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2009

THE TWENTIETH ANNUAL ELKIN R. ISAAC STUDENT RESEARCH SYMPOSIUM

ALBION COLLEGE

APRIL 22-23, 2009

SCHEDULE OF EVENTS

Wednesday, April 22, 2009

7:30 p.m. **Elkin R. Isaac Alumni Lecture: James P. Gignac, '01**
"New Energy for America: From 'Liberal Arts at Work' to Moving Beyond Coal"

Welcome: President Donna M. Randall
Remarks: H. Eugene Cline, Professor of Philosophy
Speaker Introduction: Wesley A. Dick, Professor of History
Towsley Lecture Hall/Norris Center 101

Reception immediately following the program
Science Complex, Mitchell Museum

Thursday, April 23, 2009

8:30-10:30 a.m. **Student Research Platform Presentations**
See also detailed schedule of presentations on pages 4-6.

Forum #1
Norris Center 100

Forum #2
Towsley Lecture Hall/Norris Center 101
Goodrich Chapel

Forum #3
Norris Center 102

Forum #4
Norris Center 104

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: David Trimble**
"A Nobel Laureate's Perspective on the Middle East"

Welcome: President Donna M. Randall
Conferral of Honorary Degree: President Randall; Yi-Li Wu, Associate Professor of History; and Midori Yoshii, Assistant Professor of International Studies
Speaker Introduction: Patrick M. McCombs, '11
Goodrich Chapel

Reception immediately following the program
Bobbitt Visual Arts Center Lobby

ELKIN R. ISAAC ALUMNI LECTURE

James Gignac, '01

James Gignac currently serves as Midwest director of the Sierra Club's Beyond Coal Campaign. Based in Chicago, Gignac helps coordinate and manage the campaign's legal, organizing, and communications activities across a fourteen-state region. His principal focus is on supporting the campaign's goal to eliminate one-third of the nation's global warming emissions that come from the use of coal to generate energy by opposing new coal plant proposals, accelerating the retirement of existing coal-fired power plants, and driving investment away from coal and into clean energy solutions like energy efficiency, solar power, and wind power. Gignac's day-to-day work consists of a varied and interesting mix of strategic planning, legal coordination, messaging, organizing, and policy advocacy designed to help move America beyond coal and into the clean energy economy of the future.

After graduating from Albion with majors in history and political science, Gignac earned his law degree from Harvard Law School in 2004. After leaving Harvard, he spent a year serving as a judicial law clerk for the Alaska Supreme Court. Gignac then returned to the Midwest and worked as an associate in the environmental practice group with the law firm of Mayer Brown LLP in Chicago. He joined the Sierra Club in his current capacity in June 2008.

This will be Gignac's second presentation at an Elkin R. Isaac Symposium. As an Albion College senior in spring 2001, he presented his thesis entitled "Citizen Environmental Activism: Three Case Studies in the Albion, Michigan Area." The thesis consisted of an analysis of three different opportunities Gignac had during his time at Albion to work with and study citizen involvement in environmental issues as a member of the Environmental Institute's interdisciplinary Rice Creek Project and Professor Wesley Dick's Environmental History course. In his current role with the Sierra Club, the nation's oldest and largest grassroots environmental organization, Gignac continues to work with and for volunteer activists seeking to protect their local environment and address the critical challenge of climate change.

The Institute for the Study of the Environment is a co-sponsor of this lecture.

JOSEPH S. CALVARUSO KEYNOTE ADDRESS

David Trimble

Northern Ireland leader David Trimble received the Nobel Peace Prize in 1998 following the historic Belfast Agreement in April of that year that led to a peaceful resolution of the conflict in his native country. He shared the award with John Hume. The Belfast Agreement mapped out a power-sharing arrangement between unionists and nationalists in Northern Ireland, repaired relationships between Northern Ireland and the Irish Republic, and between Ireland and Britain, and set the agenda for a lasting peace.

After a distinguished career as a law faculty member at Queen's University in Belfast, Trimble entered politics in 1990 and became the leader of the Ulster Unionist Party in 1995. His success in establishing the peace agreement led to his election as first minister of the Northern Ireland Assembly in 1998. Trimble was re-elected as first minister in 2001.

In 2006, Trimble was created Lord Trimble of Lisnagarvey and assumed a seat in the British House of Lords. He joined the Conservative Party in 2007. His tenure in the House of Lords has been marked by a particular interest in the progress of the Israeli-Palestinian negotiations as well as British-Irish political relations.

In accepting the Nobel Prize, Trimble expressed his admiration for the "politicians of the possible," those who through the course of history have sought "to make a working peace, not in some perfect world, that never was, but in this, the flawed world, which is our only workshop."

During the Calvaruso Lecture, Trimble will share the lessons he learned in negotiating the Belfast Agreement, showing how they may hold the key to ending the similar conflict between Palestine and Israel, and between the Sunnis and the Shiites. How do warring factions of different political and religious beliefs, with generations of violence toward each other, move toward disarmament; and how do they do it with words, not weapons? What needs to be the catalyst for change, and how do we begin? Trimble brings both political acumen and humanitarianism to his subject.

STUDENT PRESENTATION SCHEDULE—THURSDAY, APRIL 23, 2009

FORUM #1—Norris Center 100

8:30	Lisa Anderson (French)	Methods for Analyzing Carbon Sequestration on Degraded Lands and U.S. EPA Superfund Remediation Sites
8:45	Dontae Jacobs (Saville)	DNA Damage and Repair: A Look at the *Hobo* Element in *Drosophila melanogaster*
9:00	William Andert (French)	Investigation of Chiral Iodonium Ylides
9:15	Tim Rambo (Connamacher)	An Introduction to Quantum Algorithms
9:30	Monica Yalamanchili, Jeff Stephens, Kelyn Carlson (McCurdy)	Parasitism and Stress Levels in Populations of Green Frog, *Rana clamitans*, in Western Michigan, USA
9:45	Laura Pollum (Lewis)	Molecular Dynamic Simulations of Methane Motion in Clathrate Hydrates Cages
10:00	Ryan Graham (Miller)	Quantifying the Influence of a 4.8-Tesla Magnetic Field on the $\alpha \leftrightarrow \gamma$ Phase Transitions in Fe-0.75C Steel
10:15	Whitney Patton (Bollman)	The Biangular Coordinate System as Seen through Complex Numbers
1:15	Kelyn Carlson, Erica Tauzer (McCurdy)	A Preliminary Report from a Mini-Expedition to Study Crustaceans Living in Intertidal Mudflats in Suriname, South America
1:30	Amanda Engelhard (Kennedy)	Spying on Incubating House Wrens: Using Minicameras to Observe Behaviors in Nest Boxes
1:45	Stacy Capehart (French)	Synthesis of Gold Core/Quantum Dot Shell Nanoparticles
2:00	Elizabeth Reznikov (McCaffrey)	Chromium-tetrone Complexes as Novel Magnetic Materials
2:15	Kristen Mitchell (Wilch)	Mechanisms of Glacial Ablation at Linnébreen, Svalbard, Norwegian Arctic
2:30	Culver Redd (Zellner)	Calibration and Use of the 11-Inch Celestron Telescope for Observing and CCD Imaging
2:45	Meagan Bosket (Wilch)	Analysis of a Basanitic Hydrovolcano at Minna Saddle, Antarctica
3:00	Lesley Simanton (Zellner)	Multi-Wavelength Photometry on Stellar Clusters: Applications in Telescope-Camera System Analysis and Galactic Formation
3:15	Man Kai (Alyssa) Wong (McCaffrey)	Chromatographic Purification of Recombinant Adeno-Associated Viral Vectors Using Convective Interaction Media
3:30	Matthew Logan (French)	Synthesis and PET Reactions of *O*-alkyl Oximes
3:45	Molly Estill (Olapade)	Associations between Livestock Farms and Rice Creek's Health: A Microbiological Examination
4:00	Heather Lagendyk, Chelsea Smith (Lyons-Sobaski)	Three *Sabatia* Species Cross-Amplified Using Genetic Markers Designed for *S. campestris*

FORUM #2 – Towsley Lecture Hall/Norris 101 and Goodrich Chapel

8:30	Elizabeth Bendall (Williams)	Life between the Coasts: *m(id) magazine*
8:45	Kristin Butler (Lamouria)	Fallen Gentlemen: The Late-Victorian Fascination with Double Lives
9:00	Michelle Salemka (Stotz-Ghosh)	"Voices from a Land Divided": A Study of Literary Trends and Cultural Sentiments in Michigan
9:15	Angela Zito (Mesa)	"To Wind That Cradles Birds": An Exploration of Sonnet Structure and Voice
NOTE: The performances by Sarah Chen, Jeffrey Fang, and Ji Yun Lee will take place in Goodrich Chapel.		
9:35	Sarah Chen (Ball, Abo)	Allegro Aperto from Mozart's Concerto No. 5 for Violin and Orchestra
9:50	Jeffrey Fang (Abbott, Ball)	Sergei Rachmaninoff: Piano Concerto No. 2, Op. 18 – I. Moderato
10:05	Ji Yun Lee (Abbott)	Edvard Grieg: Piano Concerto in A Minor, Op. 16
1:15	Katharine Van de Putte (Mesa)	"Above Ground": A Collection of Poems
1:30	Emily Pieper (Cocks)	"Serving the Forgotten Man"
1:45	Melissa Bailey (Hendrix)	"Shadow on the Horizon": An Original Poetry Collection
2:00	Ashli Fox (Vaughan-Southard)	Moving Expressions of a Culture: An Exploration of Music and Dance in the Caribbean
2:15	Stephanie Edwards (Stotz-Ghosh)	Stages on Journeys Homeward: James Wright and My Poetic Journeys toward Finding Home
2:30	Chelsea Grieve (Morrow)	Manipulative Monks and the Survival of St. Catherine's at Mount Sinai

2:45	Angela Zito (Crupi)	Rochester vs. Dryden: A Case Study Examining the Development of the Pedagogical Anthology of English Literature
3:00	Hannah Trager (Wickre)	Mirrors of Masculinity: Reflections of Gender Identity in H.C. Westermann's Early 2-D Work
3:15	Ruthie Spalding (Mesa)	"Espalier"
3:30	Dianne Marshall (Mourad, Elischberger, Christopher)	Toward an Ethical Faith: Affirming the Importance of Critical Questioning Concerning Religion
3:45	Sarah Julian (Grimm)	*Die Rolle des Glaubens in der Entwicklung der Quanten- und Astro-Physik* (The Role of Belief in the Development of Quantum- and Astro-Physics)
4:00	Jonathan Reynolds (Mourad, Christensen, Christopher)	Evangelicals and the Environment

FORUM #3 – Norris 102

8:30	Amanda Tilot (Jechura)	Pregnancy and Reentrainment after Phase Shifts in *Octodon degus*
8:45	Keith Zabel (Christopher)	Conservative Ideology and Well-Being: The Mediating Role of the Proactive Personality
9:00	Katelyn Boswell (Keyes)	A Preliminary Study of Treatment Decisions Made by Parents of Children with Autism
9:15	Halie Kerver (Jechura)	Investigating the Developmental Aspect of Unihemispheric Sleep in Bearded Dragons (*Pogona vitticeps*)
9:30	Alexandra Goss (Christopher)	The Effect of Music Familiarity on Information Recall in Advertising
9:45	Christina Poulin (Wieth)	The Three-Headed Problem-Solver: Group Cognition and Its Effects on Processing and Memory of Relevant and Irrelevant Components
10:00	Kristin Sparschu (Jenson)	Using Gender Differences in Lay-Representations of Coronary Heart Disease to Predict Health Behaviors
1:15	Kevin Zabel (Christopher)	Age and Financial Risk-Taking: Mediating and Moderating Roles of Sensation Seeking and Materialism
1:30	Brittnay Williams (Jenson)	Using Gender Differences in Lay-Representation of Diabetes to Predict Health Behaviors
1:45	Alexander McKelvy (Jechura)	Penile Structure and Function in the Cavimorph Rodent *Octodon degus*
2:00	Takeshia Williams (Wieth)	The Autistic Spectrum and Creativity
2:15	Collin Miller (Keyes)	School Choice: Factors Influencing Parental Decision
2:30	Eric Schroeder (Pheley, Grossman, Rose)	Party Regimes and the Politics of Regulation: Why the Free Market Is Not Truly Free
2:45	Blair Flemion, Sarah Jose, Chelsea Knoop, Allie Lewis (Frandsen, Crandell)	Google Online Marketing Challenge
3:00	Yang Chen (Yoshida)	Factors of China's Rapid National Saving Growth
3:15	Matt Makin, Pat McCombs, Natalie Mikkola, Brittany Wiese, ESCIA: Dany Goncalves, Juliette Ismail, Johannes Weber (Mike Frandsen, Thierry Etchebarne (ESCIA))	ESCIA/Albion Plan for a Franco-American Business: "The Crêpe Connection"
3:30	Nathan De Winkle (Hakes, Cline)	Why, What, and How: Philosophical, Empirical, and Political Approaches to CO_2 Reduction
3:45	Tim Rambo (Miller)	Implementation of an Algorithm-Driven Solar Tracker

FORUM #4 – Norris 104

8:30	Jessica Clarke (Medina)	How People Respond to Film Based upon Reactions to the Films *El Laberinto de Fauno* and *Las 13 Rosas*
8:45	Rebecca Friedrick (Pheley)	The Comparative and International Policy Implications of Human Trafficking at the Thai-Burmese Border
9:00	Elisabeth Gusfa (Rose, Grossman, Dabney)	Theories of Executive Power
9:15	Hannah Scheiwe (Cocks)	Bombs Away: The Military, Political, and Social History of the Airplane and the British and American Airmen Who Fought the Strategic Bombing Campaign in the Second World War
9:30	Margaret Schaefer (Ariza)	An Ineffective and Inequitable Health Care Safety Net: A Case Study of Health Care Inequities for Chicago's Homeless
9:45	Margaret Leiby (Grimm, Franzen)	Nazi Social and Cultural Policy and Its Effect on Women

(continued on next page)

10:00	Rachel Roof (Grossman)	Culture, Government, and Politics: Analyzing Women's Movements in the United States and the Republic of India
1:15	Kwame Sakyi (Eaton)	A Historical Problem and a Contemporary Impact: Health Care, Gender, and Traditional Medicine in Ghana
1:30	Amanda Vocke (Togunde)	Media Portrayal of America and Its Influence on Young People's Migration Intentions in Nigeria
1:45	Conor Fitzpatrick (Pheley, Eaton, Grossman)	Why the African Union Should Lead Conflict Resolution Efforts in Congo-Kinshasa
2:00	Jacob Rinkinen (Togunde)	Agents of Change: Gender Differences in Migration Intentions among University Undergraduates in Nigeria
2:15	Jeffrey Simmons (B. Johnson, T. Johnson)	A Cost-Benefit Analysis of Employee Wellness Programs and Their Potential Effect on Employee Health Care Costs at Albion College
2:30	Lindsay Carniak (Whitehead-Schwarz)	Triki Triki Bang Bang: Comparative Study of Government and Non-government Organizations' Public AIDS Campaigns in Argentina
2:45	Paige Edwards (Mullin)	Global Sushi
3:00	Emily Knoppe (Medina)	The Role of the Consumption of Yerba Maté in the Construction and Expression of Argentine National Identity
3:15	Matt Baciak (Cline, Grossman, Cocks)	Nuclear Weapons as Peace Weapons: The Argument for Controlled Proliferation
3:30	Joshua Rontal (Pheley)	Educational Laptop Deployment into Developing Markets: Are They Ready for It?

POSTER PRESENTATIONS – Science Complex Atrium, 4-5 p.m.

Eric Bow, Hannah Koaches (Rohlman)	Formulating a Model Structure of the *Anabaena* Ribozyme
Thomas Freeman, Matthew Zaborowicz (Rohlman)	Synthesis and Characterization of Fluorescently Labeled Ribozyme Substrates
Catarina Gulledge (Moss)	Physical Activity and Type 1 Diabetes
Bryan Hornacek (Albertson)	*Wolbachia* Bacteria Overreplicate and Localize to the CNS in Wild Populations of *Drosophila simulans* and *melanogaster*
Lara Hubbel (B. Lincoln, T. Lincoln)	Structural Analysis of Quartzites, Black Hills, South Dakota
Brittany Myers (Van de Ven)	Chemical and Mineralogical Comparison of Soils Collected on Dolomite and Granodiorite Rock from the White-Inyo Mountain Range, California
Jakub Novak (McCaffrey)	Comparative Study of Red Wine and *Camellia sinensis* Chemical Composition
Ashley Ozelski (White)	Bird Personalities: Variations in Boldness of Nesting House Wrens (*Troglodytes aedon*)
Laura Painter (Wilch)	Interpretations of Eruptive and Depositional Environments of the Minna Bluff Volcanic Complex, Antarctica
Kaycee Rashid (Elischberger, Jechura)	Directed Forgetting of Real-Life Events in Young Adults
Carolyn Rath (Wilch)	Lithofacies Analysis of Volcaniclastic Samples from the Antarctic Geological Drilling Program (ANDRILL) McMurdo Ice Shelf (AND-B1) Core
Culver Redd (Bieler)	Photophysics of Benzoic Acid Derivatives
Megan Roberts (Jechura)	Gender Differences in Time-Dependent Spatial Learning in *Octodon degus*
Tim Stevens (Rohlman)	Fluorescence Analysis of the *Twort* Group I Introns Using an ABI Prism 310 Genetic Sequencer
Haley Sztykiel (Brandt)	On the Allure of Gambling When a Risk-Free Response Is Concurrently Available
Sachi Vyas (Olapade)	Spatial and Temporal Comparison of Bacterial Community Composition in Selected Adult Oral Cavities
Keith Zabel (Christopher)	Conscientiousness and Subjective Overachievement: A Facet-Level Analysis
See participants under Forum #3, 3:15 p.m.	SEE (Student Entrepreneurial Exchange)
Lauren Beck, Christopher Blunden, Nicole Clark, Andrew Drake, Molly Estill, Jonathan Foust, Jonathan Heckm an, Dontae Jacobs, Dana Koenig, Jennifer Lammers, Karl Smith, Melissa Tache, Monica Yalamanchili (Saville)	Comparative Genomics in *Drosophila*

ABSTRACTS OF STUDENT PRESENTATIONS

LISA ANDERSON, '09

Methods for Analyzing Carbon Sequestration on Degraded Lands and U.S. EPA Superfund Remediation Sites

Faculty Sponsor: Andrew French

Major: Chemistry
Hometown: Cadillac, Mich.

Carbon is an essential chemical element that exists in different allotropes that form the basis of all life on Earth. Carbon is stored in soil in the form of soil organic matter (SOM). When a land is disturbed, carbon is released into the atmosphere by the oxidation of SOM. The most common forms of carbon release include deforestation and agricultural practices that involve tilling. Therefore, degraded lands serve as great carbon sinks for increasing the amount of terrestrial carbon sequestration. Degraded lands and Superfund sites can be remediated and revitalized with high SOM soil amendments such as biosolids. High SOM soil amendments also provide a nutrient rich surface for vegetation growth, which also sequesters carbon.

The compilation and comparison of analytical methods for carbon in soil and biomass can be used to identify which analysis is appropriate to quantify the potential carbon sequestration at disturbed lands that have been remediated and restored using soil amendments. Conventional methods such as dry/wet combustion, although more time-consuming, labor-intensive, and limiting, will be the most likely method to be used in the near future. The emerging technologies of light-induced breakdown spectroscopy and inelastic neutron scattering provide means of increasing our understanding of soil carbon but the field instruments are not yet commercially available. Also, for the purposes of determining total organic carbon, high temperature combustion after the removal of inorganic carbonates, if present, is recommended.

Supported by: U.S. Environmental Protection Agency, National Network for Environmental Management Studies Program

WILLIAM ANDERT, '09

Investigation of Chiral Iodonium Ylides

Faculty Sponsor: Andrew French

Major: Chemistry
Hometown: Stevensville, Mich.

The use of iodine compounds in organic asymmetric synthesis has been of growing interest in the past decade. Due to the chemical properties of iodine relating to size and valency, these compounds are capable of hypervalent states. When iodine compounds are hypervalent, they can be used in asymmetric reactions. The French research group has shown such compounds react with a variety of compounds to transfer chirality with moderate enantioselectivities. Of particular synthetic interest are ylides using iodine. Related compounds with phosphorus, sulfur, and nitrogen have been previously used in related capacities, and thus the use of iodine in the ylide class of compounds was of interest. The research herein describes the synthesis and evaluation of iodonium ylides and their uses in synthetic organic chemistry.

Supported by: FURSCA

MATT BACIAK, '09

Nuclear Weapons as Peace Weapons: The Argument for Controlled Proliferation

Faculty Sponsors: Eugene Cline, Andrew Grossman, Geoffrey Cocks

Majors: Philosophy, Political Science
Hometown: Canton, Mich.

Many would argue that to stop the threat of nuclear war we must try to get rid of all the nuclear devices and destroy them. This paper will argue to the contrary, contending that by increasing the number of nuclear nations the cost of going to war would be so high that no nation would choose to launch a nuclear weapon. This view is based upon the precepts established by John Mearsheimer, Kenneth Waltz, and other structural neo-realists who believe the solution to international security is a deterrence model based upon rational choice theory. This, coupled with Nina Tannenwald's theory of a nuclear taboo, would create a status quo among the nations of the world due to the fact that no nation would dare upset this balance because of the fear that doing so would entail a cost too high to bear, namely a nuclear exchange. Therefore, by increasing the number of nuclear weapons, and nuclear nations, we will be promoting and ensuring peace.

MELISSA BAILEY, '09

"Shadow on the Horizon": An Original Poetry Collection

Faculty Sponsor: Scott Hendrix

Major: English (Creative Writing)
Hometown: Beaver Island, Mich.

No man is an island, entire of itself;
every man is a piece of a continent, a part of the main.

—John Donne

No man is an island. But what if you were born and raised an only child on Beaver Island, a remote island community in northern Lake Michigan? My honors thesis is a collection of original poetry that grapples with what it means to be a native "Islander" and with the definition of "island" itself. My poetry is not so much an explanation of island life as it is an exploration of the effects of isolation. Because, after all, if one has lived 18 out of 21 years separated from the mainland by more than 32 miles of Great Lake, cut off from paved roads, fast food, convenience stores, and hospitals, it can be difficult to render the experience with any sort of believable objectivity. Objectivity forsaken, then, my thesis attempts to reveal the way islands can swell beyond their geographical definitions and push their coastlines into our emotions and psyches. In meditating on the multiplicity of the meaning of "island(s)," we are left no choice but to question the personal borders we create both to protect ourselves and draw us close to each other.

LAUREN BECK, '11

(See Genomics at Albion)

ELIZABETH BENDALL, '09

Life between the Coasts: *m(id) magazine*

Faculty Sponsor: Laura Williams

Major: English (Creative Writing)
Hometown: Grand Blanc, Mich.

m(id) magazine was created in an attempt to develop the identity of the Midwest in the media. Using the Internet as a medium as opposed to print, the Michigan-based Web site forgoes celebrity gossip and unaffordable handbags in favor of the people, places, and events that make up the Midwest. *m(id)*'s focus is its inspiration: believe it or not, there is life between the coasts.

While the decision to make *m(id)* an online experience was a practical one, it was also a strategic move. The magazine industry is currently going through several changes, the most important likely being the decision of how and when to use the Web in relation to print.

As the editor-in-chief of *m(id)*, I had two main objectives: (1) preparing and organizing the Web site for its launch and (2) developing the voice of the magazine while keeping the content and mission statement cohesive.

Supported by: FURSCA

CHRISTOPHER BLUNDEN, '09

(See Genomics at Albion)

MEAGAN BOSKET, '09

Analysis of a Basanitic Hydrovolcano at Minna Saddle, Antarctica

Faculty Sponsor: Thomas Wilch

Major: Geology
Hometown: Eureka, Mont.

The Minna Saddle volcanic mapping project has three sections: an analysis of field data, a lithofacies and petrographic analysis, and a geochemical analysis.

The 0.5 x 1 kilometer outcrop is comprised of a well-preserved sequence of layered volcaniclastic rocks. Based on observations made in the 2007-08 field season as well as detailed descriptions of 25 hand samples and 33 thin sections, the rock outcrop has been divided into several lithofacies. Each of these lithofacies is indicative of a change in the eruptive and/or depositional mechanism. The alternating coarse and fine layers and sedimentary structures indicate variable water and magma interaction during the eruptive phase. Abundant deformation structures indicate that the outcrop was saturated following the eruption.

Geochemical analysis of two volcanic bombs and one volcaniclastic sample was completed using x-ray fluorescence, ICP-MS, $^{40}Ar/^{39}Ar$ geochronology, and electron microprobe analysis. The outcrop has been dated to an age of 0.92 ± 0.30 million years, and it is basanitic in composition.

The field observations and lithofacies analysis are used to reconstruct the eruptive style(s) of the nunatak and determine what the deposits indicate about syneruptive ice levels. The main depositional mechanism was turbulent base surges brought on by discrete pulses of the eruption through the addition of discrete amounts of water or magma to the vent. The geochemical analysis helps to determine the outcrop's relationship to the surrounding volcanism.

Supported by: FURSCA- Julia Robinson Burd, '31, Memorial Fellowship, Geological Sciences Department Taylor Fund for Undergraduate Research, National Science Foundation

KATELYN BOSWELL, '09

A Preliminary Study of Treatment Decisions Made by Parents of Children with Autism

Faculty Sponsor: Barbara Keyes

Major: Psychology
Hometown: Chesterfield, Mich.

After the first 11 cases of autism were reported in 1943, the disorder's prevalence steadily increased over the next three decades. By the 1980s, the diagnosis of autism was 0.1-0.4 in 1,000; it quickly escalated to 2-4 in 1,000 in the 1990s and is currently approximately 6.7 in 1,000 (CDC, 2007; Kanner, 1943; Rice, 2007). Whether due to genetics, the environment, an increase in awareness, or some combination of these factors, the alarming rate at which the disorder is being diagnosed has caught the attention of those in research and the media. While much of this attention has helped to raise funds and find treatments for autism, much of the media coverage has generated undue attention to treatments and interventions that lack empirical support. With over 100 treatments of autism available and no one cure, many parents run through several forms of medications, therapies, and interventions before they observe even a semblance of improvement in their child. The aims of this paper are to evaluate the efficacy of the current treatments available to children and adolescents with autism, to examine the sources and factors that affect parents' decisions in selecting treatments for their child, and to gain an overall perspective on the experience parents undergo as they seek treatments for their child.

ERIC BOW, '10

Major: Biochemistry
Hometown: St. Charles, Ill.

HANNAH KOACHES, '11

Major: Biochemistry
Hometown: Midland, Mich.

Formulating a Model Structure of the *Anabaena* Ribozyme

Faculty Sponsor: Christopher Rohlman

Bow

Koaches

This research focuses on the molecular architecture of biomolecules, using ribonucleic acid (RNA) as a model system. RNA serves as both a genetic and catalytic biomolecule in the cell. The goal is to obtain insight into the folding and catalytic behavior of the *Anabaena* group I intron in order to formulate a model structure. Group I introns are RNA sequences found in many organisms, which are capable of self-splicing and removal from neighboring RNA sequences. The *Anabaena* group I intron itself comes from a cyanobacteria.

To study the *Anabaena* ribozyme, chemical methods are used coupled with computer bioinformatics. The folding and catalytic behavior of the ribozyme can be studied using fluorescent-based assays to observe structural changes in the ribozyme. JalView sequence alignment software has also been adapted to analyze and annotate specific sequences of this group I catalytic RNA. Both chemical and genetic studies of this RNA molecule can be mapped with this method. As the structure of *Anabaena* itself has not yet been determined, computational software will be used to develop an accurate three-dimensional representation of the *Anabaena* ribozyme. Describing the three-dimensional structure and dynamic of this model biomolecule system will offer a broader understanding of its function in living systems.

KRISTIN BUTLER, '10

Fallen Gentlemen: The Late-Victorian Fascination with Double Lives

Faculty Sponsor: Lanya Lamouria

Majors: English, History
Hometown: Temperance, Mich.

This project explores the Victorian fascination with "fallen gentlemen," respectable gentlemen who simultaneously led lives of crime, adultery, and immorality—men with qualities similar to those of the character Dr. Jekyll/Mr. Hyde. Although many scholars have observed that Victorian writers demonstrate an obvious obsession with characters who lead double lives, I wondered if this literary fascination reflected a broader cultural preoccupation.

After researching nineteenth-century British newspapers now available in an online database, I successfully established this connection between the literary and cultural worlds. I located dozens of articles whose stories range from a trusted churchwarden swindling money and "victimizing hundreds of unfortunate people" (*Northern Echo*, 1895) to a diligent, disciplined office clerk who stole large amounts of money from his company and lived in a mansion, successfully convincing neighbors and relatives that he was a highly placed official. These findings are significant because, while scholars of the Victorian era argue that the double life was a metaphor for the period's hidden sexual world, I discovered that the accounts of double lives in newspapers often revolved around secret financial scandals.

Supported by: FURSCA

STACY CAPEHART, '09

Synthesis of Gold Core/Quantum Dot Shell Nanoparticles

Faculty Sponsor: Andrew French

Major: Chemistry
Hometown: Rochester, Mich.

Fluorescent organic dyes are popular probes for cellular imaging. These probes, however, have low photobleaching thresholds, poor photochemical stability, broad spectrum profiles, and narrow excitation spectra. An area of interest in cellular imaging involves utilizing nanoparticles. Of interest are CdSe/ZnS quantum dots (QDs) and gold nanoparticles (AuNPs). CdSe/ZnS QDs are semiconducting nanoparticles that have broad excitation spectra, a narrow spectral line width, and are brighter and more photostable than organic dyes. AuNPs are colloidal suspensions of gold particles that also have interesting chemical and electronic properties, such as surface plasmon resonances. The imaging properties of AuNPs are also based on light scattering, so they do not blink or bleach under continuous excitation. These two nanoparticles (CdSe/ZnS QDs and AuNPs) were combined via two synthetic methods to produce a composite AuNP-core/QD-shell nanoparticle with interesting optical properties. Both the distance between the gold-core and QD-shell as well as the emission of the QDs were varied to optimize the fluorescence intensity and photostability of the composite nanoparticle.

Supported by: National Science Foundation Research Experience for Undergraduates; Boston University Department of Chemistry and the Photonics Center. This research was conducted under the direction of Bjoern Reinhard in the Department of Chemistry and Photonics Center at Boston University in Boston, Massachusetts.

KELYN CARLSON, '10

Major: Biology
Hometown: Grand Rapids, Mich.

ERICA TAUZER, '10

Major: Biology
Hometown: Gladstone, Mich.

A Preliminary Report from a Mini-Expedition to Study Crustaceans Living in Intertidal Mudflats in Suriname, South America

Faculty Sponsor: Dean McCurdy

Carlson

Tauzer

The coast of Suriname supports millions of overwintering shorebirds that travel there from breeding sites in North America. In December 2008, we collected macroinvertebrates that serve as key prey items of shorebirds from three intertidal mudflats in Suriname. Using sampling techniques developed for our project, we collected 13-15 core samples from the waist-deep mud along transects established perpendicular to the shoreline at each site. Full processing of samples will not take place until the summer of 2009, but two common species of tanaid crustaceans, *Halmyrapseudes spaansi* and *Discapseudes surinamensis* (each >1000 / m^2), were identified. The relative abundance of these two species appears to be the reverse from what was reported by other researchers who studied mudflats in Suriname in the 1970s and 1980s, a result which may be explained by the mesh size of sieves used to retain crustaceans during sampling. We also identified a nematode of the genus *Skrjabinoclava* within a tanaid crustacean, suggesting that parasites might be transmitted by shorebirds between North and South America. A variety of conservation issues facing shorebirds will be discussed, including factors in Suriname that might contribute to declines in shorebird populations.

Supported by: FURSCA-Robson Family Fellowship

KELYN CARLSON, '10

(See Monica Yalamanchili, '09, Jeff Stephens, '09, Kelyn Carlson, '10)

LINDSAY CARNIAK, '10

Triki Triki Bang Bang: Comparative Study of Government and Non-government Organizations' Public AIDS Campaigns in Argentina

Faculty Sponsor: Rebecca Whitehead-Schwarz

Major: Spanish
Hometown: Rochester Hills, Mich.

This research presents a comparative study of public AIDS campaigns from governmental and non-governmental organizations in Argentina, starting in the 1980s with the beginning of the epidemic. In addition to the history of the campaigns and the politics that influenced them, actual campaigns circulating in Argentina were studied today. Comparisons were made between television advertisements, the most popular form of mass communication, and printed pamphlets, another principal means of mass communication, from both sectors.

Although the politics regarding AIDS between the governmental and non-governmental sectors varied greatly at the beginning of the epidemic, the politics have transformed into very similar positions in modern Argentina. Campaigns from both sectors acknowledge the importance of a preventative stance, such as promoting the use of condoms, in order to assure citizens' health and to prevent AIDS in future generations as much as possible. Both sectors target high-risk groups. Both governmental campaigns and the non-governmental pamphlet appeal to the country's low-socioeconomic population, especially to younger citizens, by using popular language and popular cumbia music in the campaigns. The television advertise-

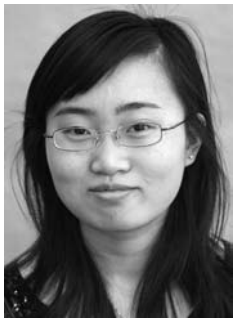
ments of both sectors are directed toward women, a group at high risk in a machismo-dominated society. All of the campaigns encourage the Argentine people to take control of their health and empower groups at high risk of contracting AIDS to exercise their right to live healthily.

SARAH CHEN, '12

Allegro Aperto from Mozart's Concerto No. 5 for Violin and Orchestra

Faculty Sponsors: James Ball, Takeshi Abo

Majors: Biology, Music
Hometown: Canton, Mich.



Concerto No.5 in A Major was composed by Mozart in 1775 and is one of the most frequently played violin concertos ever written. It is not without reason that this piece receives so much attention from violinists. The degree of its technical demands, along with the slow, melodic passages, makes this concerto a favorite among many students and professional players. The entire piece consists of three movements, and I will be performing allegro aperto, the first movement of the concerto. Allegro aperto opens with the orchestra playing the main theme. The violin soloist comes in with a slow and lyrical adagio passage. The soloist then starts playing a different melody, while the orchestra transitions back to the main theme. The entire first movement is nine minutes long. I will also be performing this piece later this year, accompanied by the Albion College Symphony Orchestra.

YANG CHEN, '11

Factors of China's Rapid National Saving Growth

Faculty Sponsor: Kotaro Yoshida

Major: Economics and Management
Hometown: Wuhan, China

Over the past five years, the Chinese national saving rate has experienced a significant increase from 40.0% in 2004 to 50.0% in 2008. Why do the Chinese save so much? Why have they increased their savings even further in recent years? By administering questionnaires in Chinese households and conducting statistical analysis on the obtained data, I try to answer these questions and explore the factors that affect the national saving rate.

In a field trip to China in summer 2008, I surveyed 300 households, collected 220 questionnaires, and compiled data. Then I ran a regression analysis with saving rate as the dependent variable on annual after-tax family income, size of family, number of dependents, education level and majors, and other factors as independent variables.

Preliminary findings are as follows. Annual after-tax income, family size, and the number of dependents negatively affect the saving rate. The first result is consistent with a conjecture that those who have higher income have higher expected income and thus less need to save today. The second and third are consistent with the fact a bigger fraction of income has to be spent when family size is bigger and that, when dependents are children, such a tendency may be magnified due to rising education costs in recent years.

Supported by: FURSCA

NICOLE CLARK, '10

(See Genomics at Albion)

JESSICA CLARKE, '09

How People Respond to Film Based upon Reactions to the Films *El Laberinto de Fauno* and *Las 13 Rosas*

Faculty Sponsor: Julia Medina

Majors: Spanish, Political Science
Hometown: Muskegon, Mich.

People respond differently to different types of film, so a filmmaker must have specific goals in mind when creating a storyline for a movie. Each kind of film evokes different emotions from the viewer, and this study was conducted to determine which kind of films are the most impactful and why. It was hypothesized that people would respond more favorably to a film that appears to be a fairytale, such as the film *El Laberinto de Fauno*, than they would to a film that appears more realistic and historically accurate, such as the film *Las 13 Rosas*, even though they are about a similar topic (in this case, the post-Spanish Civil War terror). The director and the writers have a huge amount of control over how people react, and this study looks at just how much control they may actually have based on the ways in which they approached the subject of the Spanish Civil War. A model based on the scientific method was used to gather data from fellow students who viewed both movies. This data will be presented and its significance to the film industry will be explained.

NATHAN DE WINKLE, '09

Why, What, and How: Philosophical, Empirical, and Political Approaches to CO_2 Reduction

Faculty Sponsors: Jahn Hakes, Eugene Cline

Major: Economics and Management
Hometown: Grand Rapids, Mich.

Whether it is a business deciding to go 'green' or governments debating the 'climate crisis,' the environment has come to the forefront of almost every discussion. It is the goal of this project to add to the discussion in three areas: addressing what obligations humans have to the environment, analyzing the trends in carbon dioxide (CO_2) emissions, and searching for economic and political avenues for addressing the issue.

This presentation focuses on the empirical side of the discussion. It seeks to test the hypothesis of an environmental Kuznets curve for CO_2. This theory states that there exists an 'inverted u' relationship between emission levels and income levels for a country. Other papers have already found that this relationship exists for other pollutants and CO_2, but they do not address causality—that is, just because a correlation exists between the variables does not mean that wealth directly triggers emission reduction. My econometric model will create comparisons among six countries: the U.S., China, India, United Kingdom, Germany, and Brazil. These were chosen because they are a cross-section of the developed and the developing world and have had very different approaches to address CO_2 emissions. To address this issue of causality, this paper adds dummy variables for significant events that affect emission (e.g., the reunification of Germany, or Brazil's use of ethanol). By including these variables, or at least acknowledging them, this paper seeks to show what drives emission reduction. The implications of this analysis are discussed.

ANDREW DRAKE, '09

(See Genomics at Albion)

PAIGE EDWARDS, '09

Global Sushi

Faculty Sponsor: Molly Mullin

Majors: Anthropology, Art History
Hometown: Hillman, Mich.

Let's go get sushi! In the U.S. 20 years ago, this suggestion would probably have been rejected. Raw foods, let alone raw fish, have not always been considered foodstuffs in the U.S. Today, sushi has become so fused into Americans' diets that we can go to any local Wal-Mart and pick up sushi to go. Sushi's popularity shows the influences of non-European cultures in U.S. society. Exactly how did sushi become so popular? Is sushi in America even sushi?

Through food fusion, I examined stereotypes among Japanese and Americans in food cultures and the effects of globalization. Ethnographic fieldwork was conducted in New York City and Tokyo. The relationships between Japan and the U.S. as well as their respective food cultures were studied, particularly through sushi—a food that has a vast history in Japan and is becoming a part of the United States' food fusion culture. Sushi, it can be argued, represents a challenge to the idea that globalization is Americanization, or Westernization.

My research would not have been possible without help from the Sebold Gift, the New York Arts Program, and CIEE study abroad at Sophia University; nor would it have been possible without the guidance of my professors in the anthropology and international studies programs.

Supported by: William and Gloria Sebold Gift

STEPHANIE EDWARDS, '09

Stages on Journeys Homeward: James Wright and My Poetic Journeys toward Finding Home

Faculty Sponsor: Julie Stotz-Ghosh

Majors: English (Creative Writing), Economics and Management
Hometown: Lansing, Mich.

A year and a half ago, I found myself searching for a poet whose roots were intertwined with mine, who had known the long, hard Februarys of the Great Lakes and the devastation caused by the apparatus of the factory town (especially when found sans factory). As I pored through pages of poets, both old and young, dead and living, I kept returning to James Wright, a mighty Ohioan, because I thought I heard something in his voice and words that told deep truths about my soul and the Great Lakes.

My thesis consists of a critical analysis of James Wright's poetry and my own creative work inspired by his poetry. My analysis of James Wright is expository in form, and it explores his relationship to place, paying careful attention to the dramatic shift in the portrayals of landscape between his second book, *Saint Judas*, and third book, *The Branch Will Not Break*. My creative work mainly takes the form of poetry and explores different conjurations of my place, my home, Lansing, Michigan. I bridge these two components with a reflective essay on the influences of Wright on my poems.

Supported by: FURSCA-Richard Bethune Student Research Fellowship

AMANDA ENGELHARD, '09

Spying on Incubating House Wrens: Using Minicameras to Observe Behaviors in Nest Boxes

Faculty Sponsor: E. Dale Kennedy

Major: Biology
Hometown: St. Clair Shores, Mich.

We monitored incubation bouts of female house wrens (*Troglodytes aedon*) using small, programmable temperature data loggers (iButtons) in nests. However, on hot days, high internal nest temperatures made variations in nest cup temperature difficult to interpret. As a second way to document incubation behavior, we used small video cameras with infrared illumination placed inside lids of nest boxes (N = 44). Video images showed that, in addition to sitting on eggs, females displayed a range of non-incubation behaviors that included shaking, preening, repositioning, and egg turning. The frequency of each behavior was not correlated with temperature even though bout lengths decreased with increasing temperatures. On a few occasions birds were observed eating prey items that either flew into their nest box or were found within the nesting materials during another maneuver. As a measure of metabolic activity, we counted the number of breaths (movements of the chest) per ten-second interval. A significant negative correlation existed between ambient temperature and the number of breaths per minute (r = -0.529, df = 184, $p < 0.0001$), suggesting that females have to spend more energy on colder days to warm eggs up to incubation temperature.

Supported by: FURSCA-Bruce A., '53, and Peggy Sale Kresge, '53, Science Fellowship, A. Merton Chickering Endowed Professorship in Biology

MOLLY ESTILL, '09

Associations between Livestock Farms and Rice Creek's Health: A Microbiological Examination

Faculty Sponsor: Ola Olapade

Majors: French, Biology
Hometown: Romeo, Mich.

The Rice Creek watershed, covering eastern Calhoun County and western Jackson County, serves as a major agricultural drain for those Michigan counties. Preliminary studies on the Rice Creek watershed have shown that some aspects of the pollution in Rice Creek stem from the presence of livestock farms along the channel of the creek. In this study, the impact of livestock farms adjacent to Rice Creek on the health of the creek was quantified using standard microbiological techniques. The bacterial populations, specifically of *E. coli* and other coliforms, in the creek were measured using membrane filter [MF] and viable plate counts approaches. Water parameters, such as temperature and oxygen content, were measured using the YSI multiparameter meter. Concentrations of inorganic nutrients (i.e., nitrogen and phosphorous) within the creek were also determined colorimetrically.

In summary, bacterial abundance was observed to increase between sampling locations both upstream and downstream of livestock farms and also during periods of precipitation (with a concomitant increase in nutrient concentrations). Each of the three river sites examined appeared to have unique patterns of bacterial and nutrient dynamics. Generally, it appeared from the results that there were constant influxes of nutrients and bacterial cells, particularly fecal bacteria populations into Rice Creek, often exceeding the limit of 1000 *E. coli* cells/ 100 mL water for partial body contact threshold, as issued by the Michigan Quality Water Standards.

Supported by: FURSCA-Richard Bethune Student Research Fellowship

MOLLY ESTILL, '09

(See Genomics at Albion)

JEFFREY FANG, '10

Sergei Rachmaninoff: Piano Concerto No. 2, Op. 18 – I. Moderato

Faculty Sponsors: David Abbott, James Ball

Major: Biology
Hometown: Bloomfield Hills, Mich.

Sergei Rachmaninoff, one of the greatest pianists of his time and one of the latest composers to compose in the Romantic Period, was born in Semyonovo, Russia on April 1, 1873. In his early years, he showed great skill in composition, and as a student, wrote many pieces including his Piano Concerto No. 1, as well as the famous Prelude in C-sharp Minor, which he wrote at the age of 19. However, such quick and frequent success only set him up for one of the biggest setbacks of his life.

In 1897, his Symphony No. 1 was premiered in St. Petersburg to hostile criticism. With the symphony's initial failure and problems in his personal life, Rachmaninoff fell into a deep depression and writer's block, which lasted for several years. In 1900, Rachmaninoff began to see a hypnotherapist, Dr. Nikolai Dahl, who himself was an amateur musician. After a few sessions of hypnotherapy as well as pleasant and intelligent conversations about music, Rachmaninoff recovered quickly. Later that year, he began writing a new concerto, his second. Dedicated to Dr. Dahl, the concerto was premiered in 1901 and was very well received, eventually becoming one of his most enduringly popular pieces.

Today I will be performing the first movement of this concerto with a piano accompaniment performed by David Abbott, and with the Albion College Symphony Orchestra during the 2009-10 season.

JONATHAN FOUST, '11

(See Genomics at Albion)

CONOR FITZPATRICK, '11

Why the African Union Should Lead Conflict Resolution Efforts in Congo-Kinshasa

Faculty Sponsors: Alfred Pheley, David Eaton, Andrew Grossman

Major: Political Science
Hometown: Las Vegas, Nev.

With over five million fatalities in the last decade alone, the conflict in Congo-Kinshasa is a grave humanitarian crisis that appears to generate little international urgency. Since gaining independence from Belgium in 1960, Congo-Kinshasa has yet to experience a period devoid of military, civil, and ethnic strife. Efforts by the United States to foster stability in the 1960s were ineffective and resulted in the assassination of Congo's only democratically elected leader, Patrice Lumumba. The United Nations has waged multiple "peacekeeping" missions throughout the decades, yet the situation worsens. Utilizing newly uncovered resources and recently declassified CIA memos, this study attempts to dissect the possible reasons for the failure of Western intervention in Congolese conflicts. The research addresses not only the tumultuous post-independence power struggle between Patrice Lumumba, Joseph Kasavubu, and Mobutu Sese-Seko, but also the present conflicts between Congolese President Joseph Kabila, rebel Laurent Nkunda's CNDP, Rwandan FLDR *Genocidaires*, and the Ugandan LRA.

An interesting path left untraveled is the active involvement of the African Union, which has been largely ignored and underutilized in the Congolese conflict. The AU has shown true promise mediating Togo's transition from iron-fisted dominance under Gnassingbé Eyadéma to democratic elections and also brokering a peace deal following a 2005 military coup d'état in Mauritania. With proven arbitration skills around the African continent, the African Union should lead conflict resolution efforts in Congo-Kinshasa.

BLAIR FLEMION, '11

Major: Economics and Management
Hometown: Okemos, Mich.

SARAH JOSE, '09

Major: Economics and Management
Hometown: Canton, Mich.

CHELSEA KNOOP, '09

Major: Economics and Management
Hometown: Dearborn, Mich.

ALLIE LEWIS, '10

Major: Economics and Management
Hometown: Novi, Mich.

Google Online Marketing Challenge

Faculty Sponsors: Michael Frandsen, Charlene Crandell

Flemion

Jose

Knoop

Lewis

In today's economy, businesses need to allocate money wisely within their marketing mix. One of the easiest, most effective channels to use in marketing is online advertising. Through online advertising, businesses are able to reach their target audience while obtaining beneficial success metrics that help them constantly modify their strategy.

The front runner of today's online advertising services is undoubtedly Google. The main service they provide is Google AdWords, a keyword-targeted advertising program utilized by business all over the world. AdWords is so popular and effective because each business, large or small, has control over its own budget and can instantly get feedback to change their strategy accordingly.

To further our understanding of the phenomena that is Google AdWords, 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.

The local business we selected was the Albion Heritage Bed and Breakfast in downtown Albion. Through this campaign we will drive more traffic to their well-designed Web site while gaining exposure to a broader audience of potential clientele. To achieve this goal we will conduct market research, perform a competitive analysis, and test unique keywords.

Supported by: Gerstacker Institute

ASHLI FOX, '09

Moving Expressions of a Culture: An Exploration of Music and Dance in the Caribbean

Faculty Sponsor: Heather Vaughan-Southard

Major: Biology
Hometown: Nassau, Bahamas

This thesis aims to explore the connections between dance and music in the English-speaking Caribbean through its history and its presence in contemporary society. Four specific musical genres were researched in an effort to represent Caribbean culture as a whole. Each of these genres, "Reggae," "Soca," "Dancehall," and "Rake and Scrape," has a unique history and sound that originates from different islands within the Caribbean. The main focus of this work is dance's relationship and development within these genres. When the evolution of dance

is considered in conjunction with musical development, it is obvious that music and dance are intrinsically intertwined. The characters and unique island identities of both dance and music are explored through textual and physical aspects of this work. The performance aspect of the thesis features original choreography set to a collage of these musical genres. The movement vocabulary in the pieces was generated using historical references, personal experiences, and other sources. These movements have been combined with musical choices to create a diverse collection of movement reflective of the Caribbean cultural experience. Though the certain identifying characteristics that define each genre are separate from the other, they are ultimately united under the term "Caribbean music."

THOMAS FREEMAN, '09

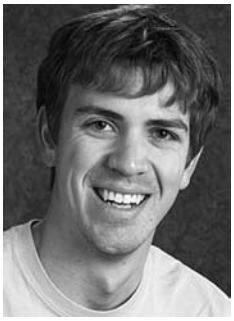
Major: Chemistry
Hometown: Perrysburg, Ohio

MATTHEW ZABOROWICZ, '11

Major: Biochemistry
Hometown: Sterling Heights, Mich.

Synthesis and Characterization of Fluorescently Labeled Ribozyme Substrates

Faculty Sponsor: Christopher Rohlman



Freeman

Zaborowicz

Group I introns are regions of ribonucleic acid enzymes also known as ribozymes that can be spliced from the surrounding RNA as the RNA acts as an enzyme on itself. In order to study the kinetics of these group I introns, fluorescence resonance energy transfer (FRET) is often used. FRET analysis for group I introns requires that a short RNA polymer have two fluorescent tags bound on either side. Current protocols for tagging these RNA polymers appear inefficient, requiring a large ratio of the fluorescent tag (the fluorophore) relative to the RNA substrate. It is apparent the reaction has not been optimized for the wide range of RNA polymers which are commonly used in the laboratory. These fluorophores are expensive organic molecules, and it would be much more efficient if the amount of fluorophore could be reduced, minimizing chemical waste and the cost of materials. The purpose of this research is to optimize the reaction of RNA polymers designed to bind to the *Tetrahymena* and *Anabaena* ribozymes with the fluorophore tetramethylrhodamine and thereby reduce cost and waste incurred by this process in the lab. Beginning with the standard protocol, a number of reactions were conducted varying the reaction conditions. Reversed-phase high performance liquid chromatography (HPLC) was utilized to determine the amount of excess fluorescent tag, tetramethylrhodamine. After testing these conditions, it was found that the reaction does indeed use a surplus of tetramethylrhodamine. We found that the amount of this reactant can be reduced to a 1:1 ratio with the RNA polymer and still provide the maximum amount of product allowing for reduced costs and less waste in future experiments.

Supported by: FURSCA

REBECCA FRIEDRICK, '10

The Comparative and International Policy Implications of Human Trafficking at the Thai-Burmese Border

Faculty Sponsor: Alfred Pheley

Major: Political Science
Hometown: Alma, Mich.

Human trafficking, or modern slavery, is sensationalized in an attempt to increase awareness of the atrocities that link the Western world to less developed countries. But this only tells a small fraction of the story. Human trafficking arises from a variety of issues related to poverty, culture, international policy, migration, and gender experiences. In looking for solutions, both the policies of international organizations and powerful governments must be evaluated, as well as the practices of developing countries. When originating from a Western, developed perspective, creating effective policy that crosses cultural boundaries requires the consideration of motives and morality. In this analysis I used the case study of the Thai-Burmese border, where trafficking is just one of many controversial issues. This is an example of many regions where weaker individuals are forced into a certain mode of life through deception and an unresponsive government. Thailand supports one of the largest sex industries in the world, perpetuating a culture of exploitation that reaches victims beyond its borders. Despite recent commitments to progress, many of the issues relevant to trafficking, especially of Burmese migrants, cannot be resolved outside of the context of geopolitical issues such as migration and trade. Like the situation in Thailand, many other areas experiencing trafficking have undergone decades of political and social turmoil, of which trafficking is just one symptom. The root problems need to be addressed one at a time along with efforts to lessen these tragic indicators.

ALEXANDRA GOSS, '09

The Effect of Music Familiarity on Information Recall in Advertising

Faculty Sponsor: Andrew Christopher

Major: Psychology
Hometown: Dexter, Mich.

This study examined recall for information present in radio advertisements as it was influenced by the familiarity of the background music of the advertisement. Limited previous research has explored the influence of song familiarity on information recall with regard to information load. In addition, this study focused on consumer need for uniqueness (CNU) as a predictor of recall. High CNUs are nonconformists, and low CNUs are conformists.

Participants completed a survey to measure CNU and then heard a nine-minute, talk-radio segment including the advertisement of interest. They then completed a survey to measure information recall for key information in the advertisement (e.g., company, product, Web site) immediately after hearing the radio segment as well as one week later. Mood and demographic information

was also obtained. The independent variables for this study were song familiarity (familiar or unfamiliar) and time of recall (immediately and one week later), with participant CNU scores serving as a quasi-independent variable. The dependent variables were information recall and mood. It was predicted that those high on CNU (nonconformists) would recall information better overall for the advertisement with the unique, unfamiliar song, whereas those low on CNU (conformists) would recall information better overall for the advertisement with the popular, familiar song. It was also predicted that information recall would not differ between familiar and unfamiliar song conditions immediately after hearing the advertisement; however, recall would be greater for the familiar song long-term (after one week). Results and implications are discussed.

RYAN GRAHAM, '09

Quantifying the Influence of a 4.8-Tesla Magnetic Field on the α↔γ Phase Transitions in Fe-0.75C Steel

Faculty Sponsor: Aaron Miller

Major: Physics
Hometown: Adrian, Mich.

High magnetic fields are useful in materials processing, but the influence that these fields have on the microscopic structure of the material is not well understood. Oak Ridge National Laboratory has developed the instrumentation to perform in-situ time-resolved neutron scattering experiments to better understand the effects that high magnetic fields have on the microscopic structure of alloys. Powder neutron diffraction data of an Fe-0.75C sample have been collected using this recently developed experimental apparatus. These Fe-0.75C data were analyzed to quantify the effect a magnetic field has on the body-centered cubic (α-Fe) to face-centered cubic (γ-Fe) phase-transition temperatures of carbon steel. The data were collected at temperatures in the range $20^{\circ}C \leq T \leq 780^{\circ}C$ with applied magnetic field strengths of 0 Tesla and 4.8 Tesla.

A multi-parameter least-squares fit to diffraction models was performed on the data to determine the volume fraction of α- and γ-Fe present. These data were used to construct diagrams of the Fe-C steel's α- and γ-phase volume fractions as a function of temperature at the two field strengths. These two diagrams were then compared in order to quantify the change in the $\alpha \leftrightarrow \gamma$ transitions temperatures when the sample was exposed to the 4.8 Tesla field. This research has confirmed that a magnetic field increases the transition temperatures of the Fe-0.75C alloy and has provided quantitative information that will enable improved design and execution of future experiments to study the effects of thermo-magnetic processing.

Supported by: U.S. Department of Energy, Office of Science; Oak Ridge Science Semester, Oak Ridge National Laboratory, Oak Ridge Institute for Science and Education

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CHELSEA GRIEVE, '10

Manipulative Monks and the Survival of St. Catherine's at Mount Sinai

Faculty Sponsor: Kara Morrow

Majors: Art History, Anthropology
Hometown: Millersburg, Mich.

Constructed on the orders of the Emperor Justinian in the early sixth century, St. Catherine's Monastery at Mount Sinai contains the most pre-iconoclastic icons of the Byzantine world including the famous mosaic of the Transfiguration. Though the icons are crucial to the study of Byzantine iconography, how the monastery survived for so long in a region dominated by Islam has posed an interesting question. Geography is often the most cited reason for the survival; however, the monks at the monastery played an active role in keeping the monastery safe. Through a series of manipulative actions, the monks managed to protect the monastery from Muslim destruction thus preserving the icons for future study. These manipulative actions can be seen through both bi-lingual and tri-lingual texts contained within the monastery, *The Letter of Protection* (or the *Ahtiname*) given by the Prophet Muhammed during the 640 CE Arab conquest of Egypt, the relationship of the monks and Christianity to local Muslim Bedouins, and grand displays of wealth as are seen through the famous mosaics and extensive decoration of the church.

CATARINA GULLEDGE, '10

Physical Activity and Type 1 Diabetes

Faculty Sponsor: Robert Moss

Major: Exercise Science
Hometown: Roscommon, Mich.

Type 1 diabetes only represents a small number of the total cases of diabetes in the United States, but it is a disease with serious consequences because the body stops producing the hormone insulin. Without this hormone, the body cannot get glucose into the cells to be metabolized into energy. While there is no cure for type 1 diabetes, there are ways to manage the disease. Physical activity is one of those ways; it makes the cells more receptive to obtaining glucose from the bloodstream, thus acting somewhat like insulin. However, not all people affected by type 1 diabetes engage in physical activity. Through a literature search and survey of type 1 diabetics, this research will examine the challenges males with type 1 diabetes face in regard to physical activity, and how physical activity affects them. This work will hopefully provide insights into this disease, provide information on how current type 1 diabetics deal with this disease, and thus provide more ways to encourage more type 1 diabetics to engage in physical activity.

ELISABETH GUSFA, '09

Theories of Executive Power

Faculty Sponsors: William Rose, Andrew Grossman, Dyron Dabney

Major: Political Science
Hometown: Grand Blanc, Mich.

In the wake of 9/11, attention has been focused on the issue of how to balance liberty and national security interests. Although Article II of the Constitution states that the executive power shall be vested in a president of the United States of America, it does not precisely define that power. The omission of the Constitution's limitations on the executive could imply the validity of arguments that support an expansive view of executive war powers.

How, then, can the President exert expansive executive powers without violating civil liberties and thereby destroying the values for which democracies stand? The balancing approach would allow the courts to shift the emphasis placed on security and liberty as the security challenges change. However, the notion of balancing liberty and security interests leads to a zero-sum game in which more of one necessarily means less of the other. Instead of employing the balancing technique, this study will argue that it is more useful to conceptualize liberty and security as existing on a continuum. In the *Nicomachean Ethics*, Aristotle emphasizes that it is crucial to achieve the mean between extremes of excess and deficiency. By striving to maintain Aristotle's mean, there can never be a deficiency on either side of the spectrum due to the fact that achieving the mean implies that both liberty and security interests have been recognized. Thus, security and liberty need not be quantified and, in turn, cannot fall prey to the zero-sum game.

Supported by: FURSCA

JONATHAN HECKMAN, '09

(See Genomics at Albion)

BRYAN HORNACEK, '09

Wolbachia Bacteria Overreplicate and Localize to the CNS in Wild Populations of *Drosophila simulans* and *melanogaster*

Faculty Sponsor: Roger Albertson

Major: Biology
Hometown: Novi, Mich.

In millions of insects worldwide, *Wolbachia* bacteria manipulate host reproduction to increase their own reproductive success. One strategy utilized in *Drosophila* includes cytoplasmic incompatibility (CI) between uninfected females and infected males. *Wolbachia* can also alter host behavior: infected males mate at a higher rate than uninfected males. In many *Drosophila* species, *Wolbachia* induce strong CI and persist at a high titer in the germline and syncytial embryos. However, strains known to infect *D. melanogaster* (*wMel* and *wPopcorn*) show very weak CI and a low titer.

To isolate *Wolbachia* variants, wild populations of *D. simulans* and *D. melanogaster* were collected in Big Sur, California and southern Michigan. Immunohistochemistry of Big Sur populations revealed that infected *D. simulans* strains had robust *Wolbachia* localization to various tissue types, including nervous tissue, throughout embryo and larval development. Destabilizing drugs indicate that *Wolbachia* utilize host microtubules, rather than actin, to localize preferentially to neuroblast stem cells. Localization to mature neurons suggests *Wolbachia* may influence host mating behavior by altering brain cell function. Michigan collections revealed a *Wolbachia* variant that overreplicates in *D. melanogaster* somatic tissue during embryogenesis which persists at a higher titer than *wMel* or *wPopcorn.* High titer levels in this newly identified strain will allow subsequent functional studies that take advantage of the powerful molecular and genetic methods available for *D. melanogaster.*

Supported by: FURSCA

LARA HUBBEL, '09

Structural Analysis of Quartzites, Black Hills, South Dakota

Faculty Sponsors: Beth Lincoln, Timothy Lincoln

Major: Geology
Hometown: Howell, Mich.

The rocks in this study were collected from the Precambrian core of the Black Hills, South Dakota, an area multiply deformed and metamorphosed during the assembly of the North American continent culminating in the Trans-Hudson Orogeny 1.7 billion years ago.

The goal was to examine quartzites from this area and determine differences between rocks that display a foliation in hand sample and those that do not. There are two types of foliation found in these rocks, limonite-stained fractures and preferred orientation of elongate axes of quartz grains. Samples of foliated and apparently unfoliated quartzites were collected in pairs from approximately the same location. This examination shows that foliation is present in all rocks on a microscopic level in thin section, even if it is not found in hand sample. For each rock the orientation and lengths of the elongate axes of quartz grains were measured relative to the fractures. The elongate axes are parallel or near parallel in rocks that appear strained in hand sample but appear to have a wider range of orientations in the unstrained rocks. Analysis of the bulk chemistry of these rocks shows a higher weight percent of immobile elements such as aluminum, yttrium, zirconium, and titanium, and a lower weight percent of silica in the foliated rocks, indicating that removal of soluble elements played a role in the development of the rock fabric. The deformation falls in the field of dislocation creep with formation of subgrains and grain boundary migration.

Supported by: Geological Sciences Department Taylor Fund for Undergraduate Research

DONTAE JACOBS, '09

DNA Damage and Repair: A Look at the *Hobo* Element in *Drosophila melanogaster*

Faculty Sponsor: Kenneth Saville

Major: Biology
Hometown: Nassau, Bahamas

Transposable elements are repetitive genomic sequences that are able to move or transpose from one location to another on a chromosome. This 'jumping' of elements can cause sequence gaps in chromosomes, a form of DNA damage called double-stranded DNA breaks (DSB). DNA damage needs to be repaired in order to prevent genetic anomalies which may lead to the development of diseases. The goal of my project is to determine how the gap of a particular transposable element called the *hobo* element is repaired by analytical observation of the third chromosome of *Drosophila melanogaster*, otherwise known as the common fruit fly. Upon successful completion, this study may further research toward determining how these DSBs are repaired in human DNA and, therefore, provide a better understanding of genetic diseases such as certain immune deficiency syndromes and cancer.

DONTAE JACOBS, '09

(See Genomics at Albion)

SARAH JOSE, '09

(See Blair Flemion, '11, Sarah Jose, '09, Chelsea Knoop, '09, Allie Lewis, '10)

SARAH JULIAN, '09

Die Rolle des Glaubens in der Entwicklung der Quanten- und Astro-Physik (The Role of Belief in the Development of Quantum- and Astro-Physics)

Faculty Sponsor: Catherine Grimm

Majors: German, Communication Studies
Hometown: Clarkston, Mich.

The word "faith" doesn't typically conjure up imagery of black holes or mathematical proofs; its immediate connotation is religious. In all of its nuances, however, faith is a concept far broader than our limited associations with the word. This thesis explores faith as a factor of development in the fields of astro- and quantum physics. Although we rarely hear the words "belief" and "science" as compatible entities, the universe is a mysterious place governed by laws of physics that require at least a little bit of faith to understand.

The research focused on the lives of two of the world's most influential physicists: Albert Einstein and Stephen Hawking. The parallels in their lives were fascinating; each held unique traits that, despite the many obstacles he faced, helped him to write theories that shocked the world and changed the way that we understand physics. In 1930, Albert Einstein's essay, "Religion and Science," introduced his thoughts on the development of religion and his belief in the "religiosity" of science. Because of the deep system of faith on which each community is based, Einstein believed that science and religion are not oppositional forces. Delving into Einstein and Hawking's histories, I sought an understanding of how their faith and their work developed, as each man produced theories that radically influenced the development of his field.

HALIE KERVER, '09

Investigating the Developmental Aspect of Unihemispheric Sleep in Bearded Dragons (*Pogona vitticeps*)

Faculty Sponsor: Tammy Jechura

Major: Psychology (Neuroscience)
Hometown: Jackson, Mich.

Unihemispheric sleep is an evolutionary process that occurs when one hemisphere of an animal's brain is in a sleep stage, while the other hemisphere is alert. It may be observed through asynchronous eye closure, during which the animal sleeps with one eye open and one eye closed.

In this study, eye state recordings of several bearded dragons (*Pogona vitticeps*) were made using a four-camera system to record eye states during the habituation to a novel environment. Unihemispheric sleep was defined by the presence of asynchronous eye closure, and eye states were judged in five-minute intervals over three 24-hour periods, from the beginning of habituation to a new environment through typical behavior in a familiar environment. It is expected that unihemispheric sleep will gradually decrease as the dragons habituate to the new environment, suggesting an evolutionary importance to unihemispheric sleep as an anti-predator survival technique. The developmental aspect of unihemispheric sleep was also observed in juvenile dragons, with a prediction that the young animals would display more unihemispheric sleep than adult dragons because of a greater overall amount of sleep in young animals and an increased predation risk.

CHELSEA KNOOP, '09

(See Blair Flemion, '11, Sarah Jose, '09, Chelsea Knoop, '09, Allie Lewis, '10)

EMILY KNOPPE, '09

The Role of the Consumption of Yerba Maté in the Construction and Expression of Argentine National Identity

Faculty Sponsor: Julia Medina

Majors: Anthropology, Transamerican Latino/a Studies
Hometown: Birmingham, Mich.

This presentation will explain how yerba maté, a South American tea-like beverage, has emerged as a unifying and romantic symbol of Argentine national identity and equality through its historical production and egalitarian consumption processes. Yerba maté, also known as *Ilex paraguayensis*, was first cultivated, prepared, and consumed communally amongst indigenous Guaraní people, and today it continues to be prepared and consumed communally in almost every home, park, plaza, office, and university in Argentina. Associated with the shared consumption of yerba maté is a set of rules that promotes sociability, sharing, and equality amongst friends, acquaintances, and even strangers. The mass consumption and sharing of yerba maté cuts across economic lines; however, the harvesting of the plant is dependent on local agricultural laborers who often live in a state of poverty. This study argues that despite the economic differences that have been maintained or that have resulted from the cultivation of the local plant, the physical form that the "produced" yerba maté takes combined with the form that its ritual consumption takes has cultivated a national sense of Argentinean unity despite the presence of distinct economic, religious, or even cultural backgrounds.

HANNAH KOACHES, '11

(See Eric Bow, '10, Hannah Koaches, '11)

DANA KOENIG, '11

(See Genomics at Albion)

HEATHER LAGENDYK, '09

Major: Biology
Hometown: White Cloud, Mich.

CHELSEA SMITH, '09

Major: Biology
Hometown: Berkley, Mich.

Three *Sabatia* Species Cross-Amplified Using Genetic Markers Designed for *S. campestris*

Faculty Sponsor: Sheila Lyons-Sobaski

Lagendyk

Smith

Eight microsatellite markers developed for *Sabatia campestris* were used to amplify microsatellite loci in three other species within the *Sabatia* genus, a group of annual or perennial herbaceous plants. Polymerase chain reactions (PCR) were optimized for all eight markers in the four species: *S. campestris, S. angularis, S. formosa,* and *S. stellaris.* Using fragment analysis, we found variation in amplification among different species. When markers amplified appropriate-sized PCR products, some products were polymorphic with some populations containing novel alleles. These genetic markers show promise for understanding the population genetics of several species of *Sabatia.* This research is of particular importance for the conservation of the genetic biodiversity of populations located at the edge of the species range which are often regionally threatened or endangered.

Supported by: FURSCA-Robert J. Gardner Summer Research Endowment (Lagendyk), FURSCA-Jenny Banner Rone Environmental Research Annual Award (Smith)

JENNIFER LAMMERS, '10

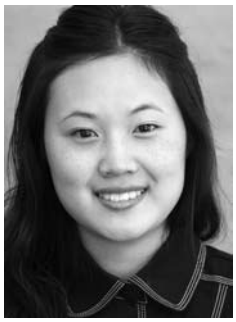
(See Genomics at Albion)

JI YUN LEE, '10

Edvard Grieg: Piano Concerto in A Minor, Op. 16

Faculty Sponsor: David Abbott

Major: Economics and Management
Hometown: Gwangju, South Korea



Edvard Grieg (1843-1907) was Norway's most recognized composer during the period of national romanticism. During his time, Norwegian culture was heavily overshadowed by the German romantic tradition. As he grew older, Grieg's love toward his homeland grew, and he became increasingly conscious of the musical potential of his own country's folk culture. He began to promote Norwegian nationalism by writing pieces rooted in the folk music traditions of Norway. His music captures the culture and images of rural Norway, giving it universal appeal. His first biographer, Aimer Gronvold, concluded that there was an intense and indissoluble relationship between the environment Grieg lived in and the music that he created.

The Piano Concerto in A Minor, op. 16 is among Grieg's earliest and best-known works, written by the 24-year-old composer in 1868. It has become almost synonymous with Norway, as the name of Grieg has been identified with the concept of Norwegian music. One of the most popular of all piano concerti, Grieg's concerto is played throughout the world; it is used in commercials, films, and television shows.

Along with the significance of the piece as a nationalistic Norwegian composition, the Piano Concerto in A Minor remains the only concerto Grieg completed. The composer revised the work at least seven times; the final version of the concerto was completed only a few weeks before Grieg's death at the age of 64, and it is this version that has achieved worldwide popularity. This grand work contains three movements: allegro molto moderato, adagio, and allegro moderato molto e marcato. My performance of the concerto's first movement will be heard in a version for

two pianos, with the orchestral reduction on a second piano by David Abbott, associate professor of music, leading the ears of the audience to rural Norway of the late eighteenth century.

MARGARET LEIBY, '09

Nazi Social and Cultural Policy and Its Effect on Women

Faculty Sponsors: Catherine Grimm, Trisha Franzen

Majors: German, Women's Studies
Hometown: Holt, Mich.

Part of the Nazi totalitarian strategy was controlling the role of women in society. The Nazis emphasized the family as the stabilizing unit in society. Within the family, then, every family member had a specific function. Through legislation and other policies, the Nazis tried to promote women as mothers and caretakers. The Nazis passed laws giving families incentives to have more children and provided classes to women, teaching them how to best fulfill their motherly duties. They also worked hard to remove women from any position of power in the public sphere and spread much propaganda portraying ideal women. Their efforts also included banning birth control and increasing the penalties for abortions. While they wanted to increase the size of families in Germany, they only wanted to increase the number of healthy, Aryan children being born, which is reflected in their sterilization practices and their denial of marriage certificates to hereditarily unfit applicants. Many Nazi policies did have some effect on the lives of women, but they were never totally embraced. The Nazi dream of a corps of ideal women was never realized.

ALLIE LEWIS, '10

(See Blair Flemion, '11, Sarah Jose, '09, Chelsea Knoop, '09, Allie Lewis, '10)

MATTHEW LOGAN, '10

Synthesis and PET Reactions of *O*-alkyl Oximes

Faculty Sponsor: Andrew French

Major: Chemistry
Hometown: Brooklyn, Mich.

The synthesis of *O*-alkyl oximes with built-in hydroxy nucleophiles has been successfully developed from benzaldehyde and allyl magnesium bromide. Hydroboration-oxidation of the resulting alkene followed by selective oxidation of the benzylic hydroxyl group yielded the desired hydroxy ketone; however, oximation of this substrate was not successful. Instead it was found that protection of the hydroxyl group was required. After protection of the hydroxyl group as a tert-butyldimethyl silyl ether, oximation of the ketone followed by deprotection of the silylated hydroxyl group successfully yielded the desired *O*-methyl oxime with the built-in aliphatic hydroxyl. The multi-functionalized *O*-methyl oxime substrate was then subjected to photo-induced electron transfer (PET) reactions to yield several products, which have not yet been identified. The synthesis of these molecules is critical to understanding the behavior and reactivity of *O*-alkyl oximes radicals in the presence of nucleophilic solvents. The developed methodology will allow for a broad array of *O*-alkyl oximes with built-in nucleophiles to be studied.

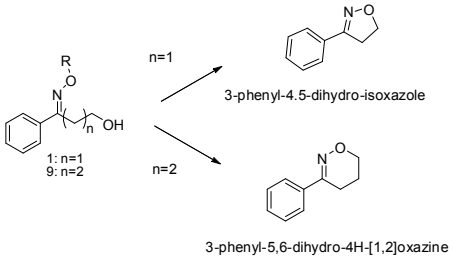


Figure 1. Expected PET reaction products of **1** and **9** after intramolecular nucleophilic attack on N and 1,3 HAT to yield stable, cyclized products.

Supported by: National Science Foundation Research Experience for Undergraduates, California State University, Fullerton

MATT MAKIN, '11

(See Albion/ESCIA Student Entrepreneurial Exchange)

DIANNE MARSHALL, '09

Toward an Ethical Faith: Affirming the Importance of Critical Questioning Concerning Religion

Faculty Sponsors: Ronney Mourad, Holger Elischberger, Andrew Christopher

Majors: Religious Studies, Psychology
Hometown: Naperville, Ill.

The purpose of this study is to determine what is necessary for ethical religious belief or faith. Usually, in religious contexts the term "ethical" is used to describe actions, particularly whether they are right or wrong given a certain religious background or given their effects on others. However, for the purposes of the present discussion, "ethical" means rightly held, on sound conviction and evidence, to the extent that such evidence can be gathered. This study undertakes an examination of the involuntary nature of belief and the voluntary nature of faith. An examination of philosophical approaches to moral religious belief illustrates that we should adopt an attitude of critical rationalism, a critical analysis of our beliefs, along with an understanding of psychology and our natural biases. Implications of this perspective for modern believers are discussed, as is the need for dialogue among religious world views.

PAT MCCOMBS, '11

(See Albion/ESCIA Student Entrepreneurial Exchange)

ALEXANDER MCKELVY, '10

Penile Structure and Function in the Cavimorph Rodent *Octodon degus*

Faculty Sponsor: Tammy Jechura

Major: Biology
Hometown: Midland, Mich.

The *Octodon degus*, a social diurnal rodent from the western slopes of the Andes mountain range, exhibits interesting penile characteristics similar to other Cavimorph rodents, including pronged barbs on the length and long spikes on the distal end of the penis. It has recently been shown that the length, abundance, arrangement, and color of these spikes are dependent on testosterone levels. The aim of this study is to determine whether the characteristics of the penile features provide some reproductive advantage through sperm competition among males. The spikes could have evolved to provide a means by which male degus could be more assured of paternity of offspring, possibly by being used for a copulatory lock mechanism, sperm removal device, mechanism for vaginal stimulation of the female resulting in induced ovulation, or some novel function. It's also possible that the spikes are simply an evolutionary vestige serving no true function. We are also examining the possibility that the number and size of spikes, which increase with increasing testosterone levels, are correlated with female mate choice.

NATALIE MIKKOLA, '11

(See Albion/ESCIA Student Entrepreneurial Exchange)

COLLIN MILLER, '09

School Choice: Factors Influencing Parental Decision

Faculty Sponsor: Barbara Keyes

Major: Psychology
Hometown: Grand Rapids, Mich.

Research on school choice in Michigan reveals that as district family income and home values rise, the probability of open enrollment for school choice declines (Arsen, Plank, Sykes, 1999). Thus, wealthier districts tend to benefit from school choice in terms of increased enrollment, whereas poorer districts experience a decrease in enrollment due to students leaving. This circumstance means that school choice in the state is unequal and needs further exploration. The district under investigation for the present study is a poorer district that lost 180 students to school choice in 2000 and 243 students in 2007 (information provided by administration). In order to further understand the factors affecting school choice, parents/guardians with school-aged children living within the assigned district were mailed a survey to assess views of the district and factors affecting choice. Both parents/guardians with students attending the assigned district and those choosing to send their students out-of-district responded. Free response questions were used to address the strengths and weaknesses of the district and suggestions for improvement. The primary purpose of the study is to critically evaluate the focal district and unravel the factors affecting parental decision-making in inter-district school choice. Results will be used to make policy recommendations to the administration in hopes of retaining students, ultimately strengthening the district.

KRISTEN MITCHELL, '09

Mechanisms of Glacial Ablation at Linnébreen, Svalbard, Norwegian Arctic

Faculty Sponsor: Thomas Wilch

Major: Geology
Hometown: Glenview, Ill.

Glacier surface lowering, meltwater discharge, and meteorological conditions were monitored during the summer 2008 melt season at Linnébreen, an Arctic cirque glacier. Linnébreen is located on the western edge of Spitsbergen, the largest island in the Svalbard archipelago in the Norwegian Arctic.

Nine glacier surface lowering measurements were taken at eight centerline locations over the course of the 2008 ablation season (mid-July through mid-August). These measurements were correlated to meteorological observations to better understand surface-lowering dynamics of the glacier. Snow loss from Linnébreen was converted to a meltwater equivalent to estimate the volume of water lost from the glacier for each day. This volume was then compared to measured discharge in the adjacent meltwater stream.

The highest ablation occurred during late July, corresponding to periods of higher temperatures and solar radiation. These 2008 results are consistent with historical records. Photo analysis reveals an average glacier retreat rate of 17 m/yr since 1936 with a rate of 41 m/yr during the past 14 years. Annual measurements indicate average surface lowering of 1.13 meters for the 2008 melt season, and a negative net balance of .34 meters, less negative than most years. Temperature and direct sunlight were inferred to be the main agents of surface lowering of Linnébreen. Continued observation is essential to better evaluate the controls on surface lowering and negative mass balance of Linnébreen. The glacial mass loss at Linnébreen is consistent with other proxy climate records in the high Arctic, which indicate accelerated warming in this region.

Supported by: National Science Foundation Research Experience for Undergraduates, Hampshire College

BRITTANY MYERS, '10

Chemical and Mineralogical Comparison of Soils Collected on Dolomite and Granodiorite Rock from the White-Inyo Mountain Range, California

Faculty Sponsor: Christopher Van de Ven

Major: Geology
Hometown: Northville, Mich.

This study compares differences in chemistry from soils taken underneath various plant species and from different parent rocks. The soils were collected from the White Mountains in California at elevations between 10,000 and 13,000 feet (3,000 and 4,000 meters) above sea level. The region is arid and located north of Death Valley along the California-Nevada border. It experiences dry summers; the majority of precipitation falls as snow in the winter. The soils studied are classified as aridosols, or arid-region soils, and were taken from areas with granodiorite and dolomite parent rock and from beneath sagebrush (*Artemisia tridentada)*, mountain mahogany (*Cerocarpus ledifolius),* bristlecone pine (*Pinus longaeva*), and in open space.

Soil samples were ground to a fine powder, melted, and fused into a glass and analyzed by x-ray fluorescence (XRF) spectrometer for chemical compounds and elements. Results showed higher amounts of calcium carbonate, magnesium oxide, and manganese in soils from the dolomite, and aluminum oxide, nickel, silica, and potassium in soils from the granodiorite. Not many differences were found when comparing differences in vegetative cover, but for some chemicals, such as barium, manganese, and calcium, sagebrush had slightly lower values than mountain mahogany and bristlecone pines. Other chemicals showed no significant or consistent differences between rock types. These outcomes suggest that the parent rock type on which the soil is formed has more influence on the composition of the soil than the vegetation, although it is also likely that plant species have greater effects on elements like carbon and nitrogen that will be analyzed in the near future.

Supported by: Geological Sciences Department Taylor Fund for Undergraduate Research

JAKUB NOVAK, '09

Comparative Study of Red Wine and *Camellia sinensis* Chemical Composition

Faculty Sponsor: Vanessa McCaffrey

Major: Chemistry (Biochemistry)
Hometown: Banská Štiavnica, Slovakia

The focus of this research is to determine the qualitative and quantitative composition of red wine and green tea *(Camelia sinensis)* plant extracts. A number of studies suggest that there are significant pharmacological effects associated with phytochemicals in these beverages. The aforementioned studies then led to the design of structurally-derived pharmaceutical products used for a variety of medical conditions as in the case of Epigallocatechin 3-gallate or trans-resveratrol.

This research focuses on comparative analysis of the chemical compounds present in the two drinks because there are a number of structurally comparable groups of phytochemicals present in both red wine and *Camellia sinensis.* They both contain polyphenolic flavonoid and catechin classes of plant chemicals known for their antioxidant properties (*(+)-catechin, (-)-epigallocatechin, quercetine, t-resveratrol, anthocyanidin* etc.). Liquid-liquid extractions were performed in order to isolate the plant chemicals. High performance liquid chromatography and gas chromatography-mass spectrometry were performed in order to qualitatively and quantitatively compare the two groups of plant chemicals. The methods and results of these studies will be presented.

Supported by: FURSCA

ASHLEY OZELSKI, '09

Bird Personalities: Variations in Boldness of Nesting House Wrens (*Troglodytes aedon*)

Faculty Sponsor: Douglas White

Major: Biology
Hometown: Macomb, Mich.

Animals can vary individually in their degree of boldness and shyness, here anthropomorphized as personality. Ultimately, scientists hypothesize that personality may affect reproductive output. It was predicted that female house wrens (*Troglodytes aedon*), common cavity-nesting birds, would differ in characteristic individual levels of boldness/shyness. Personality was assessed by observing and videotaping breeding females presented with a familiar object (leaf) and a novel object (checkered ribbon) on the nest box. Thirty-three different females with nestlings were tested and categorized by personality type in the Whitehouse Nature Center in summer 2008. The majority of females hesitated more frequently upon entering the nest box to feed their young when the novel object was added. Some females displayed aggressive behaviors such as scolding before entering the box in the presence of the novel object, and others would not enter the box at all. Personality may be determined by an interaction of heredity, experience, and environment. In a fluctuating tradeoff between risk, investment, and survivorship, bold birds may be superior at defending against intra- and inter-specific predators while shy birds may be superior at incubating and feeding young or in renesting.

Supported by: FURSCA-Jane Seymour Kilian, '39, Endowed Scholarship/Fellowship

LAURA PAINTER, '09

Interpretations of Eruptive and Depositional Environments of the Minna Bluff Volcanic Complex, Antarctica

Faculty Sponsor: Thomas Wilch

Major: Geology
Hometown: Hillsdale, Mich.

Detailed analysis of volcanic and sedimentary rock samples from Minna Bluff, Antarctica, provides important clues about the original eruptive and depositional conditions. Minna Bluff is a 45km-long volcanic peninsula that extends east from Mt. Discovery into the Ross Ice Shelf in Antarctica. Minna Bluff is composed of hundreds of overlapping volcanic deposits erupted between 12 and 6 million years ago.

More than 150 rocks from Minna Bluff were processed and prepared as microscopic thin-section slides. The rock thin sections, along with hand samples, were then analyzed for mineralogy, alteration textures, grain shape, size, and sorting. One important distinction that can be assessed in the samples is whether there was any interaction between the erupting magma and water, which may indicate eruption during a glacial period. Another important distinction is the type of sedimentary structures and textures, which may indicate either a volcanic or sedimentary mode of deposition.

Three key lithofacies (rock-depositional environment) associations were observed: (1) pillow lavas and glassy breccias, indicative of rapid water cooling; (2) oxidized lavas indicative of no water interactions and ice-free conditions; and (3) glacial and other sedimentary deposits indicative of inter-eruptive erosional events and deposition. The thin section results combined with field data indicate that the Minna Bluff volcanic complex formed during changing environmental conditions. The rocks record eruptions during small glaciations, eruptions during non-glacial intervals, and periods of overriding by a large-scale ice sheet.

Supported by: National Science Foundation

WHITNEY PATTON, '09

The Biangular Coordinate System as Seen through Complex Numbers

Faculty Sponsor: Mark Bollman

Major: Mathematics
Hometown: Bloomfield Hills, Mich.

Visual representations of mathematical functions are a melding of algebra and geometry that form into structures called coordinate systems. These systems include the Cartesian or rectangular, the polar, and the biangular coordinate systems. Each has a different representation for the real numbers and the complex numbers. I will briefly explain the similarities and differences between the structures and then delve into the biangular coordinate system, as it is mostly unknown. The description of the biangular coordinate system will rely mostly on how functions are formed and a few function representations such as circles, lines, angels, and devils. This description leads into a discussion of how complex numbers are represented in the biangular plane versus their depiction in the Cartesian and the polar structures. The final matter of discussion will be research topics or questions that would provide a good base to start another such project in the biangular coordinate system.

EMILY PIEPER, '09

"Serving the Forgotten Man"

Faculty Sponsor: Geoffrey Cocks

Major: English (Creative Writing)
Hometown: Park Forest, Ill.

"Serving the Forgotten Man" is a novella set in Germany during the 1880s, the transitional time between the formation of the German empire and the end of the reign of the Hohenzollern family. Ending in 1888, "Serving the Forgotten Man" opens a window into the life of Friedrich III, the forgotten emperor of Germany, through the loving eyes of his devoted servant, Diethelm. The drama, life, and politics of Germany are revealed by following Diethelm in his routine.

LAURA POLLUM, '10

Molecular Dynamic Simulations of Methane Motion in Clathrate Hydrates Cages

Faculty Sponsor: Lisa Lewis

Major: Chemistry
Hometown: Ubly, Mich.

Clathrate hydrates comprise a body of inclusion compounds in which a highly ordered 3D lattice of water molecules forms in a hollow cage-like structure around small gas molecules. Clathrate hydrates containing combustible gases such as propane or methane have been synthesized and occur in nature, and clathrate hydrates are known to store such gases in high densities. Modeling the behavior of gases in clathrate hydrates is essential to understanding the clathrate systems and for the optimization and utilization of clathrate hydrates for gas storage. For use in molecular dynamic (MD) simulations, several sII clathrate systems containing propane and methane were constructed. The systems consisted of

eight unit cells joined together such that the continuous 3D lattice of water molecules was maintained. The movement of methane molecules within an sII clathrate containing propane and methane was studied using a classical MD approach and work to date will be presented.

Supported by: FURSCA-Bruce A., '53, and Peggy Sale Kresge, '53, Science Fellowship, National Science Foundation Research Experience for Undergraduates, University of California, Irvine

CHRISTINA POULIN, '09

The Three-Headed Problem-Solver: Group Cognition and Its Effects on Processing and Memory of Relevant and Irrelevant Components

Faculty Sponsor: Mareike Wieth

Major: Psychology, Neuroscience Concentration
Hometown: Carmel, Ind.

Collaborative problem-solving occurs when people combine their efforts to find a solution. Research on math problems has shown that collaborative problem-solving can lead to higher solve rates (Wiley and Jensen, 2006). This study was designed to investigate the effect of collaborative problem-solving on the processing and memory of word-problems. Participants solved a problem set in either a triad or solo problem-solving setting, and then individually completed evaluations of problem components. More specifically, participants rated how relevant they thought each component was to finding the solution and how certain they were that each component was in the problem they were asked to solve. It was hypothesized that participants in the group condition would rate the relevant components as more important and remember the information better than those in the solo setting, leading to higher solve rates. The opposite results were predicted for the irrelevant components.

Results showed that participants in the group condition had higher solve rates and were more likely to rate relevant components as important to finding the solution as those in the solo condition. The opposite pattern was found for irrelevant components. Results of the memory assessment showed that participants in the group condition were more likely to remember relevant components than solo condition participants. The reverse pattern was again seen for the irrelevant components. These findings indicate that group problem-solving may lead to more focused processing of specific components than solo problem-solving.

Supported by: FURSCA

TIM RAMBO, '09

Implementation of an Algorithm-Driven Solar Tracker

Faculty Sponsor: Aaron Miller

Majors: Physics, Computer Science
Hometown: Charlotte, Mich.

Solar energy is being given an increasingly important role in the American economy and in the energy sector. This talk will provide a brief introduction to the current state of solar technology and then detail my own work in the solar industry. Topics discussed include: how the prototype solar tracking system was designed, how new error correction methods were developed, and how hardware and software were integrated into the final system. This prototype solar tracking system maintains pointing accuracy better than one-tenth of a degree relative to the center of the sun. The brain of the system is an embedded Linux system that iteratively calculates solar position using accurate time and device position information. The system then determines the alignment error of the solar collector and adjusts the pointing of the collector, if necessary, to maintain the specified accuracy. The conclusion will cover work remaining to be done on the project in its path to commercialization.

TIM RAMBO, '09

An Introduction to Quantum Algorithms

Faculty Sponsor: Harold Connamacher

Majors: Physics, Computer Science
Hometown: Charlotte, Mich.

Quantum computation is a paradigm for computing based on principles of quantum mechanics. Since these computers are built upon quantum mechanics, they are capable of some seemingly strange behavior. One example of this behavior is known as superposition, wherein a quantum bit is both "on" and "off" simultaneously. Superposition is a key component in quantum computing, and one source of its potential power. While it has not been proven more powerful than traditional computing, there are a handful of cases in which quantum computing is known to be faster than the best known non-quantum approach. An interesting example is quantum search. For a search space of n elements, a traditional computer will, at worst, have to check all n elements of the space (which requires n operations) until it finds the solution to the search problem. A quantum computer, on the other hand, can, with high probability, find the correct solution in at worst $n^{1/2}$ operations, thereby achieving a significant speedup. This talk will begin with an introduction to quantum computing (covering topics such as qubits, superposition, quantum operations, and quantum circuits) and conclude with an analysis of Grover's quantum search algorithm.

KAYCEE RASHID, '09

Directed Forgetting of Real-Life Events in Young Adults

Faculty Sponsors: Holger Elischberger and Tammy Jechura

Major: Psychology
Hometown: Midland, Mich.

Directed forgetting (DF) is poor memory for information one was instructed to forget relative to information one was instructed to remember. Extant DF literature has focused almost exclusively on memory for word lists, and the current project investigated whether the findings from these studies apply to memory for real-life events. Participants were told that the purpose of the study was to examine the ease of learning two novel research procedures (the "events"), one to study sleep deprivation, the other to study creativity. The procedures were similar in structure and duration (20 minutes), and included a variety of actions and props (e.g., attaching EEG leads; interpreting ink blot images). Participants were instructed to forget one of the two procedures immediately after learning about it under the guise that the experimenter had administered it erroneously.

After a one-week delay, participants were asked to recall everything they remembered about *both* events. Preliminary analyses of the interviews suggest that DF is a phenomenon which can, to some extent, be observed in memory for real-life events. For instance, levels of correct recall were significantly higher for the to-be-remembered (M = 10.50, SD = 5.09) than the to-be-forgotten (M = 8.93, SD = 4.63) event at the open-ended level of questioning (e.g., *Tell me everything you remember about the sleep deprivation procedure*). In contrast, total correct recall, including information given in response to specific questions, showed no effects of the forget instruction (TBR: M = 27.60, SD = 4.26; TBF: M = 26.29, SD = 4.13).

CAROLYN RATH, '09

Lithofacies Analysis of Volcaniclastic Samples from the Antarctic Geological Drilling Program (ANDRILL) McMurdo Ice Shelf (AND-B1) Core

Faculty Sponsor: Thomas Wilch

Major: Geology
Hometown: Portage, Mich.

In 2006, the international Antarctic Geological Drilling Program (ANDRILL) retrieved a 1,285 meter-long drill core (AND-1B) of rock from below the seafloor beneath the McMurdo Ice Shelf. This drill core consists of alternating glacial, biogenic, and volcanic rock deposits and reveals a record of changing environmental conditions over the past 12 million years. Ninety-nine volcanic rock samples were collected from the core for lithofacies analysis at Albion College. Samples were prepared for microscopic thin section and smear slide analysis, grain size analysis, and SEM (scanning electron microscope) morphologic analysis. A thin section is a thin 30-micron slice of the rock sample, which has been mounted on a slide and set with special glue that allows optical properties to be seen clearly. Microscopic analysis of thin sections and smear slides results in the identification of minerals present, particle sizes, shapes, and sorting, as well as other structures present. Microscope slide descriptions and other analytical results are compared to diagnostic features of deposits from known environments. From this comparison, it is possible to interpret the eruptive style and depositional environment of volcanic rocks from the core record. A variety of environments and processes are recorded in the AND-1B samples including in situ basaltic ash fall deposits, basaltic turbidites, eruption-fed gravity flow deposits, and submarine mass flow and grain flow deposits.

Supported by: National Science Foundation

CULVER REDD, '11

Calibration and Use of the 11-Inch Celestron Telescope for Observing and CCD Imaging

Faculty Sponsor: Nicolle Zellner

Major: Physics
Hometown: Lowell, Mich.

The purpose of this research was to discern and document the operational techniques of a college-owned 11" Celestron telescope, SBIG CCD camera, and associated optical equipment such as color filters and adaptive optics systems. In addition, this research will investigate several avenues in which this equipment could be used to gather data for analytical astronomy.

The former goal was accomplished by first calibrating the equipment for use at the observing site on the roof of Palenske Hall, then by taking several rounds of test images of objects like Jupiter, the Ring Nebula, and the Andromeda galaxy. During the imaging process, color filters were tested to determine their feasibility for future astrophotography, and various image enhancement features were tested in an attempt to maximize the equipment's ability to gather usable data. Finally, operational procedures were developed for use of the equipment and compiled into a comprehensive manual.

The latter goal will be accomplished by using newly purchased equipment upgrades to attempt high-resolution color imaging and to assess the effect of mechanical vibrations within Palenske Hall on image quality. Then, more images will be taken and be used to create color magnitude H-R diagrams of prominent star clusters such as M13 or M15, and possibly to determine periodicity in variable stars like Mira.

Supported by: FURSCA-Bruce A., '53, and Peggy Sale Kresge, '53, Science Fellowship

CULVER REDD, '11

Photophysics of Benzoic Acid Derivatives

Faculty Sponsor: Craig Bieler

Major: Physics
Hometown: Lowell, Mich.

Within the past few years, a spectrometry technique called matrix-assisted laser desorption/ionization (MALDI) has come into common use. This technique allows mass spectrometry of large organic molecules by crystallizing them into one of a variety of inorganic matrix compounds. However, a satisfactory understanding of the processes by which these matrix compounds absorb light has not yet been attained, thereby undermining the understanding of the MALDI mechanism as a whole.

My research has focused on benzoic acid, one of the more common matrix compounds. In particular, I have studied the ways in which functional group modification affects the molecule's ability to absorb light. More insight into how the addition or removal of various functional groups affects the photophysics of benzoic acid may lead to hypotheses about how the molecule itself absorbs light.

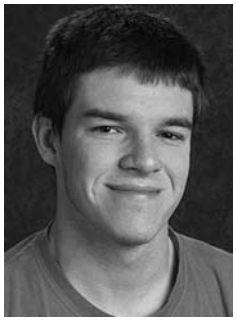
Supported by: Student Research Partners Program

JONATHAN REYNOLDS, '09

Evangelicals and the Environment

Faculty Sponsors: Ronney Mourad, Nels Christensen, Andrew Christopher

Majors: Political Science, Philosophy
Hometown: Clarkston, Mich.



For almost half a century, evangelicals played an adversarial role toward environmental activism. This particular sect of Christianity believed that the world was decaying, and when the world reached complete decay, Christ would come back and redeem the world. Because of this world view, evangelical Christians believed that there was no need to take care of the Earth. This was 50 years ago, but now the evangelical church has emerged as an unlikely ally to the environmental movement. The question is what happened within this evangelical community that caused them to change their opinion on the environment. Now the evangelical community regularly preaches about environmental stewardship and creation care. What exactly does the Bible say about creation care? And what kind of role should Christians and the church at large play in taking care of the environment?

Supported by: FURSCA-Vernon Lawson Research Endowment

ELIZABETH REZNIKOV, '09

Chromium-tetrone Complexes as Novel Magnetic Materials

Faculty Sponsor: Vanessa McCaffrey

Major: Chemistry
Hometown: Brighton, Mich.

This research has focused on synthesizing magnetic materials using a "metal-organic radical" approach with novel organic ligands, termed "tetrones." The tetrone is a rationally designed ligand based on the dimethylenecylclobutadiene diradical (DMCB). The carbon-centered radicals of DMCB have been replaced with quinone moieties for metal-binding sites. The quinones moities can be reduced to semiquinones by zero-valent metals. Calculations show that these ligands should behave as ferromagnetic couplers when coordinated to metals. First, $CrCl_2$ was used to reduce the tetrone in the presence of a reduced salen ligand to allow study of the metal-ligand interaction without the complication of long-range interactions. The second method uses metal carbonyl complexes as the reductant to form multi-dimensional networks. Preliminary results will be presented on the structural and electronic characteristics of the resulting compounds.

Supported by: FURSCA-Orpha Leiter Irwin Research Fellowship in Pre-Medicine

JACOB RINKINEN, '11

Agents of Change: Gender Differences in Migration Intentions among University Undergraduates in Nigeria

Faculty Sponsor: 'Dimeji Togunde

Majors: Chemistry, Anthropology/Sociology
Hometown: Highland, Mich.

This paper draws on surveys/interviews with 678 Nigerian university undergraduates to examine migration intentions and to detect if gender differences exist in reasons to migrate (or not) to the United States. This study is unique in focusing on future migration among university students, whose views and migration plans have been neglected in previous studies.

Findings indicate that a higher proportion of males than females cite better employment opportunities as a reason for planning to move. However, more females than males prefer safety and better infrastructures available in America as motives for wanting to move within the next five years. A higher proportion of women than men find social-cultural ties with homeland and perception of racism in America as factors discouraging them from wanting to live in the United States, whereas patriotism/love of homeland encourages more men than women to want to stay in Nigeria. Perception of America as a land of opportunities and active participation in the U.S. Visa Lottery Program are among significant predictors of intentions to migrate. Findings have implications for policies aimed at improving quality of life in Nigeria, thereby reducing emigration of "future leaders of tomorrow."

Supported by: FURSCA

MEGAN ROBERTS, '10

Gender Differences in Time-Dependent Spatial Learning in *Octodon degus*

Faculty Sponsor: Tammy Jechura

Major: Psychology, Biology
Hometown: Roseville, Mich.

O. degus are diurnal rodents endemic to the western slopes of the Andes Mountain range in South America. They live in a burrowing community with few males in the predominantly female social system. The radial arm maze is a spatial task consisting of a central chamber with six radial arms leading from it. The degus were trained to find food rewards with two different patterns of location at two different times of day so they had to use their internal clocks, or circadian rhythms, to determine the correct arms at that 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 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, and we predicted that males would learn the task faster than females.

Supported by: FURSCA

JOSHUA RONTAL, '09

Educational Laptop Deployment into Developing Markets: Are They Ready for It?

Faculty Sponsor: Alfred Pheley

Major: Political Science
Hometown: Ann Arbor, Mich.

On November 16, 2005, Nicholas Negroponte debuted his "$100 laptop" to the world. The laptop was designed by the non-profit One Laptop per Child group (OLPC) with the intention of distribution to children in developing nations around the world. While injecting technology into developing markets has the potential to address many problems that arise from the severe poverty and lack of infrastructure often found in those areas, it also raises an array of concerns. By skipping the decades of development and corollary societal change found in countries that developed the technology, developing countries may face problems similar to those felt by countries subject to externally-instigated industrialization and democratization, including backlash and possible radicalization.

One of the OLPC's features, its ability to create ad-hoc wireless networks enabling users to connect to one another and the Internet where available, across long distances, holds both great promise and danger. While it offers the possibility of unfettered communication and collaboration, it could also be subverted to spread misinformation, unify and expand radical groups, and dangerously destabilize nations. Moreover, many of these potential problems are universal to the concept of high-technology, networked teaching applications in developing areas. Technology, like industrial and governmental development, is best applied from within. Perverting that natural progression can lead to catastrophic ends.

RACHEL ROOF, '09

Culture, Government, and Politics: Analyzing Women's Movements in the United States and the Republic of India

Faculty Sponsor: Andrew Grossman

Major: Political Science
Hometown: Sebewaing, Mich.

Women's movements are a common feature of politics, and a useful mechanism for the study of social movements and political development more generally. While such collective action is a regular occurrence, it varies widely in focus, tactics, organizational forms, and success rates. This puzzle is a fascinating one; all things considered, can there be a suitable model to explain such a variety of collective action? Centering around two case studies, instances of women's movements in the United States and the Republic of India, this study outlines the importance of culture and country-specific political development in the focus, origination, and continuation of the movements analyzed, while highlighting the significance of resources, organizations, and group perceptions in both states. While the study's conclusions are only tentative because of the small number of cases considered, it serves to illuminate factors that should be taken into consideration when studying social movements. Due to the frequency of women's movements and the importance of social movements to a country's internal political development, understanding women's movements as a political force could greatly aid in future inquiry. The study doesn't offer definitive conclusions, but indicates areas in need of further exploration. The strong presence of women's movements throughout political development on a local, regional, and international scale emphasizes their importance in the analysis of political development, and this study offers recommendations for future research efforts.

KWAME SAKYI, '09

A Historical Problem and a Contemporary Impact: Health Care, Gender, and Traditional Medicine in Ghana

Faculty Sponsor: David Eaton

Major: Chemistry
Hometown: Sunyani, Ghana

Even though women I interviewed in Ghana for my research about traditional medicine (TM) could not deduce maternal mortality quantitatively or describe birth complications accurately in biological terms, its harsh reality is still part of their experiences of childbirth. Consequently, for mothers, birth is a fight for one's own survival—an event during which one has to manipulate, seek, and utilize resources that will improve the chances of surviving childbirth. Traditional medicine in Ghana is used by pregnant women to augment the chances of survival during childbirth. However, its usage has created tension between biomedical health care providers and pregnant women over its efficacy.

Because of specific cases of hypervolumic shock, obstructed labor, and hemorrhage, biomedical care providers consider traditional medicine to be problematic. In contrast, mothers view TM as a helpful and needed alternative to the dangers of childbirth. Since biomedical health care providers generally have a negative view of TM, pregnant women reported that they would be humiliated, insulted, and threatened during a birth complication if they reported their use of TM. To avert the negative reaction of health care providers, this research showed that out of the 42 women sampled, 85 percent of them admitted they will lie to health workers if they were asked of their use of TM. There is poor communication between Ghanaian women and health care providers regarding traditional medicine.

This poor communication, I argue, has its roots in British medicalization of birth in colonial Ghana and its influence on the use of traditional medicine. The medicalization of birth in Ghana did not significantly reduce maternal mortality or increase childbirth at its institutions, but it introduced birth procedures such as caesarean section and forceps delivery, which because of their high mortality rate, encouraged women's continual utilization of TM into the post-independence era. The introduction of these procedures, and maternal death in general, redefined the role of traditional medicine in childbirth in the colonial and postcolonial period. Traditional medicine, with its associated beliefs and practices, provided a complex socio-medical and spiritual role to promote vaginal deliveries and prevent infant death by intervening in culturally defined childhood diseases. The unsuccessful outcomes of medicalized procedures, because of cultural, institutional, and medical problems, created another consideration for use of traditional medicine. Women continued to use TM to create conditions that would avert procedures they associated with death at hospitals, particularly forceps delivery and a caesarean section.

However, because of specific mentioned cases of birth complications, biomedical health providers do not want women to use traditional medicine in this contemporary period, creating the poor communication between them and mothers. In order to comprehend the conditions underscoring high mortality during childbirth in Africa, it is important to understand the historical development leading to this poor communication which affects women.

Supported by: FURSCA-Orpha Leiter Irwin Research Fellowship in Pre-Medicine

MICHELLE SALEMKA, '09

"Voices from a Land Divided": A Study of Literary Trends and Cultural Sentiments in Michigan

Faculty Sponsor: Julie Stotz-Ghosh

Majors: English, French
Hometown: Portage, Mich.

Most people would agree that Michigan is not a particularly nice place to live in the spring of 2009. There are layoffs and bank closings, foreclosures, and an emigration rate higher than any other state. In 2007, the BBC summarized the state of Michigan with six simple words: "former industrial state in economic decline." But why, then, do we all still live here? What makes Michigan likeable, tolerable, unique? What makes Michigan the kind of place poets want to write about?

This talk will present some of the main ideas from my FURSCA project and thesis, "Voices from a Land Divided." Through FURSCA, I traveled around Michigan talking to people to learn what they like and dislike about living here, and what, if anything, makes them want to stay. In addition, I examined the work of five prominent authors who write from and about Michigan, trying to understand what exactly makes a person a "Michigan writer." Through analytical essays based on their published work and interviews I conducted with each of them, I explored the role that Michigan plays in these authors' identities as writers. The combination of their ideas and memories from my time traveling around the state over the summer helped me to produce my own creative non-fiction, which I will present in addition to my FURSCA and thesis findings.

Supported by: FURSCA

MARGARET SCHAEFER, '09

An Ineffective and Inequitable Health Care Safety Net: A Case Study of Health Care Inequities for Chicago's Homeless

Faculty Sponsor: Diana Ariza

Major: Biology
Hometown: South Lyon, Mich.

The health care safety net in the United States is intended to fill gaps in access to medical services for individuals who are underinsured or who lack coverage altogether. This system is made up of public hospitals, teaching hospitals, community-based clinics, and local health departments. Uninsured, poor Americans often rely on the health care safety net to receive medical services. According to U.S. Census data, in 2007, 45.7 million Americans were uninsured, and the number of Americans living in poverty rose to 37.3 million.

While some research has examined the effectiveness of the health care safety net in providing care for the uninsured, I was specifically interested in understanding the experiences of homeless individuals who rely on this system for care. In addition, I examined how social inequities compound the difficulties homeless individuals face in receiving adequate medical care.

A total of seven focus groups were conducted at three organizations serving the poor and homeless of Chicago. Through these groups, a total of 47 adults who rely on Chicago's health care safety net for medical services shared their thoughts and experiences regarding access to medical care in Chicago. The responses of these individuals revealed substantial gaps in the health care safety net and provided poignant insight into the impact social inequities have on the health care experiences of the homeless.

Supported by: FURSCA

HANNAH SCHEIWE, '09

Bombs Away: The Military, Political, and Social History of the Airplane and the British and American Airmen Who Fought the Strategic Bombing Campaign in the Second World War

Faculty Sponsor: Geoffrey Cocks

Major: History
Hometown: Indianapolis, Ind.

Few inventions change as much in a lifetime as the airplane has. From 1903 to 1945, a mere 42 years, the airplane evolved from a wooden structure covered with fabric that could barely hold a human being to a steel frame with a 141-foot wingspan capable of carrying not only a ten-man crew, but thousands of pounds of bombs. The airplane, and consequently the bombs dropped from it, has changed the way in which wars are fought. War serves as a catalyst for change; this is illustrated by the strategic bombing campaign in the Second World War. The common societal view toward the airplane, air doctrine, actual aerial policy and tactics, technology, and air personnel experiences as well as civilian experiences must all be examined in order to come to a full knowledge of how change over time affected the war and the people fighting it.

The ultimate focus of this research has been to investigate the social history and overall experience of the airmen in the B-17, B-24, and B-29 bomber airplanes that flew over Europe and the Pacific from 1939 to 1945. Veterans' stories can teach us vital lessons—history is not just a part of the past, but rather an integral part of the present, and it definitely has a major role in the future.

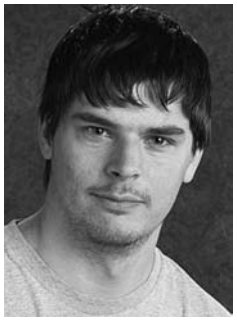
Supported by: FURSCA-Jean Bengel Laughlin, '50, and Sheldon Laughlin Endowment for Student Research, William and Gloria Sebold Gift

ERIC SCHROEDER, '09

Party Regimes and the Politics of Regulation: Why the Free Market Is Not Truly Free

Faculty Sponsors: Alfred Pheley, Andrew Grossman, William Rose

Major: Political Science
Hometown: Tecumseh, Mich.



There are many ways to look at how the American state developed throughout U.S. history. One way to look at state building is through political party regimes, a theory developed by political scientist Stephen Skowronek in which one political party holds power at all levels of government over a long period of time. In my research, I have taken Skowronek's work a step further by applying it to certain forms of public policy. When looking at government regulatory policies, I have noticed a pattern in American history in which the government goes through long periods of either regulating or deregulating certain industries and their respected markets.

Many scholars believe the reasons why the government decides to regulate or deregulate are based on the demands of the free market; however, my research offers an opposing theory. I will argue that it is the work of party regimes and their ideologies that ultimately determine why government decides to increase or decrease its regulation of certain industries. I will use several case studies involving government regulatory policies in the railroad, airline, and other transportation industries in order to show how government has changed its stance on regulation over time and then link these changes to Skowronek's timeline of "realigning elections" to show the role party regimes play in this process. Ultimately, my work will not only provide proof of the existence of party regimes but also raise some questions about whether the "free market" is truly free.

LESLEY SIMANTON, '09

Multi-Wavelength Photometry on Stellar Clusters: Applications in Telescope-Camera System Analysis and Galactic Formation

Faculty Sponsor: Nicolle Zellner

Major: Physics
Hometown: Niles, Mich.

Photometry is used to determine many properties of astronomical objects such as brightness, age, metallicity, and mass. These properties form the foundation of the vast majority of knowledge of all astronomical objects. Obtaining accurate values is crucial to conducting original research in astronomy. This study sought to use photometric analysis of well-known star clusters within the Milky Way to establish a telescope-camera system capable of research-quality data at Albion College. Color magnitude HR diagrams were created for the well-known star cluster NGC 457, making it possible to determine its age and compare the results to accepted values. Studies of common errors inherent in imaging with telescope-camera systems, such as zero magnitude corrections and limited signal-to-noise ratios, permitted identification of some of the photometric corrections necessary for accurate results in the age of a stellar cluster, as well as creation of a procedure for obtaining photometric data at Albion. The system analyzed consists of the Department of Physics' 14" Celestron telescope, custom equatorial mount, and ST-7XME CCD camera.

This presentation will also include a discussion of the applications of photometry on stellar clusters to understanding galactic structure. Finding cluster brightness, age, metallicity, and mass for those objects in other galaxies can tell us about the formation and evolution not only of the star clusters, but also of the galaxies. Such studies must be conducted with instruments capable of highly accurate measurements, and photometric errors must again be considered.

Supported by: FURSCA, National Science Foundation Research Experience for Undergraduates, University of Toledo; Albion College Department of Physics

JEFFREY SIMMONS, '09

A Cost-Benefit Analysis of Employee Wellness Programs and Their Potential Effect on Employee Health Care Costs at Albion College

Faculty Sponsors: Britton Johnson, Thomas Johnson

Major: Physical Education (Exercise Science)
Hometown: Midland, Mich.

Employee wellness programs (EWP) have many benefits. From a financial standpoint, EWP have been shown to help lower a business's health care costs, and from an epidemiological perspective, help improve the overall health and wellness of the employees.

Albion College, a small liberal arts college in Albion, Michigan, having approximately 560 employees, is currently testing the idea of implementing such a program. Albion College could reduce the amount of money spent on employee health care if all the employees were to participate in the program. Epidemiologically, Albion College could potentially discover staff and faculty at risk for hypokinetic conditions, reduce hospital visits, and reduce absenteeism. In turn, the employees would exhibit greater productivity levels in their work on Albion's campus. The employees would become healthier, physically, mentally, and emotionally, by way of the program's comprehensive approach to health and wellness. The Albion College Employee Wellness Program's (ACEWP) ability to combine education in subject areas such as exercise and physical activity, nutrition, mental health, and stress management, along with essential health assessments including blood glucose levels, cholesterol levels, weight tracking, and waist measurements, make it a program that can benefit every employee.

CHELSEA SMITH, ’09

(See Heather Lagendyk, ’09, Chelsea Smith, ’09)

KARL SMITH, ’09

(See Genomics at Albion)

RUTHIE SPALDING, ’09

“Espalier”

Faculty Sponsor: Helena Mesa

Majors: English (Creative Writing), Psychology
Hometown: Ann Arbor, Mich.

This collection of poetry shows there are many ways to listen, many ways to ignore, and far more ways to accept. Initially, we see a paranoid speaker who rejects a jagged world. For example, she mistrusts her own thought process, her perception of others, and of writing itself. Eventually, she slows her pace, thinks, recalibrates. Through short lyrics and dramatic monologues, the poems address relationships with women, family, strangers, and poetry. As the manuscript progresses, the poems are more contemplative—considering an unnameable bug, the dead, long-distance relationships, trash—in order to question her fundamentally fear-based assumptions. In the final section, the speaker is empowered. She re-explores relationships with others in a new, profound way. In this way she is like an espalier: a fruit-tree trained on a lattice, usually of woodwork, or on stakes. She climbs her way toward the sun, powerful and new.

KRISTIN SPARSCHU, ’09

Using Gender Differences in Lay-Representations of Coronary Heart Disease to Predict Health Behaviors

Faculty Sponsor: Mary Jenson

Major: Psychology
Hometown: Bloomfield Hills, Mich.

All individuals hold representations that allow them to interpret and understand their experiences with illness. The common sense model (Leventhal, Nerenz, & Steele, 1984) outlines five dimensions examining how individuals make sense of their symptoms, assess health risks, and formulate an action plan for coping with their current illness. Weinman & Petrie (1997) developed the Illness Perception Questionnaire (IPQ) to go beyond coping with an illness as the main dependent variable and to gain better insight on the interrelationship of Leventhal’s five dimensions. Recent research conducted by Figueiras & Alves (2007) used the IPQ-RH to study the illness perceptions of healthy individuals regarding AIDS, skin cancer, and tuberculosis. However, their study did not examine gender differences nor does it examine the perceptions of a more predominant illness, such as coronary artery disease.

The present study investigates individuals’ perceptions of coronary heart disease, the gender differences in lay-representations for the illness, and the association between reported health behaviors. To investigate these relationships, a modified version of the IPQ-RH and a health behavior survey were used to survey participants. The modified IPQ-RH and a health behavior questionnaire were completed online. The participants were recruited by a non-profit service that sends recruitment/reminder messages to individuals who have explicitly agreed to participate in Web-based research studies. The IPQ-RH dimensions account for a significant portion of the variance in health behaviors. Moreover, the gender differences found in the illness representations may partially explain gender variations in the trajectories for this illness.

Supported by: FURSCA

JEFF STEPHENS, ’09

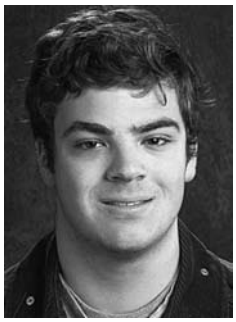
(See Monica Yalamanchili, ’09, Jeff Stephens, ’09, Kelyn Carlson, ’10)

TIM STEVENS, ’10

Fluorescence Analysis of the *Twort* Group I Introns Using an ABI Prism 310 Genetic Sequencer

Faculty Sponsor: Christopher Rohlman

Majors: Biochemistry, Biology
Hometown: Grosse Pointe Park, Mich.



One of the dogmas of modern biology is that deoxyribonucleic acid (DNA) and ribonucleic acids (RNA) code for genetic information. DNA can be expressed through transcription, the process of turning DNA into RNA. RNA can be processed by excising sequences called introns, resulting in a finished molecular product that can function in the cell. Introns are linear sequences of ribonucleic acid (RNA) that are spliced out after their biological transcription and before the RNA is used in our cells. Group I introns are catalytic RNAs capable of performing a range of phosphotransesterification reactions including self-splicing and RNA cleavage. Biological catalysts are essential to life because the conditions in our body would make many essential reactions impossible in the absence of the catalyst.

Kinetic data are recorded over varying reaction conditions to better understand the catalytic nature of the *Twort* group I intron, and data are acquired by combining several techniques. These techniques include capillary electrophoresis, fluorescence, and laser spectroscopy. The kinetic data in my research are recorded with the use of an ABI 310 genetic sequencer. The sequencer depends on capillary electrophoresis to separate DNA or RNA molecules based on size. This allows the bound ribozyme, unbound ribozyme, and the substrate to separate due to variations in their size. To quantify the binding results, a laser in the sequencer emits a light of appropriate wavelength to be a photon donor to excite the fluorescently labeled substrate. The excited substrate quickly returns to its normal state with the emission of a photon.

The wavelength and strength of this emission are recorded by the sequencer. This produces quantifiable data that allow the binding behavior of the *Twort* group I intron to be better understood by establishing a model of catalysis. Catalytic models for reactions in living organisms are essential to comprehending the biochemistry that makes life possible.

Supported by: FURSCA

HALEY SZTYKIEL, '09

On the Allure of Gambling When a Risk-Free Response Is Concurrently Available

Faculty Sponsor: Andrew Brandt

Major: Psychology
Hometown: Beverly Hills, Mich.

In a repeated-measures experiment, 18 (3 male and 15 female) participants from the Introduction to Psychology research pool were exposed to three different gambling conditions across three 40-minute sessions that consisted of 50 trials each. Participants started each session with zero tokens (poker chips that were worth one entry into a $50 lottery). On each free-choice trial, participants could choose between two options: earn or gamble. Each choice for the earn option produced 1, 2, or 3 tokens (depending on the condition) with certainty. Each choice for the gamble option required a 1 token wager and could have resulted in losing the token or winning 3 or 7 tokens. Because the gamble option cost the participant 1 token to play, participants could not choose the gamble option if they had zero tokens; therefore, some of the 50 trials may have been forced-choice trials because the participant was not allowed to choose the gamble option.

The results of repeated-measures analysis of variance showed no effect of the earn option value on participants' preference for the gamble option during free-choice trials (gambles/free choices). However, a separate analysis revealed a significant treatment by session interaction on participants' preference for the gamble option during free-choice trials. An examination of this interaction revealed that participants' preference for the gamble option increased across consecutive sessions when the earn option produced 1 token, decreased across consecutive sessions when the earn option produced 2 tokens, and was unchanged across consecutive sessions when the earn option produced 3 tokens.

MELISSA TACHE, '09

(See Genomics at Albion)

ERICA TAUZER, '10

(See Kelyn Carlson, '10, Erica Tauzer, '10)

AMANDA TILOT, '09

Pregnancy and Reentrainment after Phase Shifts in *Octodon degus*

Faculty Sponsor: Tammy Jechura

Majors: Psychology, Biology
Hometown: Saginaw, Mich.

Circadian rhythms are endogenous 24-hour cycles found in nearly every species studied. Interest in the field of chronobiology has skyrocketed in the last 40 years with new implications for rhythms research in human health and disease. Among these discoveries has been the interaction between hormones and circadian rhythms, best exemplified in the estrous cycle.

The purpose of this thesis research has been to understand how pregnancy affects recovery from circadian rhythm disruption in an animal model. To this end, six female *Octodon degus* were phase-shifted during pregnancy and the time until recovery of normal activity patterns was compared to non-pregnant animals experiencing a similar shift. It was found that the pregnant animals recovered from the shifts at a different rate than non-pregnant animals, taking significantly longer to recover from a shift analogous to the jet-lag experienced after flying to Europe. Other measures of their circadian function were examined, such as the duration of their daily activity before and after each shift. These data suggest that the condition of pregnancy and the associated changes in hormone levels has a strong impact on circadian functioning. Our result necessitates further research to better understand the potential negative effects of chronic rhythm disruption on pregnancy outcome, a reality faced by shift workers of many professions.

HANNAH TRAGER, '09

Mirrors of Masculinity: Reflections of Gender Identity in H.C. Westermann's Early 2-D Work

Faculty Sponsor: Bille Wickre

Major: Art History
Hometown: Clarkston, Mich.

A quick glance at a young Westermann's physique and his gender becomes glaringly apparent to the viewer. An artist but also an acrobat, carpenter, and prideful Marine, Westermann seems to have embodied ideals regarding masculinity at the midpoint of the twentieth century. Yet, as he progresses as a person and as an artist, one begins to wonder what being male really meant to Westermann and how he viewed his own gender identity. His sentiments about his own sex were often torn and confused but what becomes obvious later on is seen manifesting itself in the early work included in the Albion College exhibition "H.C. Westermann: Tradition and Resistance." Westermann took great pride and saw great importance in his own masculinity, while also fully realizing the irony and contradiction in the ideals of the masculine male of twentieth-century America. "Mirrors of Masculinity" presents a heretofore largely ignored aspect of Westermann's early 2-D works, that is, how they reflected ideas about gender.

Supported by: FURSCA

KATHARINE VAN DE PUTTE, '09

"Above Ground": A Collection of Poems

Faculty Sponsor: Helena Mesa

Major: English (Creative Writing)
Hometown: Grosse Pointe Woods, Mich.

"Above Ground" is a collection of poems based on my experiences in New Orleans and Southeast Louisiana. I am drawn to Louisiana because of my own family's history there and because of my involvement in the rebuilding efforts since Hurricane Katrina. This collection centers on the people of New Orleans in their resilience as they work each day to restore their home. Throughout the collection, a recurring narrative voice emerges that questions her place as an outsider, explores her role in the restoration, and offers insight into the New Orleans Renaissance.

AMANDA VOCKE, '10

Media Portrayal of America and Its Influence on Young People's Migration Intentions in Nigeria

Faculty Sponsor: 'Dimeji Togunde

Majors: French, Spanish
Hometown: Otsego, Mich.

The question of why people migrate has attracted a plethora of theoretical disquisitions especially in the last four decades. But as useful as these theories are, research shows that they do not explain the possible influence of such societal agencies as the media. In an era of media globalization and free trans-border flow of media products, it is incomplete to account for international migration intentions without factoring in the media.

In this context, the objective of this research is to examine the extent to which the media influence the intentions of young people in Nigeria to migrate to the United States. We examine the image of the U.S. presented in the Nigerian media through interviews/survey of 678 Nigerian undergraduates, content analysis of media reports, and qualitative data obtained from focus group discussions. In using multiple methodological approaches, we want to examine if young people engaged in any selectivity process in their treatment of information about the U.S. Findings show that Nigerian undergraduates receive a wide array of information about the U.S.: positive, negative, and mixed; true and false. Most of them believe only positive information. Negative portrayal of the U.S. by some of the media is incapable of discouraging migration intentions. Almost 90 percent of our respondents want to visit the U.S., and more than half want to go as permanent residents because it is a place where dreams of comfort and success can be easily realized. Some would abandon their studies if given the opportunity to relocate to the U.S., even when they have just a few months to complete their studies.

Supported by: FURSCA

SACHI VYAS, '10

Spatial and Temporal Comparison of Bacterial Community Composition in Selected Adult Oral Cavities

Faculty Sponsor: Ola Olapade

Major: Biology
Hometown: Kalamazoo, Mich.

The oral cavity of the human mouth has a myriad of microbes present that are typically involved with and influenced by individual health and hygiene conditions. This study particularly examined bacterial populations in three selected adult oral cavities with varying hygiene practices. The impacts of the various oral hygiene techniques used by these individuals (e.g., teeth brushing at least twice a day, regular flossing, and using of mouthwash) were quantified using standard microbiological techniques. The bacterial populations, specifically of *Streptococcus* and *Staphylococcus*, in the oral cavities were enumerated using various techniques, including nucleic acid staining and viable plate counts. In summary, the bacterial numbers were observed to be highly elevated in the oral cavities of the adults who failed to practice proper hygiene techniques. The results from this study appeared to indicate that each of the three adult oral cavities examined have unique patterns of bacterial growths that are attributable to their specific oral hygiene techniques and dental anatomy. Overall, this study strongly suggests that an individual's dental anatomy and types of oral hygiene practices could potentially influence overall health status and specifically aid in the prevention of bacterial-induced diseases in humans.

BRITTANY WIESE, '09

(See Albion/ESCIA Student Entrepreneurial Exchange)

BRITTNAY WILLIAMS, '09

Using Gender Differences in Lay-Representation of Diabetes to Predict Health Behaviors

Faculty Sponsor: Mary Jenson

Major: Psychology
Hometown: Bay City, Mich.

Lay representations or schemas about health and illness help us to interpret symptoms, understand illness, and cope with illness. Leventhal, Nerenz, & Steele (1984) identified five dimensions or types of schemas that individuals use to understand and label illness such as the symptoms associated with an illness, causes of an illness, the likely duration of an illness, and how and if the illness can be cured. The Illness Perception Questionnaire (IPQ) by Weinman & Petrie (1997) was constructed as a method of measuring these constructs. Figueiras & Alves (2007) revised the IPQ-R to study healthy individuals' illness perceptions of AIDS, skin cancer, and tuberculosis. However, their study did not examine gender differences nor does it examine the perceptions of the third leading cause of death, diabetes.

The present study investigates healthy individuals' perceptions of diabetes, the gender differences in lay-representations for the illness, and the association between reported health behaviors. A modified version of the IPQ-RH and a health behavior survey were used to investigate these relationships between participants. The modified IPQ-RH and a health behavior questionnaire were presented to the participants via an online survey. The IPQ-RH dimensions account for a significant portion of the variance in health behaviors. Moreover, the gender differences found in the illness representations may partially explain gender variations in the trajectories for diabetes.

TAKESHIA WILLIAMS, '09

The Autistic Spectrum and Creativity

Faculty Sponsor: Mareike Wieth

Major: Psychology
Hometown: Flossmor, Ill.

Those suffering from autism are characterized by their strong desire for a strict schedule, limited interests, and inability to communicate and socialize. These traits have been shown to lie on a continuum (Baron-Cohen, 1999). Individuals with a high number of these traits fall at the autistic end of the continuum, while those with fewer of these traits fall at the non-clinical end of the continuum.

The current study was designed to investigate the characteristics of individuals at the non-clinical end of the autism continuum. Hans Asperger proposed the extreme male brain theory, which suggests that autism is an extreme version of the male brain. In essence, those with autism are thought to be less creative because they are more "male-brained" and thus more systematic. These theories alongside other research (Baron-Cohen, 2001) provide convincing evidence that those with autism are less creative than the normal population. The present study investigated the creativity levels of individuals at the non-clinically diagnosed portion of the continuum (i.e., the normal population). If autistic traits truly lie on a continuum, one would expect that participants' creativity would vary depending upon the number of autistic traits they displayed. Preliminary results indicate that those higher on the autistic spectrum (showing more autistic traits) score lower on creativity measures than those lower on the spectrum (showing fewer autistic traits).

Supported by: FURSCA-James W. Hyde Endowed Student Research Fellowship

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MAN KAI (ALYSSA) WONG, '09

Chromatographic Purification of Recombinant Adeno-Associated Viral Vectors Using Convective Interaction Media

Faculty Sponsor: Vanessa McCaffrey

Majors: Chemistry, Music
Hometown: Hong Kong, China

Adeno-associated virus (AAV) is one of the most promising viral vectors for human gene therapy. The classic method of AAV purification by density gradient centrifugation is only effective for a small scale. A scalable production strategy of rAAV is often demanded for the use of clinical trials with larger animals. The objective of the study is to generate a scalable and robust rAAV purification system using ion exchange chromatography. For this study AAV serotype 7 and 6.2 were chosen. For optimal resolution and elution of AAV, a wide range of salt concentrations and buffer pH was screened. A set of optimal conditions was designed based on the results of initial screening that allows maximum yield of the purified vector with minimal loss of viral protein in flow through. The resolution of the two AAV serotypes was studied using a convective interaction media column (CIM-QA), which has a large surface area for a flow independent resolution and binding capacity. The result demonstrated that a considerable amount of the AAV7 viral protein could be recaptured from the column in a single step, making AAV7 a favorable candidate for monolith chromatography. AAV6.2 showed slight resolution, and with a significant loss in the flow through. This chromatography method may offer advantages in ease of purification, final vector purity, and process scalability. Large-scale production of AAV is possible with careful selection of column media and elution conditions. The optimal pH and salt concentration for purification of different AAV serotypes may vary, and may affect the overall yield of the vector.

Supported by: Cystic Fibrosis Foundation. This research was conducted at University of Pennsylvania School of Medicine under the guidance of Martin Lock.

MONICA YALAMANCHILI, '09

Major: Biology
Hometown: Ann Arbor, Mich.

JEFF STEPHENS, '09

Major: Biology
Hometown: Grosse Pointe, Mich.

KELYN CARLSON, '10

Major: Biology
Hometown: Grand Rapids, Mich.

Parasitism and Stress Levels in Populations of Green Frog, *Rana clamitans*, in Western Michigan, USA

Faculty Sponsor: Dean McCurdy

Yalamanchili

Carlson

Amphibian populations are in decline worldwide and face threats from emerging infectious diseases. In the Great Lakes region, viral, bacterial, and fungal pathogens have been identified and connected to mass mortality events in amphibian populations, although relationships between parasitism, environmental conditions, and stress levels in frogs remain unclear. Using non-lethal methods, we tested green frogs (*Rana clamitans*) for the presence of the virus *Ranavirus* and the opportunistic bacterium *Aeromonas hydrophila* at ponds in western Michigan. We also measured levels of the stress hormone corticosterone in plasma collected from frogs before and after the breeding season in 2008. Using

PCR detection methods, we failed to detect *Ranavirus* in tissue samples, but prevalence of *Aeromonas* on frogs was high (>90%) in three years of study (2005, 2007, 2008), and colony counts increased over the breeding season. As expected, males had higher levels of corticosterone (measured using EIA kits), and frogs in lower body condition also exhibited higher stress hormone levels, but corticosterone levels did not vary significantly over time. Unusually high prevalence of *Aeromonas* on green frogs (20x that recorded in prior studies) does not seem to be associated with mass mortality of frogs in the populations we studied.

Supported by: FURSCA-Orpha Leiter Irwin Research Fellowship in Pre-Medicine, Pierce Cedar Creek Institute

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MONICA YALAMANCHILI, '09

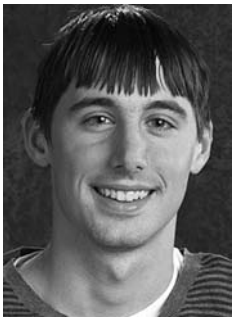
(See Genomics at Albion)

KEITH ZABEL, '09

Conscientiousness and Subjective Overachievement: A Facet-Level Analysis

Faculty Sponsor: Andrew Christopher

Major: Psychology
Hometown: Three Oaks, Mich.



We examined how different facets of subjective overachievement—self-doubt (SD) and concern with performance (CWP; Oleson et al., 2000)—were rooted in the six facets of conscientiousness (Costa & McCrae, 1992). High SDs worry that they do not have the ability to perform successfully at tasks they undertake. High CWPs feel a strong need to appear successful to others. Thus, high subjective overachievers have a strong desire to appear successful to others, but doubt they have the ability to make favorable impressions. Regarding more basic levels of human personality, individuals with high levels of conscientiousness tend to be diligent, purposeful, goal-oriented individuals. There are six facets of conscientiousness: competence, order, achievement striving, self-discipline, dutifulness, and deliberation.

To test our hypotheses that SD would be negatively predicted by the conscientiousness facet of competence and that CWP would be positively predicted by the conscientiousness facets of order and achievement striving, 307 individuals (153 men) completed an online survey. Respondents completed Costa and McCrae's (1992) 48-item conscientiousness scale and Oleson et al.'s (2000) 17-item subjective overachievement scale, as well as demographic information. Multiple regression analyses found SD to be predicted negatively by the conscientiousness facets of competence and self-discipline, but positively by deliberation. In addition, as hypothesized, CWP was predicted by the facets of order and achievement striving. 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 level (Paunonen et al., 2003).

Supported by: FURSCA

KEITH ZABEL, '09

Conservative Ideology and Well-Being: The Mediating Role of the Proactive Personality

Faculty Sponsor: Andrew Christopher

Major: Psychology
Hometown: Three Oaks, Mich.

Why are conservatives happy individuals? Previous research has found a positive relationship between political conservatism and measures of well-being (Napier & Jost, 2008). However, this research has neglected to examine the multidimensional nature of conservative ideology and well-being, and any mediating role that personality plays in this relationship.

To test our hypothesis that the belief in a just world (BJW) – positive affect (PA) relationship would be mediated by proactive personality (PP), 130 college students (88 women) from a small Midwest university completed a survey including Bateman and Crant's (1993) 17-item PP scale, Rubin and Peplau's (1975) 20-item BJW scale, Pratto et al.'s (1994) 16-item social dominance orientation (SDO) scale, Zakrisson's (2005) 15-item right-wing authoritarianism (RWA) scale, and Watson et al.'s (1988) 10-item PA scale and 10-item negative affect (NA) scale. Multiple regression and meditational analyses revealed the relationship between BJW and PA was mediated by PP. SDO was not related to PP or well-being, and RWA was not related to PP. One possible explanation for these findings is that BJW is focused on individuals believing that they control their environment and should be proactive, whereas SDO and RWA are group-level ideologies in which individuals can do nothing to change their environment.

Results supported previous research that found a positive relationship between political conservatism and SWB. The importance of studying the multidimensional nature of both conservative ideology and well-being is discussed as well as the mediating role that personality can play in the relationship between conservative ideology and well-being.

Supported by: FURSCA

KEVIN ZABEL, '09

Age and Financial Risk-Taking: Mediating and Moderating Roles of Sensation Seeking and Materialism

Faculty Sponsor: Andrew Christopher

Majors: Psychology, Economics and Management
Hometown: Three Oaks, Mich.

Much research has established an inverse relationship between age and financial risk-taking tendencies. However, less is known about the potential mediating and moderating mechanisms of this relationship. A mediator is a variable that affects a relationship among all levels of a predictor variable (age), whereas a moderator affects a relationship at only one particular level of a predictor variable. My research examined sensation seeking (a positive reaction to or desire for stimulating, exciting, and novel kinds of experiences) and materialism (value a consumer places on the acquisition and possession of material objects) as potential mediators and moderators of the established age and financial risk-taking relationship.

A total of 299 participants completed measures of investment risk-taking, sensation seeking, materialism, and demographic information. Hierarchical multiple regression analyses revealed that age initially accounted for significant variability (4.1%) in financial risk-taking. A Sobel Test revealed that sensation seeking completely mediated the relationship between age and financial risk-taking, as age now accounted for significantly less variability (0.8%, $z = -2.35$, $p = .019$). In comparison, a Sobel Test revealed that materialism had no meditational effect regarding the age and financial risk-taking relationship, as age accounted for less, but not significantly less, variability (1.9%, $z = -1.93$, $p = .054$). No moderational effects of sensation seeking or materialism on the relationship between age and risk-taking were found. Results suggest sensation seeking's role as a mediator in a host of other risk-taking contexts, and limit the extent of materialism's role as a mediator in other risk-taking contexts.

Supported by: FURSCA

MATTHEW ZABOROWICZ, '11

(See Thomas Freeman, '09, Matthew Zaborowicz, '11)

ANGELA ZITO, '09

"To Wind That Cradles Birds": An Exploration of Sonnet Structure and Voice

Faculty Sponsor: Helena Mesa

Major: English (Creative Writing)
Hometown: Rochester Hills, Mich.

The sonnet is among the oldest and most frequently revived of poetic forms. As such, it has demonstrated over the centuries an impressive capacity to both adhere to its traditional structure and to demonstrate a remarkable degree of mutability. Sonnets have taken on a number shapes (i.e., the curtal, the caudated) and functions (confessional single sonnets, exploratory crowns, narrative sequences, etc.) while continually demonstrating the influence of their traditional form.

In taking on this project, I endeavored to explore the various facets of this surprisingly versatile poetic form through my own writing. Not only did I gain a deeper understanding of how the sonnet moves despite its confined space and how that confined space condenses and concretizes the ideas within its movement, but I also learned how it is that *I* move and express ideas in the small room of the sonnet. The limitations imposed by the sonnet's form forced me to experiment with diction and syntax while allowing me the space to practice different leaps and turns within that evolving language. I also gained a sense of self-consciousness as a poet by learning to anticipate and take advantage of the reader's expectations of both the form and my own particular writing style. This evolution of form and personal style saturates the entire portfolio, but is perhaps most observable in my sequence concerning the ongoing conflict in East Africa, "To Wind That Cradles Birds," from which this project takes its title.

ANGELA ZITO, '09

Rochester vs. Dryden: A Case Study Examining the Development of the Pedagogical Anthology of English Literature

Faculty Sponsor: Charles Crupi

Major: English (Creative Writing)
Hometown: Rochester Hills, Mich.

A semester-long independent research project at the Newberry Library in Chicago on the exclusion of the works of John Wilmot, Earl of Rochester, from the canon of English literature led to this study of those generators and modifiers of the English canon: literary anthologies. Those anthologies used in the classroom seemed to be particularly interesting because of my own (and most college students') interaction with them and because of their very structure which inculcates a particular sense of what is significant, or so-called "great," literature. The central text to this project is the eighth edition of the *Norton Anthology of English Literature*, about which I make observations and ask questions concerning its content and editorial practices. Its sub-section titled "The Restoration and the Eighteenth Century" receives the most attention, as it offers the case study exploring the legacy of pedagogical tradition in the English classroom and its effects on the modern anthology. The works of John Dryden outnumber those of the Earl of Rochester three to one, a discrepancy that belies the once toe-to-toe opposition between these two poets and their works. By illustrating the animated literary culture of the Restoration *not* portrayed in the Norton, and by tracing the development of the pedagogical anthology of English literature from the earliest English classrooms through the twentieth century, this study attempts to explain why the Norton, and all anthologies, are susceptible to inevitable misrepresentation—like that concerning Dryden and Rochester.

Participants in the Albion-ESCIA Student Entrepreneurial Exchange (left to right): Pat McCombs, Juliette Ismail, Dany Veloso-Goncalves, Matt Makin, Natalie Mikkola, Brittany Wiese, Johannes Weber.

ALBION/ESCIA STUDENT ENTREPRENEURIAL EXCHANGE

JULIETTE ISMAIL (ESCIA)
Major: Accounting and Finance
Hometown: Marseille, France

MATT MAKIN, '11
Major: Economics and Management
Hometown: Rochester Hills, Mich.

PAT MCCOMBS, '11
Major: International Studies
Hometown: Cleveland, Ohio

NATALIE MIKKOLA, '11
Major: Economics and Management
Hometown: Clinton Twp., Mich.

DANY VELOSO-GONCALVES (ESCIA)
Major: Accounting and Finance
Hometown: Cergy, France

JOHANNES WEBER (ESCIA)
Major: Accounting and Finance
Hometown: Gaienhoffen, Germany

BRITTANY WIESE, '09
Major: Economics and Management
Hometown: Oakland Twp., Mich.

Faculty Sponsors: Michael Frandsen and Thierry Etchebarne (ESCIA)

ESCIA/Albion Plan for a Franco-American Business: "The Crêpe Connection"

At the Student Entrepreneurial Exchange (SEE) Seminar held in Pontoise, France from February 22-28, 2009, undergraduate students from colleges and universities in France, Austria, Croatia, Hungary, and the United States came together to develop international business plans. At the seminar, which was conducted in English, each visiting group was matched with counterparts from the host institution, ESCIA, and challenged to develop a plan. The only guideline was that the concept needed to incorporate the cultures of the two countries present in a group, for us the United States and France. Working to take advantage of their diverse skill sets, the four Albion and three ESCIA students focused on food and developed a plan for "The Crêpe Connection," a business that would be located in Kalamazoo.

Following the seminar, work continued on the plan via e-mail and videoconference so that it could be presented here. The students further developed the product concept identified at the seminar, completed internal capabilities and external environmental analyses, completed market research and developed a marketing plan, and developed a financial plan for the business. The Albion students and their counterparts from ESCIA will present a plan that will demonstrate that The Crêpe Connection could be "the best way to end your night" and a promising business venture.

Supported by: Gerstacker Institute, ESCIA, other SEE partners

SEE (Student Entrepreneurial Exchange): An International Partnership between Albion College, ESCIA (France), and Other Schools from around the Globe

The SEE partnership, started in 2008 by founding institution ESCIA, brings together students from around the globe for the development of business plans and cultural exchange. At SEE seminars held at ESCIA in Pontoise, France each of the last two springs, students have come together to create international and intercultural business plans. Teams are comprised of ESCIA students and their international guests. After a week in France, work continues on the plans "at distance" using e-mail, videoconferencing, and other means until the French pay a visit to their counterparts to put the final touches on the plan and to make a final presentation. SEE, a name coined by the students participating in the first seminar, is driven by values those students identified and defined: discover, create, share, and empower. The partnership provides a unique opportunity to grow as an individual, a student, and as an entrepreneur. The most valuable thing about SEE is the opportunity to experience cultural differences from different corners of the globe, and to make friends that will be kept for a long time. The goal of the partners is to expand to include more schools from more regions around the world. Albion may host a SEE seminar, perhaps as early as 2010.

Supported by: Gerstacker Institute, ESCIA, other SEE partners

GENOMICS AT ALBION

LAUREN BECK, '11
Major: Psychology
Hometown: Houston, Texas

CHRISTOPHER BLUNDEN, '09
Major: Biology
Hometown: Grosse Pointe, Mich.

NICOLE CLARK, '10
Major: Biology
Hometown: Rockford, Mich.

ANDREW DRAKE, '09
Major: Biology
Hometown: Dearborn, Mich.

MOLLY ESTILL, '09
Majors: French, Biology
Hometown: Romeo, Mich.

JONATHAN FOUST, '11
Major: Biology
Hometown: Hillsdale, Mich.

JONATHAN HECKMAN, '09
Major: Biology
Hometown: Lake Orion, Mich.

DONTAE JACOBS, '09
Major: Biology
Hometown: Nassau, Bahamas

DANA KOENIG, '11
Major: Biology
Hometown: Midland, Mich.

JENNIFER LAMMERS, '10
Major: Biology
Hometown: Romulus, Mich.

KARL SMITH, '09
Major: Biology
Hometown: Lincoln Park, Mich.

MELISSA TACHE, '09
Major: Biology
Hometown: Holly, Mich.

MONICA YALAMANCHILI, '09
Major: Biology
Hometown: Ann Arbor, Mich.

Faculty Sponsor: Ken Saville

The Genomics Class (left to right): Monica Yalamanchili, Melissa Tache, Jon Heckman, Andrew Drake, Nicki Clark, Chris Blunden, Jen Lammers, Ken Saville, Karl Smith, Dana Koenig, Lauren Beck, Jon Foust, Dontae Jacobs.

Comparative Genomics in *Drosophila*

A genome is the total amount of DNA information contained within a cell. The relatively recent advent of genome sequencing technology has opened up new opportunities to understand how genomes are organized and how this organization evolves. To bring the field of genomics to undergraduates a partnership called the Genomics Education Partnership, centered at Washington University in St. Louis, has been formed by Sarah Elgin of Washington University. The goal of this partnership is to develop a 'distributed research project' wherein undergraduates from around the country collaborate in solving genomics-based research problems. The overall project is to compare the total sequence of a specialized chromosome from several species of *Drosophila*. The project is divided into two parts: 'Finishing' and 'Annotation'. In the Finishing component, students analyze the quality of sequence data and recommend areas of the DNA sequence that require new data to be complete. Once the sequence is complete, students annotate the position of genes and other genetic features in the genome. In collaboration with this partnership, we as a class worked on 'finishing' approximately 250,000 base pairs of DNA sequence derived from the Hawaiian fruit fly: *Drosophila grimshawi*, and annotated several 40,000 base pair regions of sequences from *Drosophila erecta* and *Drosophila mojavensis*. A summary of the research results will be presented.

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

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 currently serves as executive director of the Gerald R. Ford Foundation in Grand Rapids. Before joining the foundation, he was senior vice president and director of risk management for Mercantile Bank in Grand Rapids.

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)
James P. Beck, '97 (2008)

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)
Carl Hiaasen (2008)

THE 2009 ISAAC STUDENT RESEARCH SYMPOSIUM COMMITTEE

Craig Bieler (Chemistry)
Sarah Briggs (Communications Office)
Jeffrey Carrier (Biology)
Gene Cline (Philosophy/Brown Honors Institute)
Chelsea Denault, '12
Lisa Lewis (Chemistry/Academic Affairs)
Anne McCauley (Art and Art History)
Dean McCurdy (Biology/Brown Honors Institute)
Ryan Stowe, '10
Michael Van Houten (Stockwell-Mudd Library)

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.