, mice with altered SERT genetic makeup displayed variable emotion-related behaviors in the context of a six-weeks-long unpredictable chronic mild stress (UCMS) paradigm. Significant effects of sex, stress, and a sex by SERT interaction were observed, which together paralleled depression rates seen in human populations. The present investigation examined amygdala volumes in the same cohort of mice to begin an assessment of putative neurobiological correlates of altered behavior. Extrapolating from human depression data, we hypothesized that amygdala volumes may increase after UCMS, differentially affect UCMS-treated female mice, and display increased volumes in mice with lower SERT levels. Brains were sliced every 40 μm , mounted, and stained for Nissl bodies. Volume measurements were obtained through outlining the boundaries of the amygdala and applying a 125 μm Cavalieri probe. Results from group-wide statistical analyses and behavior/SERT genotype/amygdala volumes correlations will be discussed.

Supported by: University of Pittsburgh Center for Neuroscience. This research was conducted in the laboratory of Etienne Sibille, Department of Psychiatry.

RASLEEN SALUJA, '08**Development of a Novel Genetic Assay to Measure Reverse Transcriptase Fidelity**

Faculty Sponsor: Kenneth Saville

Majors: Biology, Chemistry
Hometown: Darien, Ill.

Retroviruses are responsible for a number of serious diseases including the development of several cancers, neurological disorders, and acquired immunodeficiency syndrome (AIDS). In the context of a worldwide effort to contain these disorders, retroviral research has become very significant in the last few decades. The goal of this project was to create a novel assay, or scientific test, that measures the replication fidelity of reverse transcriptase, an enzyme essential to the propagation of retroviruses. Replication fidelity is inversely proportional to the mutation rate. Finding ways to alter replication fidelity is important because of the increasing number of drug-resistant viral strains. Increasing the fidelity of retroviruses decreases their mutation rates, thus making existing therapies more effective. In this project, the SacRB gene isolated from *B. subtilis* was used as a reporter gene to create a test that selected for mutations inducing loss of function. The effects of mutagenic agents on the target DNA were investigated and quantified, to mimic the effect of reverse transcribing the gene with enzymes of varying fidelity. Lastly, the results obtained in the project were used to gauge the effectiveness, applicability, and potential limitations of this newly developed assay.



RASLEEN SALUJA, '08

(See Genomics Class)

STEPHEN SANNEY, '08**The Influence of Right-Wing Authoritarianism and Social Dominance Orientation on Motivations for Voting**

Faculty Sponsor: Mark Walter

Major: Psychology
Hometown: Livonia, Mich.

This study assessed two personality constructs, right-wing authoritarianism (RWA) and social dominance orientation (SDO), and how they affect motivations for voting. It was expected that high-RWAs would vote for religious-based reasons, but that when their attitudes toward homosexuals are statistically controlled, the relationship would decrease. In addition, it was expected that high-SDOs would vote for power-based reasons, but that when their attitudes toward immigrants are statistically controlled, the relationship would decrease. Using an online survey collection site, participants (n = 365) completed surveys measuring RWA, SDO, motivations for voting (power-based vs. religious-based), homo-negativity, and attitudes toward immigrants. Unexpectedly, SDO was a significant predictor of voting for religious-based reasons. When RWA, homo-negativity, and sex are statistically controlled, however, SDO no longer significantly predicted religious-based voting. As expected, RWA significantly predicted voting for religious-based reasons. Unexpectedly, however, when SDO, homo-negativity, and sex were statistically controlled, RWA still predicted religious-based voting. As hypothesized, SDO was a significant predictor of voting for power-based reasons, and this predictive power remained even when RWA, attitudes toward immigrants, and sex were statistically controlled. Unexpectedly, RWA also was predictive of voting for power-based reasons, and this predictive power remained even when SDO, attitudes toward immigrants, and sex were statistically controlled. These results are



discussed in terms of their implications for voting. Although two of the main hypotheses held true, the fact that attitudes toward homosexuals and immigrants did not serve as mediators shows that there is more to RWAs and SDOs than their prejudice toward these groups.

Supported by: FURSCA

LAUREN SAYIG, '08**Sweet Cherry Summers: The Lives of Migrant Farm Workers in Northwestern Michigan**

Faculty Sponsor: Andrew Schlewitz

Majors: Spanish, Economics and Management
Hometown: Livonia, Mich.

Traverse City, Michigan is famous for its abundant crop of sweet cherries, and many enjoy the juicy fruit every summer. However, few consumers realize exactly who is responsible for picking this summer treat: Latino migrant farmworkers. Every June thousands of people migrate into the greater Traverse City area to harvest cherries, bringing along with them children and other dependents. They are a socially invisible segment of society, immensely important to the community, but at the same time relative outsiders.



This thesis focuses on the lifestyles of migrant farmworkers, most of whom are from the Southwest and of Mexican descent. There is a historical precedent of migratory patterns to the Midwest, which has led to the current state of migrant farm labor, including the housing available, medical and education resources, and the attitudes that permanent residents hold toward the migrant population. Natives both welcome and reject the migrant population in a strange swirl of paternalism that leaves mixed feelings about the practice of employing migrant farm labor.

Additionally, I focus on the case of special educational opportunities for migrant children. Using my experiences working as a teacher's assistant in the Elk Rapids migrant school over the summer, I explore the implications of migrant education. Since the children miss a large portion of their classes

while traveling during the harvest season, additional educational programs such as summer schools are necessary to their future success. After all, most migrant children don't dream about being cherry pickers, but rather teachers, dentists, or even athletes.

JASON SEBACHER, '08

On Playwriting

Faculty Sponsor: Mark Hoffland

Major: English
Hometown: Sturgis, Mich.

Last summer I was fortunate enough to be among those playwrights to have had his work produced at a professional theatre. The opportunity was one only a fraction of dramatists get for good reason—it's quite trying. My thesis recounts the provenance and production of three one-act plays of mine that were put on by the Performance Network Theatre in Ann Arbor—*It's People Like You*, *Abstract Art*, and *Perchance to Dream*—and also reflects upon what it was like to write and see them performed. This is not a thesis in which the quality of my work is to be judged based on present merit; that sort of nonsense has already been done. This thesis is also not a didactic piece “about” playwriting. I wouldn't dare presume myself qualified to explain how to write a play, for really I am only a playwright in the most technical sense of the word. My thesis is about the learning experience of what happens when a person who was formerly noncreative suddenly gets in tune with his psyche. It is a narrative and a reflection, and is a story nearly everyone can relate to. Its themes are universal, though its impact is personal. Much of my learning, though, was about the nature of art. Essentially this thesis raises two questions: what role does inspiration have with creating art, and what is the value of uninspired art? My answers, respectively: everything and nothing.



JASON SEBACHER, '08

“Ay me!”: Psychoanalysis and the Narrative of Grief in *Lycidas*

Faculty Sponsor: Ian MacInnes

Major: English
Hometown: Sturgis, Mich.

Milton's elegy *Lycidas* was once a standard by which one's literary knowledge was measured, but unfortunately many today feel that the poem is hopelessly dated. I argue, however, that the poem should be as relevant today as it once was. Milton was a deeply serious young man in a country facing corruption, culture wars, and religious division, and he felt impelled to use his poetic talents “to inbreed and cherish in a great people [the British] the seeds of virtue and public civility.” He was also haunted by the fear of failure, the fear that he might lead an endless, meaningless existence, never using his God-given talents to “leave something so written to aftertimes, as they should not willingly let it die.” It is clear why young readers today might easily relate to the social concerns and passionate personal anxiety that Milton pours into *Lycidas*. I argue that understanding the poem today requires us to pinpoint the source of Milton's anxiety and the ways it shapes the poem. What I attempt is to bring *Lycidas* into our time by illuminating the root of his fear, relying on history, narrative theory, discussions of elegy, and psychoanalysis to address the question: why is *Lycidas* still important?

LISA SHANKS, '09

Maurice Ravel: Piano Concerto in G Major, Adagio assai

Faculty Sponsors: David Abbott, Lia Jensen-Abbott, James Ball

Major: Music Education
Hometown: Northville, Mich.

Born on March 7, 1875, Maurice Ravel grew up in Ciboure, France and became one of the leading composers during the Impressionistic Period. Ravel wrote two piano concertos during the years 1929-1931. One was written for just the left hand and the other was the Piano Concerto in G Major. The concerto in G major consists of three movements with the second movement being Adagio assai. This slower movement calls for solo piano with orchestra as well as a strong English horn player, and it is known for its beautiful colors and the deceptively effortless flow of the piano with the orchestra. The Adagio assai begins with a tranquil solo piano section that seemingly cannot decide if it is in two beats or three. As the orchestra enters, the piano proceeds to accompany the English horn as it takes over the melody. As the concerto moves to its close, the orchestra slowly disappears and the piano rests on a brilliant trill before quietly fading away.



DORELA SHUBONI, '09**The Effect of Incremental Changes in Light Onset on the Reentrainment Rate of 12-Hour Phase Shifted *Octodon degus***

Faculty Sponsor: Tammy Jechura

Majors: Biology, Biochemistry
Hometown: Troy, Mich.

Biological rhythms play an important role in the functioning of many physiological properties of organisms. When a rhythm follows an approximately 24-hour cycle and occurs without external cues it is called circadian.



Circadian rhythms use environmental time cues (such as light and temperature) to influence the way in which the cycle is expressed, allowing the organism to "entrain" more precisely to its environment. When shifts occur in the external cues, the rhythm can reentrain by either an advance or delay of the internal clock; this is called a phase shift. By measuring the amount of time that it takes for the individual to display a similar pattern of activity onset to the new light:dark cycle as they had prior to the shift, a rate of resynchronization, or reentrainment, can be determined.

We investigated the effects of incremental light changes prior to a 12-hour shift on reentrainment rate using the diurnal Chilean rodent, *Octodon degus*. A 12-hour shift in the light:dark cycle is similar to traveling halfway around the world and typically generates a long period of jet lag. We tested the hypothesis that the internal clock can be primed for a larger shift by using smaller incremental shifts similar to seasonal changes in light. We expected the animals that experienced incremental advances in the light:dark cycle to reentrain faster than animals that experienced the 12-hour shift with no priming.

Supported by: Psychology Department

JENNIFER SIMS, '08**Childhood Perceptions of Physical Fitness, Health, and Nutrition**

Faculty Sponsor: Thomas Johnson

Major: Athletic Training
Hometown: Shelby Township

One-third of children in the United States are overweight or at risk of being obese, which has led obesity to be considered an epidemic in the United States (Mayo Clinic, 2007). Such statistics were the motivation for this research



conducted in summer 2006 which examined children's thoughts on physical fitness, health, and nutrition.

A total of 259 children (between four and eight years old) were surveyed in the following Michigan cities: Albion, Battle Creek, Marshall, Saginaw, and Union City. The questions addressed physical fitness/activity, nutrition, portion sizes, and body image through 18 pictorial and 18 verbal questions.

The results show that a significant number of children are unable to identify activities associated with healthy nutritional and active lifestyles. Not only are children unable to identify what would be considered a healthy decision, their choice of extracurricular activities led to the conclusion that children are more inclined to choose screen-time activities over activities that involve movement and action. The data collected show children need more education in school and at home to prevent the lifelong harmful effects of childhood obesity.

The data collected from this study are extremely important because they help pinpoint a reason for the increasing rates of childhood obesity. The study is also significant because it is one of the first to examine children's perspectives, and it has led to several conclusions that can be beneficial to educators, parents, or health care providers to help teach children about healthy decisions.

Supported by: FURSCA

JACOB SKEANS, '08**Getting Ahead of the Game: The Degradation of ([EMIM][BF₄])**

Faculty Sponsor: Clifford Harris

Major: Chemistry
Hometown: Dearborn, Mich.

Ionic liquids are one of organic chemistry's hot research areas. More and more chemical companies are offering them for sale in larger and larger quantities. Inevitably, a spill will occur, allowing these



unnatural products into the environment. This study explores and offers a safe approach to the cleanup, or degradation, of ionic liquids through oxidation by potassium permanganate. 1-ethyl-3-methylimidazolium tetrafluoroborate ([EMIM][BF₄]), a "room temperature ionic liquid," is degraded by potassium permanganate in aqueous solution. We have found two intermediate compounds that are relatively stable in the reaction pathway from [EMIM][BF₄] to mineralization. *N*-Ethyl, *N'*-methylethanediamide and 1-ethyl-3-methyl-2,4,5-trioxoimidazolidine have been characterized through H-NMR and GC-MS and isolated through column chromatography. Both of these compounds have been found to be less toxic than the original compound which makes them viable options for environmental clean-up processes such as *in situ* chemical oxidation (ISCO). Analytical exploration will continue with the help of Western Slopes Laboratory.

Supported by: FURSCA

REID SMITH, '09

(See Laura Pollum, '10, Reid Smith, '09)

JEFF STEPHENS, '09

Movement Patterns and Habitat Use by Female Wood Turtles, *Glyptemys insculpta*

Faculty Sponsor: Dean McCurdy

Major: Biology

Hometown: Grosse Pointe, Mich.

Wood turtles (*Glyptemys insculpta*) face numerous threats from human activities and may be in decline throughout their range. As part of a larger study on habitat use and movement patterns of wood turtles living on the St. Mary's River, Nova Scotia, I tracked 18 females to and from nesting beaches in 2007. By relocating females 3-4 times per week, I observed that they usually remained near moving water (within 25 m), but employed a variety of habitat types for foraging and basking (e.g., alder swale, tree farms, clear cuts, agricultural fields). The reliance by many of these turtles on agricultural fields as basking sites during the nesting season, and long-distance movements of female turtles over land (often > 500 km), likely exposes them to mortality from encounters with farm equipment and might also increase their likelihood of being run over by automobiles and collected as pets. Management practices that could reduce mortality of female turtles will be discussed, as well as the relationship between environmental temperatures and behavior of turtles.

Supported by: FURSCA-Bethune Fellowship, McDonald's of Canada, Ltd.

MICHAEL STOUT, '08

Modern Fighting Power: Comparing the German and American Armies of World War II

Faculty Sponsor: Geoffrey Cocks

Majors: History, Music

Hometown: Ann Arbor, Mich.

My research compares the German and American armies in World War II in order to test whether the study conducted by historian Martin van Creveld is correct in asserting that the Germans had the superior fighting force. Van Creveld's work is called *Fighting Power*, and his conclusions were that the Germans were superior to the Americans because of the organization, weapons, training, and doctrines of the German army, and that the Americans only won because they had more men and matériel than the Germans.

It is true that the Americans had greater resources and also had far more vehicles and aircraft than the Germans. There are several problems with his thesis, however. First, his study is not based on battles, but on numbers collected after the fact. Numbers do not tell the entire story of how an army fights. Second, a large portion of the information on which he bases his studies is questionable. And, third, his study only covers the infantry of the German army and not the strategy, logistics, and industrial organization required to manage a mechanized army fighting a modern war. These are things that the Americans did much better than the Germans.

My thesis adds to van Creveld's definition of "Fighting Power" the considerations of vehicles, weapons, logistics, industrial mobilization, and heavy weapons support in order to cover the entire preparation for, and conduct of, battle. I am therefore also looking at specific battles to compare how the armies fought, particularly the battles the two armies fought between June 1944 and January 1945



in Normandy during the summer of 1944 and in the Ardennes in winter 1944-45. My conclusion is that the Americans, not the Germans, were the superior force based on my more complete definition of "Fighting Power."

Supported by: FURSCA

LAKE SWEET, '08

Behavioral Manifestations of Social Competence in Juvenile *Homo sapiens*

Faculty Sponsor: Jamie Walter

Major: Psychology

Hometown: Mackinac Island, Mich.

Conflicts threaten the fulfillment of human social needs by damaging social status and causing disruption to normal social interactions. Conflict resolution, observed in many species of primates, including humans, is a possible method of repairing social relationships wounded by conflict. Examining conflict resolution in preschoolers, a group undergoing a rapid period of cognitive, social, and lingual development, could lead to new proximal and evolutionary understandings of social reconciliation. The present study aimed to connect the fields of social development, lingual development, and conflict resolution in preschool students. A sample of 18 children was observed during free play, and any conflict and reconciliatory behaviors were recorded. Types of aggression and reconciliation (verbal vs. physical) were also recorded. Teacher evaluations of each child's social competence were calculated using the Social Competence and Behavioral Evaluation (SCBE). Results indicate trends that require more data to be fully understood. Significant relationships were found between externalizing scores on the SCBE and verbal reconciliations, as well as between gender and reconciliation rates. Findings are discussed in relation to evolution of behavior and cognition as well as implications for proximal development.



Supported by: FURSCA

ERICA TAUZER, '10**Mapping the Distribution of *Zanthoxylum* (Rutaceae), the Prickly-Ashes, in North America**

Faculty Sponsor: Dan Skean

Majors: Biology, Spanish
Hometown: Gladstone, Mich.

The genus *Zanthoxylum* includes about 200 species of trees and shrubs in the citrus family (Rutaceae). Seven species are reported to occur in North America, north of Mexico:

Z. americanum Mill., *Z. clava-herculis* L., *Z. coriaceum* A. Rich., *Z. fagara* L., *Z. flavum* Vahl, *Z. hirsutum* Buckley and *Z. parvum* Shinnars. Approximately 1,200 dried specimens of these species were borrowed from herbaria, identified, and sorted to species. The specimens were compiled in a spreadsheet, which was imported to ArcGIS and used to generate geographic distribution maps for each of the species. The maps reveal that *Z. parvum* is restricted to Jeff Davis County in west Texas and that there is a zone of hybridization for the two species *Z. clava-herculis* and *Z. hirsutum* in east Texas. These distribution maps will be used to prepare range maps for the *Zanthoxylum* species in Volume 13 of *The Flora of North America*, which is scheduled for publication in 2010.

Supported by: FURSCA-Irwin Fellowship

SHANNON TAYLOR, '08**Emotional Expression: Reasons and Methods for the Expression of Negative Affect in Children**

Faculty Sponsor: Jamie Walter

Majors: Psychology, Music
Hometown: Walled Lake, Mich.

This study examines the influence of emotion type (sadness and anger) and gender on 17 kindergarten and 18 second-grade children's reasons and methods for affect expression. Each child was read two emotion stories that contained a best friend or a medium friend. The child was then asked a series of 10 questions about methods, or how they express emotion, and reasons, or why they express emotion. The answers are based on a four-point scale. Based on child interviews and a parent report, Child Behavior Checklist (T. Achenbach), the following results were found. Pouting or sulking, and telling a friend how they felt, were endorsed more in the sad condition than in the angry condition. No significant differences were found as a function of friendship level. Girls endorsed having a sad look on their face as a method of expression in the sad condition and the best friend condition more than boys did. No age differences were found in methods or reasons for expression. Controlling for age, children who expressed emotion for help from a medium friend scored high on the total problems Child Behavior Checklist score. Children who did not express emotion by pouting or sulking scored higher on the internalizing scale.

Supported by: FURSCA

AMANDA TILOT, '09**Effects of Continuous Phase Shifts on Pregnancy and Offspring in *O. degus***

Faculty Sponsor: Tammy Jechura

Majors: Psychology, Biology
Hometown: Saginaw, Mich.

The effects of prenatal stress can be long-term; longitudinal studies have revealed cognitive deficits years into an animal's lifespan. While the number of pharmacological and social stress studies is large, little research has been done regarding circadian rhythm disruption as a source of prenatal stress. Our goal is to elucidate the effect of circadian disruption on pregnancy in *Octodon degus*, and track the development of the offspring in their first year. *O. degus* are social, diurnal rodents from Chile with a three-month gestation period, an excellent animal model for studies of human circadian rhythms. At the start of the study, 18 female *O. degus* were removed from the colony at Albion College, and mated with unrelated males. The light cycle of the experimental group was continually shifted to prevent full entrainment to a particular light cycle for more than a few days, causing circadian disruption in the animals similar to constant jet lag. The control animals were not subjected to these shifts, and activity data from the experimental and control groups will be compared for differences. Research has demonstrated that shifting our internal clock to a new time zone or light/dark cycle is stressful, but the effect of this particular kind of stress on development is unclear and may have serious implications for populations at risk for chronic circadian disruption. The long-term aim of this study is to follow the offspring from birth through the first year of life, testing periodically for differences in entrainment ability and circadian development, as well as on cognitive and emotional measures.

Supported by: FURSCA

AMANDA TILOT, '09

(See Genomics Class)

ELIZABETH WEAGE, '08

Comparisons of Antibiotic Resistance Patterns of Bacterial Isolates from the Kalamazoo River

Faculty Sponsor: Ola Olapade

Major: Biology
Hometown: Baroda, Mich.

Coliforms are groups of gram-negative bacterial populations that are present in the intestinal tracts of humans and animals. Therefore, the presence and quantity of these bacterial populations are commonly utilized during the monitoring of water quality and also depended on as indicators of fecal contamination of aquatic environments. Wastewater from agricultural facilities, pharmaceutical plants, hospitals, and human waste treatment plants has been linked to increased levels of antibiotic-resistant and virulent organisms in aquatic systems (e.g., Muñoz-Aguayo 2007), due in part to increased usage of various antibiotics and their improper disposal. These circumstances have raised serious public health concerns. Recently, there have been reported cases of the methicillin-resistant *Staphylococcus aureus* [MRSA] associated with wounds and several other nosocomial infections. In this study, the resistance patterns among several coliform isolates from two sites along the Kalamazoo River in Albion, Michigan, one site located upstream and the other downstream of the sewage treatment plant, were examined in response to various antibiotics including ampicilin, tetracycline, bacitracin, rifampin, and neomycin, using the standard Kirby Bauer disk assay approach. The results obtained indicated that nearly all the isolated species from both sites were completely resistant to bacitracin based on an average zone of inhibition of 0.07cm, whereas the levels of susceptibility were variable in the presence of the remaining antibiotics examined.

Supported by: FURSCA-Irwin Fellowship



CARMEN WEDDELL, '08

That's Some Messed-Up Music! (A Mathematical Approach to N-Tone Equal-Temperament Pitch Systems)

Faculty Sponsor: Mark Bollman

Majors: Mathematics, Music Performance
Hometown: Farmington, Mich.

Western concert music is written in a 12-tone equal-temperament pitch system; that is, each octave is divided into 12 equal intervals. We can model this system with the mathematical group $Z_{12} = \{0, 1, 2, \dots, 10, 11\}$. Several rules of music theory also govern the composition of western concert music. Following this group-theoretic representation of the common system, rules such as tonic-dominant relationships can be translated into group-theoretic principles. Finally, it is possible to generalize these results to an N-tone equal-temperament pitch system in which the octave is divided into N equal intervals. For the generalized N-tone system to take on properties similar to those of the 12-tone system, however, the value of N must be restricted. I will present the model outlined above and explore the necessary restrictions on N. Finally, I will give a brief description of how we would perceive music written in systems that differ from the one to which we are accustomed.

Supported by: FURSCA-Kresge Fellowship



ELIZABETH WHITE, '08

The Abundance and Compositional Variations of Surface-Associated Bacterial Populations in Teeth Plaque Assemblages in Response to Food Consumption

Faculty Sponsor: Ola Olapade

Major: Biology
Hometown: Troy, Mich.

Surface-associated bacterial populations (i.e., biofilms) are groups of immobilized microbial communities found commonly attached to various surfaces including rocks, the human oral cavity, and the catheter, among others (e.g., Teughels 2006). The presence, abundance, and activities of these surface-associated communities, comprising diverse microbial groups (i.e., bacteria, algae, and fungi) are of significant environmental and public health importance. Specifically, the severity of a number of human diseases, such as tuberculosis, cystic fibrosis, and tooth decay, is attributable to biofilm developments on infected patients. Tooth decay is associated with the formation of a sticky, colorless mass of bacterial cells referred to as plaque found either on the surface of teeth, near the gum line, or in spaces between teeth. One of the major factors in the development of dental plaque is the type of food consumed that may induce bacterial development and proliferation.

Although some earlier studies have documented the importance of biofilm microbial communities in tooth decay as a result of consumption of food products containing high starch contents, to the best of our knowledge, no study has yet to examine the changes in the microbial community composition in biofilms in response to dietary change over a period of time. In this study, we used a combination of qualitative (API, Biomreux) and quantitative (viable counts and DAPI staining) approaches to examine bacterial populations on teeth temporally for about five weeks. The results obtained from examining total bacterial counts after brunch (mean value = 3.55×10^5 /mL) and dinner (mean value = 3.79×10^5 /mL) meals



were not significantly different. Bacterial species belonging to the *Streptococcus* and *Staphylococcus* genera predominated among the microbial communities examined. Overall, the results suggest that fairly high and nutritionally fastidious bacterial populations might have been supported by the various food products consumed during the period of the study.

Supported by: FURSCA

MEREDITH WHITEHOUSE, '08

God-Loving Liberals: Why the Religious Left Gets Left Out

Faculty Sponsor: Ronney Mourad

Major: Psychology
Hometown: Brighton, Mich.

The present research discusses the role of the Religious Left in contemporary society. I begin by looking at three modern theorists who each have different perspectives on the presentation of religious views in the political arena.



One theorist argues that exclusive use of religious views should be avoided in political discourse in order to avoid coercive policies, which I contend is a major factor in the Religious Left's unwillingness to play an active role in politics. I then discuss the rise of the Religious Right and how it has come to nearly overshadow the Religious Left. I also explore the development of the Religious Left by examining the significant role religious views with politically liberal implications played in the civil rights movement. At the end of the civil rights movement, religion and liberal politics were deeply connected. What has changed in the last 40 years that has almost removed the Religious Left from the political arena and the religious sphere? More importantly, what will it take for the Religious Left to gain an active role in today's society?

SARA WYCOFF, '08

The Department of Homeland Security: A Risk-Based Analysis of Its Priorities and Sustainability

Faculty Sponsor: Andrew Grossman

Major: Political Science
Hometown: Grosse Ile, Mich.

The focus of this study will be to answer the question of why the Department of Homeland Security, despite numerous and continuous investments on behalf of the United States' people and government, continues to fail in its mission. Its failure can be evidenced in the utterly insufficient response to Hurricane Katrina, consistent failure of the Transportation Security Administration's random airport security testing, and most recently the events surrounding Andrew Speaker's illegal re-entry into the United States via the Canadian border. Andrew Speaker is an American citizen who was believed to have the extremely deadly and contagious XDR form of tuberculosis while traveling abroad. Although authorities ordered him to be prevented from reentering the country, he entered with ease under his own identification, potentially jeopardizing untold numbers of Americans.



The fact of the matter is that, regardless of the billions of dollars, thousands of additional personnel, an incredible amount of legislation, and the creation of several new departments including but not limited to the Department of Homeland Security, America's national security system continues to fall short of its mission over five years after the fateful attacks of September 11. This paper speculates that the scope at which the Department of Homeland Security is currently operating is utterly unsustainable, as evidenced by recent events. This paper will argue that, unless the Department of Homeland Security is able to narrow its scope and use its resources accordingly, it is destined for continued failure.

KEITH ZABEL, '09

Conscientiousness and Work Ethic Ideology: A Facet-Level Analysis

Faculty Sponsor: Andrew Christopher

Major: Psychology
Hometown: Three Oaks, Mich.

We examined how different facets of work ethic ideology were rooted in the basic personality construct of conscientiousness. Individuals who endorse high levels of work ethic tend to work hard, make work an important part of their life, avoid wasting time, delay gratification, are self-reliant, act morally, and abhor leisure. Conscientious individuals tend to be diligent, purposeful, and competent in their daily activities. Costa and McCrae (1992) distinguished between six facets of conscientiousness: competence, order, dutifulness, achievement striving, self-discipline, and deliberation. Previous research suggested that the global constructs of work ethic and conscientiousness were weakly correlated (Miller, Woehr & Hudspeth, 2002).



To test our hypothesis that different work ethic dimensions are rooted in different facets of conscientiousness, 299 individuals (157 men, 142 women) participated in this study through an online survey service. Respondents completed Miller et al.'s (2002) 65-item multidimensional work ethic scale and Costa and McCrae's (1992) 48-item conscientiousness scale. Multiple regression and dominance analyses suggested the conscientiousness facets of achievement striving and dutifulness were the strongest predictors of work ethic outcomes, predicting all but one of the work ethic dimensions. Results supported previous research that found increases in predictive and incremental validity in measuring personality constructs at the facet level as opposed to the global construct level (Paunonen, Haddock, Fosterling, & Keinonen, 2003). This study emphasized the importance of studying work ethic at the facet level as opposed to the construct level.

Supported by: FURSCA, Faculty Development Committee

KEITH ZABEL, '09

Protestant Ethic Ideology: Its Multifaceted Relationship with Just World Beliefs, Social Dominance Orientation, and Right-Wing Authoritarianism

Faculty Sponsor: Andrew Christopher

Major: Psychology
Hometown: Three Oaks, Mich.

This research examined how different facets of work ethic ideology would be related to just world beliefs (JWB), social dominance orientation (SDO), and right-wing authoritarianism (RWA). Individuals who endorse high levels of work ethic tend to work hard, make work a central part of their life, avoid wasting time, delay gratification, are self-reliant, act morally, and abhor leisure. JWB consists of believing in a world in which those who do well are rewarded and those who do poorly are punished. SDO is an attitude toward in-group relations referring to what degree an individual prefers such relationships to be hierarchical as opposed to equal. RWA consists of rebelling against established authority, aggression toward outgroups, and the tendency to be conservative (Altemeyer, 1996).

To examine how the work ethic facets were related to JWB, SDO, and RWA, and the extent to which using work ethic facets provided greater predictive validity than measuring work ethic as a global construct, 256 individuals (133 women, 123 men) completed an online survey that included a 65-item multidimensional work ethic scale (Miller, Woehr, & Hudspeth, 2002), JWB scale (Rubin & Peplau, 1975), SDO scale (Pratto et al., 1994), and RWA scale (Altemeyer, 1996). Multiple regression analyses revealed JWB was related to the belief that

hard work yields a desirable outcome, SDO was related to making work a central part of life, and RWA was related to self-reliance and morality. In addition, the work ethic facets provided greater predictive validity than the more often used composite work ethic score.

Supported by: FURSCA, Faculty Development Committee

ANGELA ZITO, '09

Run Down by a Company of Rogues: The Exclusion of the Works of John Wilmot, Second Earl of Rochester, from the Canon of English Literature

Faculty Sponsor: Charles Crupi

Major: English
Hometown: Rochester Hills, Mich.

This project takes as its subject John Wilmot, second earl of Rochester, and his libertine poetry in exploring some aspects of canon formation and the compilation of pedagogical anthologies. Rochester, a courtier poet of the Restoration period (dated roughly from 1600 to 1700) infamous for his uncouth verses and scandalous behavior, has long suffered exclusion from the English literary canon—and consequently from works anthologizing the canon—due to centuries of unreserved criticism against his controversial persona and his employment of obscene and sexually explicit



language in many of his verses. This omission does the poet, the canon, and the student of English literature a great injustice, however, by casting into shadow a figure and corpus of poetic works highly representative of the literary, social, and political atmosphere of Restoration London.

In Part I of this paper, I discuss the changing ethos of England upon the return of Charles Stuart II that so dramatically shaped Rochester and his poetry into the representational specimens they became. Part II takes a closer look at the controversial nature of Rochester's life and several of his libertine poems. Discussion of the aesthetic qualities of his libertine poetry follows in Part III, along with a survey of the history of Rochester criticism. Part IV surveys the contents of eight editions of the *Norton Anthology of English Literature* to illustrate his gradual acceptance into the present canon.

GENOMICS CLASS**ROBERT BAILEY, '08**

Major: Biology
Hometown: Novi, Mich.

MOLLY ESTILL, '09

Majors: French, Biology
Hometown: Romeo, Mich.

JIM GEARY, '08

Major: Biology
Hometown: Montreal, Canada

MARITA HAMILTON, '08

Major: Biology
Hometown: Flint, Mich.

CAMERON HARRIS, '08

Majors: Psychology, Biology
Hometown: Portage, Mich.

ELIZABETH JEWELL, '08

Majors: Biology, Music
Hometown: Stevensville, Mich.

EMILY LEATHERMAN, '08

Major: Biology
Hometown: Battle Creek, Mich.

RACHEL LIPPERT, '08

Majors: Chemistry, English
Hometown: Clyde, Ohio

RASLEEN SALUJA, '08

Majors: Chemistry, Biology
Hometown: Darien, Ill.

AMANDA TILOT, '09

Majors: Biology, Psychology
Hometown: Saginaw, Mich.

Genomics at Albion

Faculty Sponsor: Kenneth Saville

Genome sequencing technology has increased our understanding of how genomes are organized, a critical parameter in the regulation of gene expression, and has created new opportunities for student-scientist research partnerships. With appropriate training, undergraduate students can provide the needed human input to improve raw sequence data and carry out careful annotation. Over 30 primarily undergraduate institutions are working with the Biology Department and Genome Sequencing Center of Washington University to create the Genomics Education Partnership (GEP), providing students with an opportunity to work on a genomics research problem.

Currently we are finishing and annotating the gene-rich region of the dot chromosomes of several *Drosophila* species.

In *D. melanogaster*, this unique domain has properties of both euchromatin (including normal gene density) and heterochromatin (including a high density of repetitive DNA- remnants of transposable elements and retrotransposons). Students work as a research team, each contributing to finishing, annotating, and analyzing about 40,000 base pairs of DNA. A comparison of the *D. melanogaster* and *D. virilis* dot chromosomes is now being prepared for publication; our group is analyzing the dot chromosomes of *D. erecta* and *D. mojavensis*. Students participating in the GEP report intellectual and personal gains normally associated with summer research experiences, particularly in developing problem-solving skills; they are very enthusiastic about the project.

Supported by: Howard Hughes Medical Institute and National Institutes of Health under grants to Sarah Elgin at Washington University, St. Louis.



The Genomics Class: (left-to-right) Cameron Harris, Emily Leatherman, Robert Bailey, Kenneth Saville, Jim Geary, Elizabeth Jewell, Molly Estill, Marita Hamilton, Rachel Lippert. Not pictured: Rasleen Saluja, Amanda Tilot.

THE ELKIN R. ISAAC ENDOWMENT

The Elkin R. Isaac Endowed Lectureship was created in 1991 by Albion College alumni in honor of their former teacher, coach, and mentor, Elkin R. "Ike" Isaac, '48. Isaac taught at Albion from 1952 to 1975 and coached basketball, track, and cross country. He led his teams to one Michigan Intercollegiate Athletic Association basketball title, six consecutive league championships in track, and three cross country championships. He also served as the College's athletic director and created Albion's "Earn, Learn, and Play" program and the "Albion Adventure Program." In 1975, Isaac joined the faculty at University of the Pacific and became athletic director in 1979. He retired there in 1984. He now lives in Florida with his wife, Edith.

Reflecting Elkin Isaac's lifelong interests in higher education and research, proceeds from the endowment are used to bring a noted scholar or public figure to campus each year to offer the Isaac Lecture and to visit with classes. In 1997, the Isaac Lectureship was expanded and is now associated with Albion College's annual Student Research Symposium, featuring presentations by students recommended by their faculty sponsors for outstanding independent study and research. The symposium now bears Isaac's name.

THE ISAAC ENDOWMENT COMMITTEE

Cedric W. Dempsey, '54
Ben E. Hancock, Jr.
T. John Leppi, '59
Thomas G. Schwaderer, '56
Leonard F. "Fritz" Shurmur, '54 (deceased)
John R. Taylor, '55

THE JOSEPH S. CALVARUSO KEYNOTE ADDRESS ENDOWMENT

Joseph S. Calvaruso, '78, and his wife, Donna, established an endowment fund in 2005 to support the annual Elkin R. Isaac Symposium keynote address. The keynote address now bears Calvaruso's name.

An Albion native, he entered the banking profession shortly after graduating from Albion College in 1978, and he currently serves as senior vice president and director of risk management for Mercantile Bank in Grand Rapids. He has also held numerous leadership roles in professional organizations, including the Risk Management Association.

Active in the Republican Party on the state and national levels, Calvaruso is a member of the Gerald R. Ford Institute for Public Policy and Service Visiting Committee at the College.

In keeping with Calvaruso's personal goal to "try different things in life," the keynote endowment ensures the symposium will continue to provide an exceptional variety of presenters from the arts, sciences, social sciences, and humanities.

PAST ISAAC SYMPOSIUM SPEAKERS

Elkin R. Isaac Alumni Lecture

Emilio DeGrazia, '63 (1999)
James Misner, '66 (2000)
John Vournakis, '61 (2001)
Joseph Serra, '56 (2002)
Denise Cortis Park, '73 (2003)
John Porter, '53 (2004)
Elkin Isaac, '48 (2005)
Joseph Calvaruso, '78 (2006)
Eileen Hebets, '94 (2007)

Joseph S. Calvaruso Keynote Address

Wade Davis (1999)
Stephen Jay Gould (2000)
Doris Kearns Goodwin (2001)
Kurt Vonnegut (2002)
Salman Rushdie (2003)
Gloria Steinem (2004)
Edward O. Wilson (2005)
Regina Carter (2006)
Steven Pinker (2007)

THE 2008 ISAAC STUDENT RESEARCH SYMPOSIUM COMMITTEE

Morris Arvoy (Communications Office)
Craig Bieler (Chemistry)
Sarah Briggs (Communications Office)
Jeffrey Carrier (Biology)
Gene Cline (Philosophy/Brown Honors Institute)
Lauren Karcz, '08
Lisa Lewis (Chemistry/Academic Affairs)
Anne McCauley (Art and Art History)
Dean McCurdy (Biology/Brown Honors Institute)
Rachel Ransom, '08
Ruthie Spalding, '09
Michael Van Houten (Stockwell-Mudd Library)
Royal Ward (Academic Affairs)

FOUNDATION FOR UNDERGRADUATE RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITY (FURSCA)

The Foundation for Undergraduate Research, Scholarship, and Creative Activity (FURSCA) was established to promote and support student research, original scholarship, and creative efforts in all disciplines. Through a number of programs, taking place at all points in a student's career at Albion, FURSCA can help students pursue independent study in their areas of interest. Students work closely with a faculty mentor to develop and carry out research or other creative projects. Participation in such projects provides valuable experience beyond the scope of classroom work, and enhances a student's preparedness for future employment or graduate studies. Some examples of FURSCA programs are listed below.

Student Research Partners Program—Geared toward first-year students, this program pairs a student with a faculty mentor to work on a project related to the faculty member's research or creative area. Students gain hands-on experience with scholarship in a specific field,

and may elect to continue during their sophomore year. Participation is selective, based on high academic achievement, and stipends are awarded.

Research Grants—Students may apply for funds to support research or other creative projects. Students must work closely with a faculty adviser; however, projects are not limited to any particular discipline. Grants may be awarded to pay for supplies, printing costs, subject payments, software, or other costs associated with completion of the project.

Travel Grants—Students may be awarded travel funds to help cover expenses associated with travel to attend professional meetings at which they will present the results of their research or creative projects.

Summer Research Fellowship Program—A select number of students may remain on campus during the summer, earning a stipend, to work on research or creative projects. In addition to working closely with a faculty adviser, students participate in weekly seminars with other students in the program.

