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THE FOURTEENTH ANNUAL ELKIN R. ISAAC RESEARCH SYMPOSIUM

ALBION COLLEGE

APRIL 23-24, 2003

SCHEDULE OF EVENTS

Wednesday, April 23, 2003

7:30 p.m.

The Elkin R. Isaac Lecture: Denise Cortis Park, '73
"The Aging Mind"

Welcome: President Peter T. Mitchell, '67
Opening Remarks: Thomas G. Schwaderer, '56
Speaker Introduction: Michael D. Anes
Bobbitt Visual Arts Center Auditorium

8:30 p.m.

Reception
Bobbitt Visual Arts Center Lobby

Thursday, April 24, 2003

8:30-10:00 a.m.

Symposium Platform Presentations
Refreshments will be served at each location listed below.
See also detailed schedule of presentations on pages 3-5.

Forum #1
Norris Center 101

Forum #2
Norris Center 109

Forum #3
Norris Center 103

Forum #4
Bobbitt Visual Arts Center Auditorium

10:30 a.m.-Noon

Honors Convocation
Goodrich Chapel

1:15-3:15 p.m.

Symposium Platform Presentations
See locations listed for morning session.
Refreshments will be served at each location.

3:00-4:30 p.m.

Symposium Poster Presentations
Gerstacker Commons, Kellogg Center

7:00 p.m.

Symposium Keynote Address: Salman Rushdie
"Step Across This Line"

Welcome: President Peter T. Mitchell
Conferral of Honorary Degree: President Mitchell and James K. Diedrick
Speaker Introduction: Samata Singhi, '03
Goodrich Chapel
Mr. Rushdie will be available for a book-signing on the Goodrich Chapel stage, immediately following this program.

THE ELKIN R. ISAAC LECTURE

Denise Cortis Park, '73

Denise Park is currently a professor of psychology at the University of Illinois at Urbana-Champaign (UIUC) and a faculty member in UIUC's Beckman Biological Intelligence Group. She is also director of a Roybal Center for Applied Cognitive Research on Aging.

Her primary research interest is in understanding the effects of age-related changes in memory function, on both the individual and the collective levels. Park utilizes neuroimaging and behavioral studies to evaluate picture memory and imagery formation abilities in individuals. With these studies, she is working to "map" the changing neural circuitry associated with the brain's encoding and retrieval processes. At the collective level, Park's research examines the implications of aging in society. Using cross-cultural research studies in Asian and Western cultures, she has focused on cultural differences in basic memory processes and how these processes are affected by aging.

Since 1981, Park has been the principal investigator for research initiatives funded by the National Institute on Aging, the Arthritis Foundation, the National Institute of Arthritis and Musculoskeletal Diseases, and the AARP Andrus Foundation. The author of numerous articles in professional journals, she has also been quoted widely in the media, including *The New York Times*, *The Washington Post*, *USA Today*, *Time*, and AARP's *Modern Maturity*, and her research has been featured on PBS.

Before moving to UIUC in 2002, Park was a professor of psychology and senior research scientist at the University of Michigan. After earning her Ph.D. from the State University of New York at Albany in 1977, she had faculty appointments at the University of North Carolina at Charlotte and the University of Georgia before joining the University of Michigan faculty in 1995.

Park has held numerous leadership positions in professional organizations, and among her many awards she received a 2002 American Psychological Association Distinguished Contribution Award to the Psychology of Aging and a 1997 Albion College Distinguished Alumni Award. She was recently named a fellow of the American Association for the Advancement of Science.



SYMPOSIUM KEYNOTE ADDRESS

Salman Rushdie

With a keen sense of humor and a unique style of blending Western classical studies, Indian history, and pop culture, Salman Rushdie has delighted, enraged, and fascinated readers worldwide during his nearly 30-year writing career.

A native of Bombay, India, Rushdie is a second-generation Cambridge University graduate and the grandson of an Urdu poet. His first novel, *Grimus*, was published in 1975.

In 1981, Rushdie's critically acclaimed second novel, *Midnight's Children*, won the Booker Prize, Britain's top literary award. Seven years later Rushdie's fourth novel, *The Satanic Verses*, won the Whitbread Award and unleashed an international furor. In response to the novel's criticism of fundamentalist Islam, Iran's Ayatollah Khomeini issued a *fatwa*, or religious edict, condemning Rushdie to death. Rushdie was forced into hiding for nearly 10 years, but nonetheless published two well-received novels, including *The Moor's Last Sigh* in 1995. He also wrote a number of essays on intellectual freedom during this period, and has continued to articulate his strong views on the subject since then. The government of Iran lifted the *fatwa* in 1998.

In addition to his eight novels, Rushdie has published several books of collected stories and essays, and his fiction and nonfiction have been included in numerous anthologies. His writings have been translated into more than 30 languages. Rushdie's latest book, *Step Across This Line*, will be the subject of his Albion presentation. A collection of his journalistic writings from 1992-2002, the book centers on themes of religion, culture, and politics in an age of rapid modernization.

Rushdie has lectured at many prestigious educational institutions, including a March 2003 visit to the University of Michigan during the North American premiere of a Royal Shakespeare Company stage adaptation of *Midnight's Children*. He is also an honorary professor of the humanities at the Massachusetts Institute of Technology. Rushdie holds an M.A. from King's College, Cambridge.

He currently lives in London and New York.



STUDENT PRESENTATION SCHEDULE – Thursday, April 24, 2003

FORUM #1 – Norris 101

8:30	Alex Case (Sacks)	Blood, Brains, and Brawn: College Football in the Industrial Era
8:45	Travis Boyd (Christopher/Moss)	Predictive Factors of Athlete Burnout: An Analysis of Division III College Student-Athletes
9:00	Kristen Abraham (Christopher)	Conflict Resolution in Interpersonal Relationships: The Roles of Sex and Sexism
9:15	Elizabeth Haas (Christopher)	Interpersonal and Professional Consequences of Narcissistic and Avoidant Personality Disorders
9:30	Leonard Noel (Christopher)	Materialism and Psychological Well-Being: The Mediating Role of Religiosity
9:45	Dana Lobelle (Keyes)	Female Self-Description as Related to Self-Identification as a Feminist
1:15	Lillian Sacks (Walter)	An Examination of Young Mothers' Parenting Skills: The Role of Social Support and Parenting Stress
1:30	Tara Springer (Walter)	Preschool Parental Satisfaction and Its Relation to Parental Stress Levels, Involvement, and Social and Emotional Functioning
1:45	Emily Dobbins (Mull)	Children's Perceptions of Inter-Parental Conflict
2:00	Nicole Clouthier (Schippers)	Gender, Families, and the Work of Kinship
2:15	Sarah DiPonio (Walter)	The Value of Pets in the Lives of Children
2:30	Hannon Hogan (Keyes)	The Effects of Activity Level on Children's Positive and Negative Affect and Overall Well-Being
2:45	Brooke Reich (Keyes)	Acne in Relation to Stress, Self-Esteem, Body Image, and Depression in Isotretinoin Therapy
3:00	Emily Williams (Keyes)	Dental Anxiety: Dental Patients' Physiological and Psychological Responses to a Specific Procedure

FORUM #2 – Norris 109

8:30	Rose-Anne Meissner (Harris)	Memory's Puzzle: Probing the Structure of the NMDA Receptor in the Brain
8:45	Wynne Dawley (Wilson)	The Effect of Piracetam on Working and Reference Memory in a Delayed Non-Matching to Sample Task
9:00	Courtney Hancock (Wilson)	The Effect of Electrolytic Lesions of the Nucleus Basalis and Medial Septum on Working Memory in Rats
9:15	Lauren Hecht (Anes)	Does a Simple Shading Manipulation Lead to Size Overestimation in 3-D Volumes?
9:30	Sarah Storbeck (Anes)	The Representation of Rotational Motion
9:45	Laurie Vance (Terstriep)	The Social Benefits and Implications of the Cochlear Implant and Its Effects on the Deaf Community

(continued on next page)

1:15	Derek Burkholder, Taki Johnson (McCurdy)	Macroinvertebrate Communities and Ecosystem Health: The Rice Creek Interdisciplinary Project
1:30	Anjali Arora (Green)	Investigation of the Holding Time Limits of a Number of Semi-Volatile Organic Compounds
1:45	Brooke Larche (Gaswick)	Diesel Power Sacrificed for Cleaner Air
2:00	Sarah Cooper (Hendrix)	Coordinating Community Resources to Improve Student and Family Success
2:15	Teresa Liedtke (Melothe)	A Glimpse at Education in Ecuador: How I Learned a Little More About the World
2:30	Rebecca Miller (W. Rose)	Immigration in the European Union: Is There a 'Fortress Europe'?
2:45	Cortney Schaffer (Chambers)	"Home Alive in '45": The G.I. Bill of Rights and Albion College
3:00	Joshua Cecil (W. Rose)	Border Security along the Northern Border of the United States of America after the Terrorist Attacks on September 11, 2001

FORUM #3 – Norris 103

8:30	Elizabeth Mettler (Kennedy/White)	An Amino Acid Profile of Wild Bird-Dispersed Fruits in Michigan
8:45	Michelle Aleo (White)	Two-Part Songs in House Wrens: Responses to Introductory and Terminal Song Portions in Field Playback Experiments
9:00	Amanda Kent (Kennedy)	Examination of Methods to Increase DNA Yield from Feathers to Determine Sex Ratios of Nestling House Wrens (<i>Troglodytes aedon</i>)
9:15	Sean Logan (McCurdy)	Do Fish Prefer Male Prey? Impacts of Fish Foraging on the Marine Amphipod <i>Corophium volutator</i> (Pallas)
9:30	Michael Marvin (Rohlman)	Structural Analysis of the <i>Anabaena</i> Group I Intron: Thermodynamic Characterization
9:45	Adam Herrman, Michelle Steber (Erbeznik)	The Isolation and Characterization of Genes Encoding for an ABC-Type Transporter in <i>Thermoanaerobacter ethanolicus</i>
1:15	Crystal Ingison (French)	Hypervalent Iodine in Organic Chemistry: Research Adventures from Albion to Wales
1:30	Kimberly Illg (Green)	Photodegradation of CCl ₄ with Modified TiO ₂
1:45	Joshua Menig (Harris)	Oxidation of Trialkylboranes Using Potassium Permanganate
2:00	Rick Straughen (Reimann)	Simple Program Generation for Tutoring Novice Computer Science Students
2:15	Matthew Linden (Reimann)	A Design Document for the Construction of an Interactive Entertainment Experience Entitled "Paradox"
2:30	David Friday (Ludington)	Radio-Analytical Determination of Potassium
2:45	Jennifer Tobin (Moreau)	Designing a LabVIEW Program to Determine the Electrical Properties of Four New Superconducting Materials
3:00	William Green (Seely)	The Construction of a Charge-Separation and Detection System for a Photodetachment Spectrometer

FORUM #4 – Bobbitt Visual Arts Center Auditorium

8:30	Alexis Snyder (Young)	<i>Carousel</i> : Gender and Stereotypes in American Musical Theatre
8:45	Jason Kennedy (Starko)	Cosos: The Creation of an Original Musical
9:00	Laura Kraly (Oosting)	Western Attitudes toward Kabuki Theatre
9:15	Angela Lang (Crupi)	Struggling with Women in Shakespeare's Early Works
9:30	Susan Dudley (Oosting)	Shakespeare's <i>King Lear</i> in Transition: Culture or Practicality?
9:45	Barbara Grabas (Levine)	Polish Politics through Polish Film
1:15	David DiVincenzo (Wickre)	Art and Desire in the Photography of Duane Michals
1:30	Alyssa Russell (Wickre)	Inspired Creations: The Art of the Navajo Rug
1:45	Amber Buck (Murphy)	Twinnings: A Collection of Poetry
2:00	Susan O'Connor (Murphy)	My Umbrella: A Collection of Writing and Original Artwork Inspired by a Year in Ireland
2:15	Amie Haffner (Moret)	La Malinche: Mexican Mythology Lends Itself to Ambiguity in Gender, Race, and Ethnicity
2:30	Karin Heffel (Crupi)	Orwell and Spirituality
2:45	Sean Nelb (Davis)	Creationism's Blunt Wedge: Evolution and the Failure of Intelligent Design
3:00	Julie Esh (Ariza)	Photographs and Writings by Middle School Girls

POSTER PRESENTATIONS – Gerstacker Commons, Kellogg Center, 3:00-4:30 p.m.

Tammy Calvin (Kennedy)	Patterns of Songs Used in Short-Range Mate Communication of House Wrens (<i>Troglodytes aedon</i>)
Amy Copenhaver (Schmitter)	The Identification of Primary Producers Inhabiting Rice Creek
Elizabeth Duvall (French)	Reaction Chemistry of Chiral Titanium Complexes
Edward Epp (T. Lincoln)	Textural and Chemical Analysis of Sheared Quartzite from the Black Hills, South Dakota
Brianna Granlund (Green)	Low-Level Phosphorus Detection for the Rice Creek Watershed
Kathryn Hilovsky (Bartels)	Morphology, Variation, and Systematics of Eocene Dermatemydid Turtles
Daniel Holland (Steffenson)	A Study of the Degradation of High-Performance Polyimide Foams
Kirstin Leiby (Otto)	The Problem of Social Desirability: The Effects of Race, Gender, and Skill Level on Candidate Evaluation
Jeremiah Morse (T. Lincoln/Wilch)	Hydrology of a Small, Rural Watershed in South-Central Michigan: Monitoring Stream Flow, Turbidity, and Temperature
Katherine Niesen, Rebecca Puszcz (Kennedy)	Geographic Variation in Songs of House Wrens in Michigan
Nathaniel Sowa (Kennedy)	Changes in RpoS Levels of <i>Pseudomonas aeruginosa</i> in Response to Environmental Stress
Craig Streu (French)	Progress toward the Synthesis of an Aliphatic Hypervalent Iodine Reagent
Erin Toth (Rohlman)	Structural Analysis of the <i>Anabaena</i> Group I Intron Sub-Domains

ABSTRACTS OF STUDENT PRESENTATIONS**KRISTEN ABRAHAM, '03****Conflict Resolution in Interpersonal Relationships: The Roles of Sex and Sexism**

Faculty Sponsor: Andrew Christopher

Major: Psychology
Hometown: Berkley, Mich.

One's sex (e.g., Billingham et al., 1999) and individual differences (Jensen-Campbell and Graziano, 2001) are known to relate to interpersonal conflict resolution. This study

examined whether sexism played a role in conflict resolution. Glick and Fiske's (1996) Ambivalent Sexism Inventory (ASI) categorizes respondents as one of four types of sexists: hostile, benevolent, ambivalent, or nonsexist. It was hypothesized that the type of sexism one exhibits would relate to the type of conflict resolution chosen.

Undergraduates (N = 53) read three vignettes depicting a conflict about a lack of time spent with a romantic partner, a best friend of the same sex, and a best friend of the opposite sex. Participants rated their likelihood of using Sternberg and Dobson's (1987) four styles of conflict resolution. A 3 (target in conflict with participant) x 4 (sexist type) x 2 (participant sex) MANOVA, with four conflict resolution strategies as dependent measures, revealed nonsexists are least likely to use active intensifying strategies in comparison with other strategies, and hostile sexists are more likely than other types of sexists to use active intensifying strategies. Strategic trends in resolution were similar for all targets, except participants were more likely to choose active mitigating strategies and less likely to choose passive mitigating strategies when in a conflict with a romantic partner as compared to when in a conflict with a friend of either sex. Discussion centers on why sexism is related to conflict resolution and why resolution style varies with the person with whom one is in conflict.

*Supported by: FURSCA***MICHELLE ALEO, '04****Two-Part Songs in House Wrens: Responses to Introductory and Terminal Song Portions in Field Playback Experiments**

Faculty Sponsor: Douglas White

Major: Biology
Hometown: Chesterfield, Mich.

Songs of male house wrens (*Troglodytes aedon*) have two parts, an introduction featuring a broad range of low-amplitude syllables that may attract mates and a terminal section of high-amplitude

trills that may be used in long-distance territorial defense. To explore how birds use song to communicate, I tested the hypothesis that territorial males will respond differently to the two parts of the song. I created playback tapes as a stimulus to get males to respond vocally and behaviorally. These tapes separately featured the introduction, the terminal section, and the whole song of stranger wrens in random order.

Last summer in the Whitehouse Nature Center, I exposed male wrens at different times of the breeding season to these experimental songs, and observed and videotaped their behavior and vocal responses. I predicted (1) that playbacks of introductions would spur mate competition and increase singing rate and song complexity, and (2) that playbacks of terminal sections would spur defensive behaviors including aggression directed at the tape player. Males responded strongly to playback tapes, both vocally and aggressively. Contrary to expectation, however, singing rate and orientation to the tape player did not vary significantly among playback segments or seasonally. Lengths of introductory and terminal sections of response songs were analyzed spectrographically using Avisoft SASLab-Pro to test for more subtle changes in song structure.

*Supported by: FURSCA-Hyde Fellowship***ANJALI ARORA, '04****Investigation of the Holding Time Limits of a Number of Semi-Volatile Organic Compounds**

Faculty Sponsor: David Green

Major: Chemistry
Hometown: Saginaw, Mich.

The Environmental Protection Agency has set the holding time limits of semi-volatile organic compounds at fourteen days. This study is an examination of the changes in concentration of seven representa-

tive organic compounds. It was hypothesized that degradation, if measurable within the holding time limit, would be most easily observed at the beginning of the holding time. Overall, good separation of compounds was observed via GC/MS, and working calibration curves were created.

Concentrations of some representative compounds changed in a preliminary ten-day holding time experiment. Overall, some degradation was evident within the first ten days for a number of compounds. A few compounds are more stable than others, suggested by more horizontal slopes. More extensive study is necessary to support these preliminary conclusions.

Supported by: FURSCA-Hyde Fellowship

TRAVIS BOYD, '03

Predictive Factors of Athlete Burnout: An Analysis of Division III College Student-Athletes

Faculty Sponsors: Andrew Christopher and Robert Moss

Major: Psychology
Hometown: Saginaw, Mich.



Although previous research has examined correlates of burnout in college student-athletes, such investigations (e.g., Vealey et al., 1998) have tended to focus on Division I and Division II

student-athletes. This study examined coping strategies and different elements of sports commitment as predictors of burnout in Division III student-athletes. Furthermore, it used a new, apparently psychometrically sound measure of burnout (Raedeke and Smith, 2001) that operationalizes the three facets of burnout (i.e., reduced sense of personal accomplishment, emotional exhaustion, and depersonalization) generally accepted in the organizational psychology literature.

A total of 126 student-athletes representing eleven different men's and women's sports completed questionnaires that included the Raedeke and Smith (2001) 15-item measure of burnout in athletes. In addition, participants also completed measures of sports commitment and athlete coping styles.

We first ran four simultaneous-entry regressions using the five Scanlan et al. (1993) sports commitment subscales as well as the seven Smith et al. (1995) athletic coping styles as predictors of the Raedeke and Smith (2001) composite burnout scale and each of its three subscales. Results from the four regressions using coping styles revealed much consistency across the three burnout subscales, particularly the reduced sense of accomplishment and depersonalization subscales. Specifically, social constraints, a subscale from the sports commitment measure, were positively related to all three subscales and the composite scale. Furthermore, sport enjoyment, a part of the sport commitment scale, and confidence and

achievement motivation, a coping strategy, were both negatively related to the reduced sense of accomplishment and depersonalization subscales and the composite scale.

Supported by: FURSCA

AMBER BUCK, '03

Twinnings: A Collection of Poetry

Faculty Sponsor: Daryl Murphy

Major: English
Hometown: Freeland, Mich.



"Twinnings" is a collection of original poetry about the complexities of mother/daughter relationships. The short poems, between ten and sixty lines each, are written from the perspective of four

fictional characters—two mother/daughter pairs. Each poem functions as a snapshot that provides the reader with a glimpse into a specific moment of the character's life and relationship with her mother or her daughter. Together, the poems form a cohesive narrative exploring these women's experiences and the evolution of their relationships with each other. The collection focuses on Katie and her mother, Joyce, who each explore their memories of the past after a long estrangement to determine how their relationship fell apart. Jennifer, a past classmate of Katie, and her mother, Susan, support the main narrative with their memories of Katie and Joyce and their own experiences, adding a contrasting perspective on what it means to be a mother and a daughter.

Supported by: FURSCA

**DEREK BURKHOLDER, '04
TAKI JOHNSON, '04**

Macroinvertebrate Communities and Ecosystem Health: The Rice Creek Interdisciplinary Project

Faculty Sponsor: Dean McCurdy

Derek Burkholder
Major: Biology
Hometown: Mason, Mich.

Taki Johnson
Major: Biology
Hometown: Novi, Mich.



Burkholder



Johnson

Using EPA, GLEAS, and DEQ-SWQD (Michigan) protocols, we assessed the quality of macroinvertebrate communities in Rice Creek, Calhoun and Jackson Counties, Michigan. Based on previous macroinvertebrate and habitat assessments of the creek, we expected that the North Branch of the creek would have the healthiest benthic invertebrate communities because of abundant

vegetation along the streambank, little dredging, and fewer point sources of organic nutrients (sewage). However, we found that the South Branch of Rice Creek was healthier than the North Branch in many areas. Non-exclusive possibilities to explain this include: reduced point-source pollution on the South Branch, and warmer waters on the North Branch associated with heating in lakes (warmer waters are lower in dissolved oxygen and provide poorer habitat for many invertebrates). Further, dredging on the South Branch may have ultimately increased habitat quality for some invertebrates by allowing for cooler ground water to enter

into the stream. Overall, the health of the creek has improved since it was last monitored in 2001.

Supported by: FURSCA, Institute for the Study of the Environment, Environmental Protection Agency Federal 319 Grant

TAMMY CALVIN, '03

Patterns of Songs Used in Short-Range Mate Communication of House Wrens (*Troglodytes aedon*)

Faculty Sponsor: E. Dale Kennedy

Major: Biology
Hometown: Sears, Mich.



Many studies have examined the functions of song in mate attraction and territorial acquisition and defense, but relatively few studies have looked at aspects of song in short-range mate

communication. I examined whether songs given by a male house wren while a female was present at the nest differed from those sung while she was absent from the nest. I recorded songs of 18 colorbanded males at different times during the breeding season: while unpaired, during the incubation period, and on days two, six, and ten of the nestling period. Recordings during incubation and nestling periods were made with a videorecorder.

From the videos, I examined male singing behavior with respect to female behavior (entering or exiting a nest box). Songs were analyzed using Avisoft SASLab Pro. No differences were found in elements used in songs given when the female was present at the nest versus when the female was absent. Songs sung to the female during incubation and the nestling period were shorter than those sung when unmated. During all stages examined, fewer songs were sung while the female was out of the nest box than when she was in the nest box. Fewer songs per minute were sung as the nestlings aged. During the incubation period, 10 of 12 males sang more short songs

(introductions of less than one second) when the female was present at the nest than when she was absent ($X^2 = 26.12$, $df = 1$, $p < 0.01$).

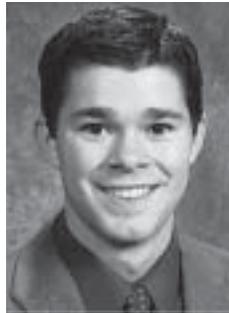
Supported by: FURSCA-Kresge Fellowship

ALEX CASE, '03

Blood, Brains, and Brawn: College Football in the Industrial Era

Faculty Sponsor: Marcy Sacks

Majors: History, English
Hometown: Union City, Mich.



It was no coincidence that college football rapidly gained popularity in the U.S. at the turn of the twentieth century. The industrialization of the nation not only changed the structure of the economy, but

also challenged the prevailing concepts of masculinity. The Self-Made Man of the Civil War era found himself lost among the regulations and machines of emerging industries. Working class men faced monotonous, unsatisfying work experiences, only to return to a home controlled by women, who made the day-to-day decisions in their absence. Middle class men found themselves relegated to desk jobs, a physically unfulfilling activity which threatened their idea of manliness. Theodore Roosevelt constantly questioned the manliness of this generation of men as he sought to construct the superior American race.

Using the new concepts of leisure time and disposable income made possible by the clock-like regulation of the workday, men began to seek out sports as a way to exercise and energize their masculinity. While working class men played professional sports such as baseball, middle and elite class men who attended college participated in the amateur sports of football and basketball. Football emerged as a metaphor for war; coaches and players referred to the game as "the field of battle," and good generalship became a must for competent captains and coaches. Injuries threatened the game in the early twentieth century, but President Roosevelt's insistence secured a place for the game in America and paved the way for the National Collegiate Athletic Association.

JOSHUA CECIL, '03

Border Security along the Northern Border of the United States of America after the Terrorist Attacks on September 11, 2001

Faculty Sponsor: William Rose

Major: Political Science
Hometown: Wayne, Mich.



After the terrorist attacks against the United States of America on September 11, 2001, there was a powerful public outcry for strong measures to be taken by the federal government in order to

protect Americans from future terrorist attacks. The U.S. Congress responded and soon after the attacks passed the USA Patriot Act of 2001. A portion of this legislation was aimed at strengthening border security along the northern border of the United States. The public seemed to be appeased; however, the Congress was not finished. One year later the U.S. Congress passed the Enhanced Border Security and Visa Entry Reform Act. This legislation had as its primary goal the heightening of border security along both the southern and northern borders.

The question that this paper addresses is whether or not the USA Patriot Act of 2001 and the Enhanced Border Security and Visa Entry Reform Act did enough in and of themselves to effectively increase border security along the nation's northern border. This presentation will hopefully answer that question and prove that the USA Patriot Act of 2001 and the Enhanced Border Security and Visa Entry Reform Act of 2002 represent the first necessary steps in heightening the levels of security along America's northern border. However, in and of themselves they do not do enough to ensure that terrorists do not cross America's understaffed and under-patrolled northern border.

NICOLE CLOUTHIER, '03

Gender, Families, and the Work of Kinship

Faculty Sponsor: Mimi Schippers

Majors: Speech Communication, Anthropology
Hometown: Berkley, Mich.



The purpose of this study is to examine the division of labor in families in relation to the work of kinship and maintaining family ties. This labor is commonly called "kinwork."

Specifically, the research explores the effects of gender, family structure, and sexual orientation on the division of kinship labor. In addition, the researcher developed a new theoretical model for understanding influences on who in a family does kinwork, what kinwork activities they do, and why they do kinwork. The theory is called Kinwork Distribution Theory (KDT). KDT offers a framework for making connections among social hierarchies, family culture, and family communication and their influences on kinwork in families.

The researcher drew on empirical data from twenty-five surveys and six interviews to test KDT's usefulness in understanding kinwork and kinwork roles. The data suggest that gender, family structure, and sexual orientation may be important factors in forming kinwork roles. Furthermore, KDT seems to provide a useful framework for understanding how kinwork roles evolve.

Kinship is a fundamental aspect of human relationships. Thus, focusing research on the maintenance of these relationships is valuable from a social and academic perspective. KDT can provide a new lens to the study of kinship relationships and labor. While the scope of this study is limited, it does suggest some interesting patterns among variables that can be further explored in future research.

Supported by: FURSCA

SARAH COOPER, '03

Coordinating Community Resources to Improve Student and Family Success

Faculty Sponsor: Scott Hendrix

Major: English, Elementary Education Certification
Hometown: Grand Rapids, Mich.



My four-month mentorship role with a local, at-risk Caucasian thirteen-year-old female sparked my interest in national and local efforts to enhance student achievement and family cohesiveness. Due to

common factors like poverty, violent neighborhoods, and/or abusive homes, at-risk students like my mentee exhibit below-average academic performance and juvenile delinquency. Without additional support and social services, these students may struggle to become productive members of society.

Mentoring programs have the potential to help at-risk youth overpower self-defeating behaviors, but only if the programs are carefully orchestrated and thoroughly supported by the community. Typically, mentoring programs assume the parents recognize a need for additional support and require parents to enroll their children in order for them to receive the offered services. Yet, for students without strong parental support, like my mentee, the opportunities may never arise, leaving their academic, social, and emotional well-being for the schools and community to manage.

By means of scholarly readings, interviews, and Internet searches, I identified mentoring program best practices from national and regional mentoring programs. My conclusions were comparable to professional lists such as those published by Public/Private Ventures and the National Mentoring Partnership and provided guidelines for reflection of my own mentorship role.

In light of the complex problems and behaviors exhibited by many at-risk youth, there may be no guarantee that a mentoring program will provide the appropriate services

or reach those who need help the most. Thus, I searched for additional means to aid at-risk students like those in Albion, Mich. Consequently, I focused on two areas of exploration: (1) service integration organizations like Communities in Schools (CIS), which coordinates existing youth services and brokers new partnerships with local businesses, professionals, and volunteers, and (2) the opportunity to envision my own, ideal solution for at-risk students, a combination of my mentoring program best practices and features of the service integration model.

Supported by: FURSCA

AMY COPENHAVER, '03

The Identification of Primary Producers Inhabiting Rice Creek

Faculty Sponsor: Ruth Schmitter

Major: Biology
Hometown: Fenton, Mich.



Primary producers are the basis of food webs in most aquatic habitats. The purpose of my research was to collect and identify primary producers from Rice Creek, the first time that a focused study of

producers had been done there. I also estimated relative abundance of producer species with respect to each other and to the time during the summer.

Rice Creek water and sediments were sampled from four sites that are used by others in the Rice Creek Watershed Project. Two of the sites had received high nutrient inputs because of runoffs from surrounding fields. These "contaminated" sites were observed by others to become very turbid at times. Two other sites were sampled as "clean," control sites. One of them was part of the nearby Spring Brook watershed. I examined portions of each sample using a compound light microscope, making measurements of and notes about unknown organisms. In the beginning most of the organisms found were "unknown"! I used standard, dichotomous keys to freshwater algal genera and species to identify them. I also counted how many of each organism were present in a standard drop of water, which allowed me to calculate an estimate of

relative abundance for each organism at the different sites.

My results showed that, including cyanobacteria and algae, there were more than 50 species of primary producers living in Rice Creek during summer 2002. Diatoms made up the greatest number of organisms. At "clean" sites, diatoms and non-diatoms were present in about equal numbers of organisms. The relative proportion of the species that were diatoms, as well as the total numbers of diatoms, were greater at the contaminated sites. As the summer proceeded, the number of diatoms especially decreased drastically.

Supported by: FURSCA, Institute for the Study of the Environment

WYNNE DAWLEY, '03

The Effect of Piracetam on Working and Reference Memory in a Delayed Non-Matching to Sample Task

Faculty Sponsor: W. Jeffrey Wilson

Major: Psychology
Hometown: Alpena, Mich.



This study examined the drug piracetam, which is believed to have memory-enhancing properties. These effects were tested using a delayed non-matching to sample task in an elevated radial arm

maze. Female Sprague-Dawley rats were trained to complete the task, which included a one-hour delay during each session. Once a consistent performance level was attained, each rat received a low dose of piracetam (50 mg/kg), a high dose of piracetam (150 mg/kg), or a control injection of saline after the pre-delay segment of each session. The design of the study allows the effects of different doses of piracetam on working memory and reference memory to be examined separately.

Supported by: FURSCA-Metalonis Fellowship, Neuroscience Program

SARAH DIPONIO, '03

The Value of Pets in the Lives of Children

Faculty Sponsor: Jamie Walter

Majors: Psychology, Biology
Hometown: Morrice, Mich.



In many ways, pets influence healthy physical and emotional development in children. Previous research has shown that children learn about responsibility, attachment, comfort, and also death and grieving

through interactions with pets. The current study focused on the roles that pets play in children's feelings of loneliness and empathy, as well as how pets influence overall feelings of self-perception. Three measures were used to investigate these effects: the Loneliness and Social Dissatisfaction Questionnaire, the Empathy in Children Questionnaire, and the Self-Perception for Children Questionnaire. Seventh- and eighth-grade students from two small, Midwestern public schools were recruited to complete the questionnaires.

It was hypothesized that children who felt higher levels of loneliness at school would report a stronger bond with a family pet than would children who felt low levels of loneliness at school. In addition, it was hypothesized that children who felt high levels of loneliness would also report feeling less socially accepted than children without pets. Finally, it was hypothesized that children who reported a strong attachment to their pets would be more capable of empathizing with both children and animals in a variety of situations than would children without a strong bond to a pet. Results are discussed in terms of educating parents about the role pets can play in the lives of their children while also examining how introducing pets into school systems may benefit those children unable to interact with a pet at home.

Supported by: FURSCA

DAVID DIVINCENZO, '03

Art and Desire in the Photography of Duane Michals

Faculty Sponsor: Bille Wickre

Major: Art History
Hometown: Fraser, Mich.



Foucault describes a society that is defined by themes of imprisonment, control, punishment, and surveillance. Through mechanisms of power he also exposes a way by which people

police themselves, for fear of discovery and punishment. Within the context of AIDS, the ways by which the disease is made visible create "truths" around the disease, which are then used as labels that also make visible the individual's inner desires, depravity, deviance, and transgressive actions. I am interested in the ways in which desire is expressed and how it is "policed" within the images of contemporary photographer Duane Michals. Michals' body of work is an exploration of desires, sexuality, and identity within the context of the AIDS pandemic. The photographer's combinations of photography and text provide an arena in which to examine the presence and position of desire within visual and written forms.

EMILY DOBBINS, '03

Children's Perceptions of Inter-Parental Conflict

Faculty Sponsor: Melinda Mull

Majors: Psychology, Music Performance
Hometown: Albion, Mich.



Studies have suggested that witnessing inter-adult conflict can have a wide range of effects on children. These include significantly poorer verbal abilities, an increase in displays of aggressive

behavior, an increase in emotional problems such as depression, and lower levels of social competence (Huth-Bocks et al., 2001; Fantuzzo and Mohr, 1999). Most of these findings are based on information provided by adults (parents, teachers, shelter staff, etc.). Assessing children's perceptions can provide further insight that may be overlooked when researchers rely strictly on objective observational data or reports of others. The goal of this study was to examine differences in children's perceptions of inter-adult conflict as a result of non-traditional gender roles of the aggressor and presence or absence of children during the conflict.

Four scenarios depicting discussions between two adults including money issues and household responsibilities were read to middle school participants. After each story the participants responded to a series of questions about their perceptions of the characters in conflict. It is hypothesized that children will perceive the aggression of the mother as more negative than the aggression of the father because of a contradiction in gender stereotypes. It is also hypothesized that differences in perceptions of the conflict will be related to the gender of the students and the gender of the parents in the scenarios.

Supported by: FURSCA

SUSAN DUDLEY, '03

Shakespeare's *King Lear* in Transition: Culture or Practicality?

Faculty Sponsor: J. Thomas Oosting

Majors: Theatre, English
Hometown: Livonia, Mich.



Anyone who approaches Shakespeare's *King Lear* is faced with the immediate question of which text is the true text. The Quarto text of the play is significantly longer than the Folio text, and there is

enough internal revision to call the accuracy of both texts into question. The Revisionist camp argues that the Folio text is a revision by Shakespeare himself in order to form a better play, while those who disagree with the Revisionists point out that the changes could have been made by anyone, at any time, and for any number of reasons.

My take on the two-text problem is that the play may have been revised in order to make Edgar the lead character. The text supports this idea showing that not only is Edgar's part uncut, but also slightly heightened. There could have been many reasons for this change: the actor might have been a popular one, the audience could have simply demanded more from such a likable character, or the part could have been revised to show support for the new king. This last idea is the most compelling one. It has been suggested that Shakespeare wrote *Macbeth* for King James, and therefore it is plausible that he reworked *King Lear* for James as well. Edgar is a man who takes over for a deceased, well loved, and aged ruler; this parallels King James' succession to the throne after the death of Queen Elizabeth. The rewriting of any major work is an interesting topic of debate when it is so extensive and seemingly unexplained, but, by looking at what evidence there is, it is possible to piece together theories that may answer the many questions that arise.

ELIZABETH DUVALL, '03

Reaction Chemistry of Chiral Titanium Complexes

Faculty Sponsor: Andrew French

Major: Chemistry
Hometown: Burr Ridge, Ill.



The chiral ligand (H_2L , $i\text{-PrNHCH}(\text{CH}_2\text{C}_6\text{H}_3)\text{CH}_2\text{OH}$) was synthesized in a three-step procedure from L-phenylalanine. A modified procedure gives significantly higher yields of the material. The

free ligand reacts with $\text{CITi}(\text{NMe}_2)_3$ to produce the dimeric complex $[\text{TiLCl}(\text{NMe}_2)_2]_2$. This complex bridges through the amino alcohol oxygen atoms, and contains terminal chlorides. Two new titanium complexes were synthesized from the dimer: $[\text{TiL}(\text{NMe}_2)\text{Np}]_2$ and $[\text{TiLCl}(\text{OAr}')_2]$, $[\text{Np}=\text{CH}_2\text{CMe}_3]$; $\text{OAr}'=\text{O}-2,6\text{-i-PrC}_6\text{H}_3$. The reaction chemistry of these complexes with a variety of donor ligands will be reported. These donor ligands include: trimethylacetone, benzonitrile, phenyl isocyanate, and 4-(dimethylamino) pyridine (DMAP).

Supported by: National Science Foundation

EDWARD EPP, '03**Textural and Chemical Analysis of Sheared Quartzite from the Black Hills, South Dakota**

Faculty Sponsor: Timothy Lincoln

Major: Geology

Hometown: Alliance, Ohio



The goal of the study was to test a hypothesis for the mechanism of development of shear zones in Proterozoic quartzite, from the Black Hills, S.D., and to develop a sense of shear indicator for these

rocks. A textural study was undertaken to determine whether asymmetric shapes of muscovite grains within the shear zones could give a sense of shear. Secondly, compositions of sheared and unsheared rock were compared to test the role that material removal played in the development of the textures of the shear zones.

The hypothesis is that micas responded to shear by dissolving and recrystallizing epitaxial overgrowths in the original crystallographic orientation, but in a shape more stable with respect to the shear. Cleavage orientation and elongation of 250 mica grains, in each of three mutually perpendicular oriented thin sections per shear zone, were measured, and symmetry type of each grain was noted. Symmetry types were classified as being elongate parallel to cleavage (A), right- and left-handed rhombic (RandL), elongate perpendicular to cleavage (B), equant (E), and cleavage in plane of thin section (C). In many sections, symmetry type is strongly related to orientation of cleavage; RandL orientations are offset 20°-30° on either side of the A orientations, and B types are offset 90° from the A orientations. These relationships are consistent with the model of dissolution/recrystallization proposed, and can give an orientation of the strain ellipsoid in the rock.

Chemically, sheared quartzite and nearby unsheared quartzite were examined using ICP and XRF spectroscopy. Preliminary results indicate that some enrichment of high field strength elements, including Zr, Y, Ti, and La, has taken place in sheared rocks,

consistent with the interpretation that these elements remained immobile and were concentrated as other elements were removed.

Supported by: National Science Foundation Instrumentation and Laboratory Improvement Grant

JULIE ESH, '03**Photographs and Writings by Middle School Girls**

Faculty Sponsor: Diane Ariza

Major: Sociology

Hometown: Whitehall, Mich.



As a student in the Building Assets in Middle School Girls mentor program, I am conducting research on the identity of adolescent girls in Albion and the empowerment achieved through

artistic self-expression. In the past, photographers Sally Mann, Lauren Greenfield, Nina Nickles, Ellie Brown, and Joanna Pinneo have all produced excellent images regarding adolescent life and girl culture. However, these works lack "power" as do many photographs, due to the fact that the photos are only the view of a photographer, an outsider, and one whose view is objective.

Documentary photographers and researchers alike have always been especially concerned with minimizing the distance and maximizing the intimacy between themselves and their material in order to make the most honest, unmediated portraits possible—encouraging, in effect, their subjects to speak for themselves. Photographer Wendy Ewald pioneered a practice that many professional photographers would fear: handing the camera over to her subjects. In doing so, she opened the world of photography to an unexpected population: children and women from developing nations and disadvantaged communities. She soon realized that such encouragement empowered children to articulate their emotions and their aesthetic vision, as well as giving them a heightened sense of the world around them. Wendy Ewald has since worked with

children all over the world to break down the boundaries between photographer and subject.

By adopting Ewald's approach and handing the camera over to the girls, I am subverting the traditional power relationship that exists between photographer and subject. Instead of framing the world according to my perceptions, I am creating a situation in which I allow the perceptions of adolescent girls to surface.

Supported by: Center for Interdisciplinary Study in Contemporary Expression in the Arts

DAVID FRIDAY, '04**Radio-Analytical Determination of Potassium**

Faculty Sponsor: Martin Ludington

Major: Mathematics

Hometown: Royal Oak, Mich.



A certain amount of all potassium in the world is radioactive (potassium-40), emitting gamma rays. Using the new germanium gamma ray detector in the Dow Analytical Science Labora-

tory, we are able to determine how much radiation is given off by a sample of potassium. Using a consistent volume of our potassium salt each trial, the average amount of radiation given off per unit time over the course of 3-4 hours was determined. A small complication is that the salt absorbs some of the radiation given off. To compensate, another gamma ray source was placed on top of the sample, and the amount of radiation detected compared to the amount of radiation actually given off (i.e., compared to an empty sample jar, no salt inside) aided in the calibration.

Supported by: FURSCA-Kresge Fellowship

BARBARA GRABAS, '03

Polish Politics through Polish Film

Faculty Sponsor: Myron Levine

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



During my semester abroad in Krakow (Cracow), Poland, I received a glimpse of the insights that contemporary Polish film offers on Polish politics. After returning to Albion's campus, I continued my in-

depth study of these effects by viewing the films of Andrzej Wajda and Krzysztof Kieslowski. My presentation will focus on filmmaking under communism, from the post-Stalinist era through the rise of the Solidarity movement that led to the end of communism. My particular focus will be on the period 1956-1981. I will concentrate on several themes seen in *Man of Marble* (1976) and *Man of Iron* (1981) by Andrzej Wajda.

As seen in *Man of Marble*, communist politics and art of the 1950s were still characterized by Stalinist ideology and "socialist realism." During this time period, many in the Polish population still believed in the government's ideology. In both the Soviet Union and Poland, the Stakhanovites presented the population with ideal-type workers as role models. But, as the film shows, the workers did not always believe fully in the myths propagated by the workers' state.

Man of Iron reveals that the popular belief in communism was soon to undergo even greater challenge as the model communist workers gave way to strikers who fought against the price increases in food and fuel. They also fought for political rights, including the right to form a worker's union independent of the Communist Party.

References to censorship and corruption are apparent in both films; however, the degree and form of censorship depended on the era in which the film premiered. Unlike in the United States, the government in Poland played a more intrusive role in the arts, especially in filmmaking; it sought to maintain a certain idealized image of Poland and the communist system.

BRIANNA GRANLUND, '05

Low-Level Phosphorus Detection for the Rice Creek Watershed

Faculty Sponsor: David Green

Major: Chemistry
Hometown: Gaylord, Mich.



The Rice Creek Project was concerned with what was suspected to be elevated levels of phosphorus concentration in the creek bed that were being erratically released into the creek. The

team hypothesized that phosphorus and inorganic phosphates were being absorbed into the gravel bed and being released sporadically into the creek. Elevated levels of phosphorus in a freshwater environment result in algae blooms, which block the penetration of sunlight to the creek bed and inhibit the prosperity of the underwater ecosystem. The project team experienced problems with its original method of phosphorus detection (ion chromatography), and a new method was found and implemented. EPA Method 365.2 measured phosphorus accurately from 10 to 500 parts per billion (ppb) using a spectrophotometer (measured at 650 and 880nm). The samples fell within 35 and 115 ppb with little exception ($\pm 5\%$). This method promises a level of accuracy of $\pm 2\%$ standard deviation. This level has not yet been reached with actual Rice Creek samples.

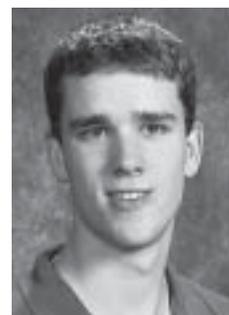
Supported by: FURSCA, Institute for the Study of the Environment

WILLIAM GREEN, '05

The Construction of a Charge-Separation and Detection System for a Photodetachment Spectrometer

Faculty Sponsor: David Seely

Majors: Mathematics, Physics
Hometown: Downers Grove, Ill.



This project focused upon the construction of Faraday Cup detectors for use in an apparatus to study the photodetachment of light negative ions. The apparatus consists of a 60 kV

accelerator and an electrostatic dodecapole (12-pole) ion beam separator coupled with a high-intensity laser oriented in a collinear fashion with the negative ion component of the separated beams. The Faraday Cups will be used to detect negative and positive ions that emerge from the electrostatic fields created in the dodecapole. These devices were assembled and installed on the apparatus, and characterized with an incident 20 kV beam of negative hydrogen ions. The devices worked as expected, but the applied "retarding" voltage necessary to collect electrons emitted from the surface of the detector was higher than expected. Mathematical models of the electrostatic dodecapole field were generated, and preliminary results indicate that the detection apparatus works as expected.

Supported by: FURSCA-Hyde Fellowship

ELIZABETH HAAS, '03**Interpersonal and Professional Consequences of Narcissistic and Avoidant Personality Disorders**

Faculty Sponsor: Andrew Christopher

Major: Psychology
Hometown: Vicksburg, Mich.

Narcissistic personality disorder is the manifestation of self-righteousness, subject to need for admiration as well as the envy of others. Avoidant personality disorder is the manifestation of

avoidance of interpersonal contact as well as feelings of inadequacy (Diagnostic and Statistical Manual IV TR, 2000). This study examined the effect that narcissistic and avoidant personality behavioral tendencies have on the hire-ability of an applicant for a sales or accounting position.

One hundred forty-nine (65 male, 84 female) undergraduates watched one of four videos portraying a male or a female displaying either narcissistic or avoidant personality disorders while "applying" for a job. Each video had three segments, with the first and third segments serving as neutral stimuli in which the applicant read from a self-developed employee handbook. During the second segment the applicant filled out an application by answering the application questions in accordance with the Millon Clinical Multiaxial Inventory III (Millon, 1994) to display either narcissistic or avoidant personality disorder tendencies. The participants were asked to rate the character in the video on the appropriateness for one of two job positions, sales or accounting. A 2 (disorder) x 2 (stimulus sex) x 2 (participant sex) x 2 (type of job) x 3 (time segment) MANCOVA controlling for attractiveness was run to ascertain whether the applicant was deemed appropriate in either job position. There was a significant interaction between type of job, time segment, and disorder ($F(2, 141) = 18.55, p < .001$). During video segment two, in which the applicant was portraying tenden-

cies of a personality disorder, the disorder that was portrayed had a significant effect on the type of job for which the applicant was deemed appropriate.

Supported by: FURSCA

AMIE HAFFNER, '03**La Malinche: Mexican Mythology Lends Itself to Ambiguity in Gender, Race, and Ethnicity**

Faculty Sponsor: Zulema Moret

Majors: English, Spanish
Hometown: Pleasant Ridge, Mich.

The myth of La Malinche serves as a lens through which to view complex gender and identity issues that Mexican and Chicana women face today. Born an Aztec princess, Malinche was sold into slavery by her

mother, who preferred that Malinche's brother inherit the kingdom. After being sold to Mayan lords, she was consecutively sold to Hernan Cortés and his Spanish *conquistadores*. Because she spoke both Maya and Nahuatl she served as translator, advisor, and ultimately lover to Cortés. It is said that without Malinche, Cortés could not have conquered Mexico. Furthermore, Malinche bore a son by Cortés, who became known as the first documented *mestizo* (mix of Spanish and Indian). As a result, Malinche's reputation as a traitor has become two-fold. While she is said to have betrayed her country, culture, and race, her name becomes further marred with the suggestion that her amorous affair with Cortés may have been voluntary. Today the term *malinchista* is used to bring shame to any woman who dares to act out against pre-established rules of her community *or* her man, thus legitimating a system of patriarchy. For some women, however, La Malinche represents a woman who dared to dream and serves as inspiration to escape the imprisonment of *machismo*. The ambiguity of Malinche that continues to live on in Mexican culture is documented in the analysis of poems, paintings, and the historical development of her name.

COURTNEY HANCOCK, '03**The Effect of Electrolytic Lesions of the Nucleus Basalis and Medial Septum on Working Memory in Rats**

Faculty Sponsor: W. Jeffrey Wilson

Major: Biology, Neuroscience Concentration
Hometown: Saginaw, Mich.

This study examined the role of the nucleus basalis (NB) and the medial septum (MS) in working memory performance in rats. Female Sprague-Dawley rats were trained in a delayed non-

matching to sample protocol using an elevated eight-arm radial arm maze. Following acquisition of the task, animals underwent one of four surgical procedures: lesioning of the NB and the MS, lesioning of the NB, lesioning of the MS, or sham lesioning of the NB and the MS. All lesions were induced electrolytically. Animals were then reevaluated post-surgery using the delayed non-matching to sample protocol. Significant increases in all errors measured were observed in the NB/MS and the MS lesion groups. No data were collected from animals in the NB lesion group. No significant performance changes were observed in the control group.

Supported by: FURSCA, Neuroscience Program, Honors Institute, Albion College Psychology Department

LAUREN HECHT, '03

Does a Simple Shading Manipulation Lead to Size Overestimation in 3-D Volumes?

Faculty Sponsor: Michael Anes

Majors: Philosophy, Psychology
Hometown: Peotone, Ill.



In the 1850s, Helmholtz identified the Irradiation Effect, a phenomenon in which subjects identify a white square as larger than a same-size dark square. We investigated this effect by asking

participants (N=36) to make same/different size judgments of two 3-D cubes, displayed briefly (167 ms) and masked in a centered vertical arrangement against a white background. Size differences were made by increasing line segment length by 10% from small to large cubes. Cube pairings (same/different), cube size (large/small), cube shading (one cube was 0%, 25%, or 50% gray), and shading position (top/bottom) were manipulated.

For same size cubes, accuracy in both large and small pairs was dependent on cube shading and shading position; increased shading of the bottom cube led to diminished same judgment accuracy. For different trials, accuracy improved in conditions pairing a small, unshaded top cube and a large shaded bottom cube; accuracy increased parametrically with darker shading. Shading position effects may be understood in terms of differential attentional deployment to upper and lower visual fields and in light of the lower field advantage in figure-ground assignment (Vecera, Vogel and Woodman, 2002). The pattern of costs in same judgments and benefits in different judgments as a function of increased shading indicates darker shading results in size overestimation, contrary to Helmholtz's observations.

An additional experiment is in progress; if the relative salience of object to background is responsible for overestimation, the

pattern should be unchanged with a photonegative manipulation (Black background, with 100%, 75%, and 50% gray cubes).

Supported by: FURSCA

KARIN HEFFEL, '03

Orwell and Spirituality

Faculty Sponsor: Charles Crupi

Major: English
Hometown: Midland, Mich.



While George Orwell is best known as the author of political works like *Animal Farm* and *1984*, throughout his books, novels, essays, and articles, including the overtly political ones, he does

explore other prominent themes. One such theme is the role of Christianity in society. Generally, in Orwell's works, when a church surfaces, it is devoid of any sense of spirituality, and often it is used ironically in a manner against the grain of Christian morality. In *Burmese Days*, for example, for the colonial British, church attendance symbolizes their racial superiority over the native Burmese. However, there are other literary works of Orwell's, *The Clergyman's Daughter* in particular, that discuss humans' spiritual needs. While Orwell rejects a formal belief in God and Christianity, he acknowledges a sense of human longing which religious spirituality can fill or which the absence of religious spirituality can create.

My thesis about Orwell's exploration of the nature of human spirituality is the culmination of two years of research. During my junior and senior years I have read the complete published works of Orwell and studied the historical time period in which Orwell wrote. I have also employed secondary sources to inform my own research. Combining history, secondary sources, and Orwell's works, I have synthesized an Orwellian concept of spirituality that can help open up Orwell's texts to other readers by emphasizing a previously neglected theme in his writings.

Supported by: FURSCA, Center for Interdisciplinary Study in History and Culture

ADAM HERRMAN, '04

MICHELLE STEBER, '04

The Isolation and Characterization of Genes Encoding for an ABC-Type Transporter in *Thermoanaerobacter ethanolicus*

Faculty Sponsor: Luti Erbeznik

Adam Herrman
Major: Undeclared
Hometown: Baroda, Mich.

Michelle Steber
Major: Biology
Hometown: Alpena, Mich.



Herrman



Steber

Over the past few decades, the negative effects of burning fossil fuels, such as hazardous spills and global warming, have become obvious. An environmentally superior alternative to fossil fuels is ethanol that could be produced mass scale via fermentation of plant waste by microorganisms such as "heat-loving" bacteria. The goal of this project is to isolate and analyze genes encoding for ABC

(ATP binding cassette) transporters of xylose (a major structural component of the plant cell wall) in *Thermoanaerobacter ethanolicus*. The degradation of lignocellulose into ethanol by microbes such as *T. ethanolicus* could be made efficient by genetic engineering, but transport and metabolism mechanisms and their genetic basis must be understood first.

The genes that code for the components of the xylose ABC transport system include *xyiF*, *xyiG*, and *xyiH*. The *xyiF* gene has previously been characterized. We isolated a clone containing *xyiG*, *xyiH*, and a fraction of *xyiF* from the *T. ethanolicus* sub-genomic library by using a *xyiG*-specific probe and a chemiluminescence-based detection method. The genes appear to be organized in an

operon and the newly discovered *xyIF* differs from the *xyIF* isolated previously. The final objective of the project is to obtain the remainder of the *xyIF* sequence, so the sequence of the entire operon will be known. Sequence analysis of the isolated clone reveals significant similarities to other bacterial ABC transporters. To our knowledge, this is the first report of the xylose ABC transport DNA sequence in a thermophilic anaerobic bacterium.

Supported by: FURSCA

KATHRYN HILOVSKY, '03

Morphology, Variation, and Systematics of Eocene Dermatemydid Turtles

Faculty Sponsor: William Bartels

Major: Biology
Hometown: Stow, Ohio



Baptemyx is a genus of the Dermatemydidae that lived during the Eocene Epoch in North America. The systematics of this genus have not been well studied since their original description almost 100

years ago by Hay (1908). Currently, there are three described species within the genus: *Baptemyx wyomingensis*, *B. tricarinata*, and *B. fluviatilis*. The goal of this study is to assess the validity of each species by analyzing the characteristics and variation in recently collected fossil specimens of *Baptemyx* from the Green River Basin of Wyoming.

My analysis involves two components—the analysis of character states and an assessment of the morphometrics of each species and specimen. Character state analysis involves the identification and distribution of discrete derived bony characteristics. Morphometrics is an analysis of the size and shape of various bones and structures of the outer shell. Data from these analyses are also plotted and graphed versus both stratigraphic level and locality in order to identify any temporal or geographic trends.

Results thus far suggest that there are no character states that can reliably separate the three species. Morphometric analysis

indicates that the shape of the epiplastral lobe may serve to distinguish *Baptemyx wyomingensis* from *B. tricarinata*. In both cases, *B. tricarinata* should be considered a junior synonym of either *B. fluviatilis* (if it is valid) or *B. wyomingensis* (the first named species). No quantifiable temporal or geographic trends have been identified.

Supported by: FURSCA-Bethune Fellowship, National Science Foundation, National Geographic Society, the National Park Service, the Pew Foundation, Albion College Hewlett-Mellon Faculty Development Program

HANNON HOGAN, '03

The Effects of Activity Level on Children's Positive and Negative Affect and Overall Well-Being

Faculty Sponsor: Barbara Keyes

Major: Psychology
Hometown: Richland, Mich.



In modern Western society, children are being placed in more structured activity every year. In order to determine if this increase of extracurricular activity affected children's mood, twenty-seven

children from the third, fifth, and seventh grades were studied during the summer and fall months. Parents completed a short demographics questionnaire for their children (regarding household information) and an activity list (summarizing all activities the child had engaged in during the prior eight weeks). Children completed the Overall Well-Being Scale (in order to assess how much each child had enjoyed the past two months) and the Positive and Negative Affect Schedule (in order to assess the child's mood). The first data collection occurred in early August and the second occurred in early November.

Preliminary results indicate that the total amount of time spent in extracurricular activity does affect overall well-being and positive affect, although only in the summer months. Results also show that the total amount of time spent with friends is positively correlated with overall well-being and positive affect. The results suggest that

although time spent in many different activities does not affect mood, time spent socializing with other peers their age is important to their well-being.

Supported by: FURSCA

DANIEL HOLLAND, '03

A Study of the Degradation of High-Performance Polyimide Foams

Faculty Sponsor: Daniel Steffenson

Majors: Chemistry, Physics
Hometown: Canton, Mich.



The degradation of various high-performance polyimide foams under thermal, atomic oxygen, and weathering exposure has been studied by FT-IR and Raman spectroscopy. The foams studied are

candidate materials for the next generation of reusable launch vehicles. These foams belong to a class of polymers characterized by strong thermal and chemical stability and resistance to degradation, made from the reaction between a dianhydride and diamine. Foamed polymers studied include TEEK-HH, made from ODP/3,4'-ODA (4,4-oxydiphthalic anhydride/3,4-oxydianiline), TEEK-CL, from BTDA/4,4'-DDSO₂ (3,3,4,4-benzophenone-tetracarboxylic dianhydride/4,4-diaminodiphenyl sulfone), and TEEK-TEEK-L8, from BTDA/4,4'-ODA (3,3,4,4-benzophenone-tetracarboxylic dianhydride/4,4-oxydianiline).

Semi-quantitative analysis of FT-IR spectra pertaining to thermal degradation of the polyimides to indicate reversion of the polyimides to a polyamic acid precursor involved in the foams' synthesis. Raman data indicate formation of a graphitic char, presumably through cross-linking of the numerous aromatic groups in the polymer chains. The other degradation processes of these polymers will be presented as well.

Supported by: NASA Undergraduate Student Research Program, NASA Kennedy Space Center

KIM ILLG, '04

Photodegradation of CCl_4 with Modified TiO_2

Faculty Sponsor: David Green

Major: Chemistry
Hometown: Naperville, Ill.



The photocatalytic degradation of carbon tetrachloride in aqueous solutions by titanium dioxide has been widely studied with the use of gas chromatography. Previous research has

shown that adding 16.7% ethanol as an electron donor to the solution will increase the rate of degradation of the CCl_4 to CO_2 and HCl . It has also been suggested that coupling metal oxides will increase the rate of degradation.

In this study, titanium dioxide and iron oxide were used in ratios of 100/0, 75/25, 50/50, and 25/75 by mass. The mixture of 75% iron oxide and 25% titanium oxide was the most effective at degrading the CCl_4 . All the solutions containing coupled metal oxides were more effective at degrading the CCl_4 than those with just a single metal oxide. The addition of the iron oxide also helped to eliminate competing reactions taking place in the solution. The pH of the reaction was also examined using a pH meter. As the reaction progresses, the pH drops over the first 24-48 hours, then rises from 48-96 hours. This suggests the production of a hydroxide, which would cause the pH to become higher. Future work will be needed to examine other metal oxides that could be used for maximum degradation, as well as to further examine the impact of the pH on the degradation.

Supported by: FURSCA-Bethune Fellowship

CRYSTAL INGISON, '03

Hypervalent Iodine in Organic Chemistry: Research Adventures from Albion to Wales

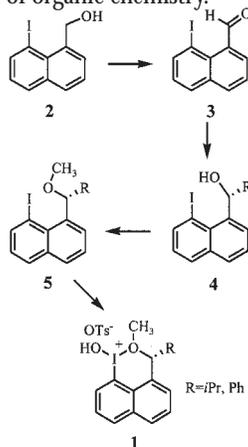
Faculty Sponsor: Andrew French

Major: Chemistry
Hometown: Marquette, Mich.



Hypervalent iodine reagents have been used for a wide variety of chemical transformations, including oxidations, additions to alkenes, and lactonizations. The focus of this research has been divided into two

areas. First, progress has been made toward the synthesis of a new chiral hypervalent iodine reagent (shown below), to be used in asymmetric addition reactions to alkenes. Reaction conditions were optimized for the transformation of compound 3 to compound 4, a key step in the synthetic sequence involving the use of organometallic reagents. Research into a mechanistic question of whether a phenonium ion intermediate was present in lactonization reactions of aryl alkenoic acids induced by diacetoxyiodobenzene was also conducted. A preliminary study of the electronic effects on the phenyl moiety of five different *para*-substituted alkenoic acids was used to support the hypothesis that a phenonium ion was indeed involved. Both of these projects will eventually provide more knowledge about the usefulness of hypervalent iodine compounds in the realm of organic chemistry.



Supported by: FURSCA, National Science Foundation

TAKI JOHNSON, '04

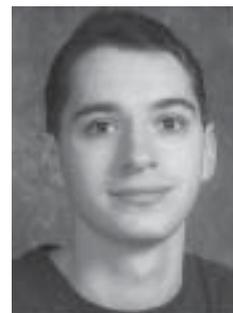
(See Derek Burkholder, '04, Taki Johnson, '04)

JASON KENNEDY, '04

Cosos: The Creation of an Original Musical

Faculty Sponsor: Robert Starko

Major: Art
Hometown: Brownington, Vt.



Some of the most enduring entertainment motifs of the twentieth century arose from musical theatre, which reached its heyday during the 1940s and '50s. The power of music and lyric provides its

audience with a form of involvement separate from that of its dramatic counterpart. But the glitz and glamour common to many musicals requires great amounts of work and years of preparation. As the basis for my honors thesis, I've explored this creative process and am writing the libretto and lyrics of an original musical, with the music to be completed at a later date. I've studied playwriting for three years—working primarily in drama—but undertaking a musical meant I needed to learn a completely new style of writing.

Last summer I worked with Bob AuFrance learning the musical playwright's method and considerations, as well as beginning to write the rough draft of the musical. This new method taught me to consider staging, financial constraints, actor/character interactions and development, character-based versus event-based story lines, and story parsimony. I read and watched numerous musicals, and found inspiration from all media for my developing story line. The main focus of the summer was the actual composition of the text of the musical. The story line has since been streamlined from its original form (likely an eight-hour show) to its current form (about two hours). Motivated by a desire to watch a less-campy musical, I am writing my show with Brechtian overtones, reminiscent of *Urinetown* and *The Full Monty*—suffice it to say that Rodgers and Hammerstein would

not have written this musical. A polished draft of the first act is written, and a rough draft of the second act is in progress.

Supported by: FURSCA

AMANDA KENT, '03

Examination of Methods to Increase DNA Yield from Feathers to Determine Sex Ratios of Nestling House Wrens (*Troglodytes aedon*)

Faculty Sponsor: E. Dale Kennedy

Major: Chemistry
Hometown: Cadillac, Mich.



Determining sex ratios of offspring in a species is important in understanding natural selection of a species. Previous studies of sex ratio in house wrens have shown biases between different sexes in early and

late broods. DNA is a reliable way of sexing nestlings and can be acquired from both blood and feathers; however, acquiring DNA from feathers is less invasive and poses a smaller risk of a researcher obtaining blood-borne pathogens. In this experiment, I examined four methods for extracting DNA from feathers: QIAGEN® DNeasy kit, QIAGEN® DNeasy kit with Dithiothreitol (DTT), PBS and water, and Collagenase with the QIAGEN® DNeasy kit. Amounts and purity of extracted DNA were measured using a UV-Vis spectrophotometer. The QIAGEN® DNeasy kit with DTT provided the highest yield and purity of DNA. Using this extraction method, I found that male to female nestling sex ratio was 50:50 in both the early and late broods of 2002. These data differ from findings in 2001 in which early broods were female biased and late broods were male biased. Differences in sex ratios between the two years may be due to more polygyny in 2002.

Supported by: FURSCA

LAURA KRALY, '03

Western Attitudes toward Kabuki Theatre

Faculty Sponsor: J. Thomas Oosting

Majors: Theatre, English
Hometown: Davisburg, Mich.



This project examines how Kabuki, an ancient form of Japanese theatre, is received and perceived by Western audiences. Kabuki has a 900-year-old tradition in Japan, and is respected as a significant cultural

treasure. It is highly stylized and utilizes an exceedingly complex system of conventions. This theatre, born in isolated medieval Japan, is completely different from any Western form. How, then, are Westerners to understand this foreign art form, and how do they react to it?

I am approaching this question by examining news and criticism surrounding the tour of the Kabuki-za, Japan's national Kabuki troupe, to the United States. They visited New York, Los Angeles, and San Francisco in 1960, exposing denizens of these cities to an utterly unfamiliar type of theatre. An examination of this troupe's reception will be helpful in assessing post-World War II and Occupation-era American feelings toward Japanese cultural achievements.

Supported by: FURSCA

ANGELA LANG, '03

Struggling with Women in Shakespeare's Early Works

Faculty Sponsor: Charles Crupi

Majors: English, Biology
Hometown: Westland, Mich.



Throughout his early works, William Shakespeare experimented with many themes that became more apparent in his later works. The effects of women on male friendships and the

inevitable downfall of the powerful woman are two dominant themes. Close analysis reveals the importance of these two themes in *The Two Gentlemen of Verona*, *The Taming of the Shrew*, *Love's Labours Lost*, *Titus Andronicus*, and *Henry VI: Parts 1 and 2*.

BROOKE LARCHE, '03

Diesel Power Sacrificed for Cleaner Air

Faculty Sponsor: Dennis Gaswick

Major: Biology
Hometown: Escanaba, Mich.



Economically, the diesel engine industry plays an important role in the United States as a producer, a consumer, and a transportation medium. This same industry is devastating to global environ-

mental health, releasing ozone constituents and other pollutants into the atmosphere. Legislation has been drawn up to counter the output of these pollutants, and the diesel engine industry has been a recent target of the United States Environmental Protection Agency (EPA). In October 2002 the mandatory integration of emissions regulations on diesel engines began, and a number of changes have been seen since. The purpose of this study is to examine the

environmental versus economic positions of the diesel engine industry, and to assess the benefits and harms the EPA regulations have had on the industry.

Supported by: Engineered Machined Products

KIRSTIN LEIBY, '04

The Problem of Social Desirability: The Effects of Race, Gender, and Skill Level on Candidate Evaluation

Faculty Sponsor: Amy Otto

Majors: Psychology, Sociology
Hometown: Plymouth, Mich.



Because of the social stigma associated with people who express prejudiced attitudes, it is difficult to measure such attitudes explicitly. Past research (Devine et al., 2002; Plant and

Devine, 1998; Swim and Cohen, 1997) suggests that, in studies measuring prejudiced attitudes, participants may be motivated to respond without prejudice, thus biasing their judgments in favor of the minority. The purpose of this research is to assess whether participants will respond in a socially desirable manner to a fictional character in a short story.

The present study is a 2 (race: African American or Caucasian) x 2 (gender) x 5 (skills relevant to being a student senator: 0-4 skills) between-subjects design. The story describes a day in the life of a character (named either Jen or Joe) running for student senate. Each story includes information about the character's race, gender, and the skills she/he possesses relevant to fulfilling a position on the student senate. The questionnaire that accompanies the story will assess general attitudes toward the character, and attitudes toward her/him as a candidate for senate.

It is hypothesized that participants will indicate the most positive attitudes toward the character when she is African American and female and the least positive attitudes toward the character when he is Caucasian and male. It is also hypothesized that there will be an interaction between race, gender, and the number of skills demonstrated.

Specifically, it is expected that preference for the minority candidate will be especially likely to occur when the candidate is unskilled.

Supported by: FURSCA

TERESA LIEDTKE, '03

A Glimpse at Education in Ecuador: How I Learned a Little More About the World

Faculty Sponsor: Michael Meloth

Major: English
Hometown: Portage, Mich.



A truck drives past, delivering potable water for five dollars a barrel to the shack houses in the neighborhood. Boys and girls dressed in school uniforms purchase apples, rice, chicken, and bread

from vendors on the streets before walking to the public and private schools. In such a dirty and poor environment, I want to know how the children are affected and what the system of education is like. Are the teaching methods different? Do the children feel safe in their environment and do these feelings affect their ability to learn? In order to find answers to some of the questions I had during my first volunteer experience in Ecuador, I returned to the country to interact more closely with the schools there. I spent a month interviewing principals, teachers, and students and observing classrooms in nine different public and private schools.

My travels to Ecuador have provided me with a deeper understanding of how their educational system works and of who I am as a teacher and as a person. My narrative piece titled, "A Glimpse at Education in Ecuador: How I Learned a Little More About the World," intertwines my personal observations and cultural experiences with the ideas of educational philosophers.

Supported by: FURSCA

MATTHEW LINDEN, '03

A Design Document for the Construction of an Interactive Entertainment Experience Entitled "Paradox"

Faculty Sponsor: David Reimann

Majors: Mathematics, Music
Hometown: Adrian, Mich.



Video games, particularly role-playing games, have long held a fascination for me through their intense story lines, stirring themes, moving melodies, and cutting-edge graphics. I have always believed

that video games can be used for more than mere entertainment; they can be effective tools also for education and moral instruction. For this reason, I see this project not just as a game but also as an interactive entertainment experience.

The first step in the production of any video game is the creation of a design document integrating all details relating to the game. Role-playing games in particular require their design documents to include story crafting, event flowcharting, character generation and interaction, world building, graphical design, set-up and layout design, musical composition, a great deal of creativity, and intense revision. Since my early childhood, I have taken special delight in creating such wondrous characters and plots taken out of the fantasy and science fiction genres. "Paradox" evolved from a collection of ideas developed over many years. Recently, there has been much refinement of these concepts and encouragement from loved ones to take the initial musings and evolve them into a dream. My design document describes the game "Paradox" as a fantastical world of heroes, magic, and monsters, and also as a collection of lives and events exploring themes of love, friendship, good, and evil. I am at the point where my dream has the potential to become a reality.

Supported by: FURSCA-Hyde Fellowship

DANA LOBELLE, '03**Female Self-Description as Related to Self-Identification as a Feminist**

Faculty Sponsor: Barbara Keyes

Majors: Psychology, English
Hometown: Canton, Mich. and Hudsonville, Mich.

The purpose of this research is to study the social changes related to feminism that have occurred since the 1960s. My study is designed to look at young women ages 18 to 24 and their mothers in

terms of how they describe themselves, as a function of level of involvement in the women's movement. The data for the younger cohort of this study were collected at Albion College final enrollment in August 2002, and the data from their mothers were collected throughout the fall semester. My hypothesis was that mothers and daughters would differ from each other in significant ways, specifically that the daughters would use more words traditionally associated with men to describe themselves than would their mothers. I further hypothesized that, due to the widespread impact of the women's movement, there would be no significant differences between the self-descriptions of women who are actively involved in the women's movement and those who are not actively involved.

The results of the current data will be discussed and compared with results from a pilot study conducted in Venice, Italy in which women were asked not about their involvement in the women's movement but rather about the extent to which they self-identify as feminist. These preliminary results indicated that women of the younger cohort who did not consider themselves feminist tended to avoid "gendered" words entirely, whereas women of the older cohort who did not consider themselves feminist identified with both male- and female-stereotyped words.

Supported by: FURSCA, Benjamin Gilman Scholarship

SEAN LOGAN, '04**Do Fish Prefer Male Prey? Impacts of Fish Foraging on the Marine Amphipod *Corophium volutator* (Pallas)**

Faculty Sponsor: Dean McCurdy

Major: Biology
Hometown: Warren, Mich.

Corophium volutator, an intertidal crustacean, is a key prey item for numerous species of fish and migratory shorebirds. I explored interactions between *Corophium* and fish predators by assessing

foraging preferences of fish and determining consequences of predation on sex ratios of *Corophium*, which are strongly female-biased. Using collections of *Corophium* and quantitative evidence of foraging activity, I found that foraging by fish was most intense in patches of mud containing the highest densities of adult *Corophium* and in areas where fish had the greatest amount of time to forage. Considering impacts of sex ratio, both benthic (bottom-feeding) and pelagic (open water-feeding) fish fed disproportionately on male amphipods relative to sex ratios in the substrate. Sex-biased depredation of male amphipods might result in population declines, particularly in conjunction with other sources of male-biased mortality.

Supported by: FURSCA-Upjohn Fellowship, Blanchard Fellowship

MICHAEL MARVIN, '04**Structural Analysis of the *Anabaena* Group I Intron: Thermodynamic Characterization**

Faculty Sponsor: Christopher Rohlman

Major: Chemistry
Hometown: Coldwater, Mich.

The focus of this research has been on determining the structural stability of a ribozyme derived from the *Anabaena* Group I self-splicing pre-tRNA^{leu} intron. The *Anabaena* system is used in

order to test the applicability of conclusions that have been previously drawn from Group I introns on *Tetrahymena*, which serves as the classical model for catalytic RNA. The known primary structure and secondary structures of the *Anabaena* ribozyme will provide crucial information concerning catalytic ability of Group I introns in general. This is accomplished by studying the influence of longer-range intramolecular interactions between secondary structural regions, and how these interactions are encoded by the primary sequence, with thermal melt ultra violet (UV) spectroscopy techniques. The UV spectroscopy analysis will take advantage of the differential thermal unfolding properties of the ribozyme under varying conditions. Treating the thermal denaturation as a phase transition and monitoring the progress over a range of temperatures will provide a way to empirically determine the thermodynamic parameters that govern the concerted folding of the molecule. Currently, pilot experiments are being carried out to determine optimal experimental conditions for this procedure. The resulting data will yield valuable information about the structural forces that govern the tertiary folding motifs of the *Anabaena* ribozyme and insight into how molecules can form complicated structures from simple linear sources of information.

Supported by: FURSCA-Kresge Fellowship

ROSE-ANNE MEISSNER, '03

Memory's Puzzle: Probing the Structure of the NMDA Receptor in the Brain

Faculty Sponsor: Clifford Harris

Major: Chemistry
Hometown: Redford, Mich.



As an intellectual endeavor, neuroscience is the epitome of an interdisciplinary field. The interests of neuroscientists range from understanding the biochemistry of the brain to the philosophical

implications of how organisms create for themselves a neural representation of the external world. One of the most exciting aspects of the field is the challenge to elucidate the molecular mechanisms underlying behavioral and cognitive processes such as memory and learning. Much attention has been focused on the synapse, the intracellular space where one neuron "talks" to another. By analogy, the synapse may be thought of as consisting of a set of keys and locks. Molecules called neurotransmitters are released from one neuron and function as keys to activate the receptors, or locks, on another neuron.

Glutamate is one of the most prevalent neurotransmitters in the mammalian central nervous system. The N-Methyl-D-Aspartate (NMDA) receptor is one of several classes of glutamate receptors in the mammalian brain. The NMDA receptor is of particular interest to neuroscientists due to its involvement in long-term brain phenomena such as learning, memory, and loss of cognitive functions due to stroke or other brain damage. In order to better understand the specific function of the NMDA receptor, the structure of the receptor must be determined by biochemical analyses that require a large amount of pure receptor protein. As a first step in this process, an artificial system must be engineered for generating large amounts of viable NMDA receptors. My research focused on

developing such a system by using Vaccinia virus to express NMDA receptors in mammalian cells.

Supported by: National Science Foundation Research Experiences for Undergraduates. This research was conducted at the University of Pittsburgh under the guidance of Jon Johnson (Department of Neuroscience) and Mike Cascio (Department of Molecular Genetics Biochemistry).

JOSHUA MENIG, '03

Oxidation of Trialkylboranes Using Potassium Permanganate

Faculty Sponsor: Clifford Harris

Major: Chemistry
Hometown: Bloomfield Hills, Mich.



Trialkylboranes derived from terminal and internal symmetrical alkenes were oxidized using potassium permanganate. An optimization study of solvents was performed, examining the

effects of acetone, water, methylene chloride, ethyl ether, and THF. Neutral, basic, and acidic conditions were also studied. The optimized procedure provides the expected alcohols in reasonable yields. The reaction compares favorably to the classic alkaline peroxide oxidation since the workup is simple and requires no aqueous extraction.

Supported by: FURSCA-Robson Fellowship

ELIZABETH METTLER, '03

An Amino Acid Profile of Wild Bird-Dispersed Fruits in Michigan

Faculty Sponsors: E. Dale Kennedy and Douglas White

Major: Biology
Hometown: Sturgis, Mich.



To explore the co-evolutionary relationship between fruit-producing seed plants and migratory birds, I used high-performance liquid chromatography (HPLC) to analyze the amino

acid content of fruits of ten Michigan bird-dispersed species. Wild fruits are a key, readily available food for fall-migrating songbirds. Nutritionally rewarding fruit pulp should be favored if it attracts birds that swallow fruits whole and subsequently disperse the contained seeds. Like all animals, birds must regularly consume proteins, including a balance of essential amino acids, to meet their metabolic needs. But nitrogen, a part of every amino acid, is often a limiting resource for plants. Previous studies have shown fruit pulp to be rich in sugar or fat but poor in nitrogen, a crude analytic surrogate for total protein. Just how rewarding pulp is as a food for birds depends on how nitrogen is actually distributed among different amino acids and non-protein secondary compounds.

HPLC technology now available through the Albion College Dow Analytical Science Laboratory offers the prospect of direct determination of amino acids. To determine these profiles, I adapted the AccQ-Tag method from Waters Corporation for use on small samples of fruit pulp. This method involves hydrolysis of proteins in an anaerobic hydrochloric acid bath, derivitization of the separated amino acids with an AccQ-Fluor reagent and buffer, and separation of the final products through an AccQ-Tag HPLC column specific for amino acid analysis. Challenges to applying this protocol included troubleshooting lab techniques and clarifying samples containing fibrous plant material.

REBECCA MILLER, '03**Immigration in the European Union: Is There a 'Fortress Europe'?**

Faculty Sponsor: William Rose

Major: International Studies
Hometown: St. Johns, Mich.

By looking at historical approaches to immigration policies in member states of the European Union (EU) and by analyzing the current situation with immigration in the EU, I hope

to find where the EU is headed in creating a "Common Immigration Policy." My project is an analysis that is both historical and institutional in approach. It is a qualitative and critical analysis of immigration policies of selected EU countries.

The unique history of immigration in European Union countries, as well as the basic, yet difficult questions member states face in developing a common immigration policy, makes it difficult for EU states to agree on a common approach to the related issues. However, it is necessary for the EU to have common practices of immigration at its external borders if it truly is going to have free movement within its internal borders. As it heads toward "Fortress Europe," the EU faces serious difficulties in attaining true intergovernmental cooperation on immigration matters.

Immigration is not an issue that can be isolated. Immigration brings into question extremely important aspects of identity and citizenship that could pose a threat to sovereignty, as we know it today. Although the EU seems to be relatively removed from the American sphere, the immigration measures taken in one part of the world are interrelated to what measures will come into being in other regions. Therefore, as the EU comes closer to developing a united front on immigration, what is implemented will affect the migration flows coming into America.

JEREMIAH MORSE, '03**Hydrology of a Small, Rural Watershed in South-Central Michigan: Monitoring Stream Flow, Turbidity, and Temperature**

Faculty Sponsors: Timothy Lincoln and Thomas Wilch

Major: Geology
Hometown: Belding, Mich.

In summer 2002, we monitored stream flow and water quality of Rice Creek, a fourth-order tributary of the Kalamazoo River in south-central Michigan. The stream is managed as an agricultural

drain and is on the Environmental Protection Agency's non-attainment list for suspended solids. Rice Creek includes three distinct segments: the 12 km stem, the 21 km North Branch with multiple in-stream lakes, and the 24 km South Branch. Our study is part of a multi-year undergraduate interdisciplinary monitoring project, funded by an EPA Section 319 watershed-planning grant, the Institute for the Study of the Environment, and FURSCA.

We generated rating curves for 10 gauging stations by comparing discharge and stream level measurements (mean R^2 of 0.88). Hydrographs, which show discharge vs. time, were prepared by applying the rating curves to level data from continuously logging pressure transducers, and revealed a 43-74 percent summer decline in discharge due to lack of rain. Spikes in discharge following isolated rain events were short-lived. Superimposed on the decline were regular daily cycles in stage of ~ 0.1 ft with crests at 2-6 p.m. and troughs at 12-4 a.m. Daytime measurements of total suspended solid (TSS) concentrations and turbidity did not vary consistently with date or discharge. TSS concentrations ranged from 0.5-22 mg/L, with calculated loads as high as 1567 kg/day. TSS concentrations and turbidity tended to be highest in the South Branch and lowest in the North Branch sites downstream from lakes. However, continuous monitoring of turbidity showed cyclical daily variations throughout the watershed, with nighttime

levels 3-4 times higher than daytime levels. Temperature, logged continuously at six stations, also showed a daily cycle that varied in magnitude in different stream segments. Upstream sites showed a 6-9° C daily range; daily variation at the most downstream sites was 3° C. Waters in the North Branch between lakes were always 5-9° C warmer than in other parts of the stream.

Research is concentrating on the cause of diurnal fluctuations in stage height, and developing models for groundwater recharge using base flow from hydrographs.

Supported by: Institute for the Study of the Environment, Culpeper Foundation, Environmental Protection Agency Federal 319 Grant

SEAN NELB, '03**Creationism's Blunt Wedge: Evolution and the Failure of Intelligent Design**

Faculty Sponsor: Ralph Davis

Major: Philosophy
Hometown: Midland, Mich.

Creationism's latest branch, the Intelligent Design movement, hopes to pass itself off as legitimate science and show that evolutionary explanations for the development of life are unscientific, that evolu-

tion is actually a religion, and that metaphysical statements should be part of science. Intelligent Design's arguments fail largely because they misunderstand the nature of science, erroneously requiring it to be a completely deductive process rather than an inductive one; they confuse religious and scientific statements; and they resort to god-of-the-gaps theology.

Supported by: FURSCA

KATHERINE NIESEN, '05
REBECCA PUSZCZ, '06

Geographic Variation in Songs of House Wrens in Michigan

Faculty Sponsor: E. Dale Kennedy

Katherine Niesen
Major: Biology
Hometown: Lapeer, Mich.

Rebecca Puszcz
Major: Undeclared
Hometown: Macomb, Mich.



Niesen



Puszcz

In organisms that learn their vocalizations, such as songbirds, there is often geographical variation in specific types or arrangements of notes. House wrens sing complex songs made up of two parts: a relatively low-amplitude introduction and a relatively high-amplitude terminal section. The terminal section generally consists of repeated syllables, or trills. Previous studies on wrens have found that,

within a population, neighbors often share more syllables than do birds separated in space. However, no work has been done on this species on variation of songs on a larger geographic scale. Song variation might be proportional to the distance between populations studied.

In this study, songs of male house wrens recorded at Kellogg Biological Station in Hickory Corners, Mich. (by Natalie Dubois, '97), were compared with those recorded in Whitehouse Nature Center in Albion, Mich. Males from the two sites were matched according to their breeding stages and dates of recording. We used AviSoft SASLab Pro to examine the pattern of trill syllables found in 10 consecutive songs. Here we present results of our examination of overlap in sharing of trill syllable types among different birds and sequences of identical syllable types in songs.

LEONARD NOEL, '03

Materialism and Psychological Well-Being: The Mediating Role of Religiosity

Faculty Sponsor: Andrew Christopher

Majors: Psychology, Anthropology and Sociology
Hometown: Madison Heights, Mich.



The purpose of this study was to examine the potential mediating role that religiosity plays in the relationship between materialism and psychological well-being (PWB). A mediator is a

variable that accounts for the relation between a predictor (i.e., materialism) and a criterion (i.e., PWB) variable (Baron and Kenny, 1986). Materialism can be defined as the importance a consumer attaches to worldly possessions (Belk, 1985). Cohen and Cohen (1996) found that individuals highly focused on materialistic aims had lower life satisfaction and happiness. Belk (1983) reported a positive relationship between PWB and religiosity, while Marek et al. (2002) found a positive correlation between materialism and fundamentalism and between materialism and extrinsic religious orientation. Although research has examined the relationship between each possible pair of these variables, no one study has examined their interrelationships simultaneously. In the present research, I measured participants' materialistic orientation, various aspects of their religious lives (e.g., how often one attends church, prays), and well-being. It was hypothesized that when religiosity is statistically controlled, the relationship between materialism and PWB will be either eliminated or significantly attenuated.

Supported by: FURSCA

SUSAN O'CONNOR, '03

My Umbrella: A Collection of Writing and Original Artwork Inspired by a Year in Ireland

Faculty Sponsor: Daryl Murphy

Major: English
Hometown: Portage, Mich.



My experiences studying abroad in Cork, Ireland and travels through Europe during the 2001-02 school year were the basis for the fiction and creative non-fiction pieces I

have written for this thesis. From the experience of tutoring an African immigrant in Cork to a mistaken adventure on a nude beach in France, the pieces combine to tell a story of discovery and growth. The artwork that accompanies the manuscript, rather than illustrating the stories, serves as a visual extension of the written word.

REBECCA PUSZCZ, '06

(See Katherine Niesen, '05, Rebecca Puszcz, '06)

BROOKE REICH, '03**Acne in Relation to Stress, Self-Esteem, Body Image, and Depression in Isotretinoin Therapy**

Faculty Sponsor: Barbara Keyes

Major: Psychology

Hometown: Dimondale, Mich.



Acne is an extremely prevalent disease; it is the most commonly diagnosed skin disorder in the United States. According to the American Academy of Dermatology

(2001) nearly 85 percent of the U.S. population between the ages of 12 and 25 will develop some form of acne. Acne, although not a serious threat to overall physical health, can cause a great many psychological problems such as lowering self-esteem and body image. In this study the hypothesis that acne severity was related to self-esteem and skin image was strongly supported. Caffeine consumption was related to the severity of acne. Stress was highly related to acne severity, suggesting that stress can play a part in the development of acne.

Supported by: FURSCA, Psychology Department

ALYSSA RUSSELL, '04**Inspired Creations: The Art of the Navajo Rug**

Faculty Sponsor: Bille Wickre

Majors: Anthropology, Art

Hometown: Palo Alto, Calif.



In February 2001 the Albion Art Department received a bequest from Hugh Charles Sebastian, a member of the Albion community and a valued alumnus. Within the donation was a miraculous

collection of 43 rugs, over 30 of which have been authenticated as Navajo (dating from 1920-1955). In the process of learning about Hugh Sebastian and his wife, Margery Sturtevant, I discovered the wonder and delight of the rugs themselves.

Through touching the texture and breathing in the scent of the rugs, I connected with their history and the process of their creation. The symbols and techniques used to create these works are steeped in history that begins with the Pueblo people and endures through the Trail of Tears. Intricate design, mostly geometric configurations, is incorporated into each piece. Because of this each of these rugs is tied to the history and culture that created them.

It was this history that drew me to this project, the ability to see and understand more about a different way of life by analyzing and researching an object. In the process I have also tackled the idea that meaning is created through the environment in which an object is placed. The women who created the rugs initially did not view them as we do today as they hang beautifully in Upper Baldwin. My presentation will share with you this amazing chronology of women, including the creation of the rugs themselves and the unique process by which they are woven.

Supported by: FURSCA

LILLIAN SACKS, '03**An Examination of Young Mothers' Parenting Skills: The Role of Social Support and Parenting Stress**

Faculty Sponsor: Jamie Walter

Majors: Psychology, Early Childhood Development

Hometown: Chelsea, Mich.



Many factors influence parenting practices of young mothers, such as planned or unplanned pregnancy, parenting stress, social support, financial status, and living situation, all of

which need to be considered as young parents are scrutinized for their varying parenting abilities. Past research has shown that, if young mothers have strong networks of social support, the influence of stressors related to parenting can be lessened. This study examines the roles of social support and parenting stress in relation to parenting skills.

Three measures were used to investigate these effects. The Parenting Stress Index tested levels of stress related to parenting. The Social Support Functions Inventory measured varying levels of social support mothers received from partners, family, and friends. Finally, Egeland's Infant Feeding and Play Observation Scales were used to code the interactions between the mothers and infants.

It was hypothesized that teen mothers who are older would have better parenting skills and be able to cope better with parenting stress than younger teen mothers *if* they have equal levels of social support. Mothers with strong networks of social support were expected to be less vulnerable to the stresses caused by parenting and establish stronger and more positive bonds with their infants than mothers with little social support. Education level and socioeconomic status were expected to negatively influence the relationships between mothers and infants due to the stress lower educational attainment and financial difficulties can cause. Results are discussed in terms of

implications for future programs and aid to assist young mothers.

Supported by: FURSCA, Michigan Campus Compact

CORTNEY SCHAFFER, '03

“Home Alive in '45”: The G.I. Bill of Rights and Albion College

Faculty Sponsor: Thomas Chambers

Major: History

Hometown: Jackson, Mich.



When World War II ended in 1945, suddenly over twelve million American servicemen and women were coming home. The United States government had a plan waiting to help the veterans

successfully reintegrate into society, the Servicemen's Readjustment Act of 1944 or the G.I. Bill of Rights. The G.I. Bill provided housing loans, job training, unemployment insurance, and educational benefits for all men and women who served in the armed forces during World War II. The educational benefits made it possible for almost all veterans to attend college. Over two million attended college on the G.I. Bill, and many came to Albion College.

The G.I. Bill not only changed the lives of ex-servicemen, but also changed this institution. During the years of 1945 to 1950, Albion College went through many changes due to the presence of veterans attending on the G.I. Bill, including a large increase in enrollment, an evolving campus culture, and changing physical plant. But these difficulties were overcome and strengthened the college in many ways. With the help of 315 alumni who answered my survey, my project focuses on the changes that occurred during that time and the people who lived through it. Albion College sought to balance all of the demands of not only the ex-servicemen and women, but also those students right out of high school. The G.I. Bill created a college campus atmosphere like no other, and the experiences of Albion College students are indicative of what occurred all over the nation.

Supported by: FURSCA

ALEXIS SNYDER, '04

Carousel: Gender and Stereotypes in American Musical Theatre

Faculty Sponsor: Margaret Young

Major: Theatre

Hometown: Coldwater, Mich.



Suicide, theft, domestic violence, and extramarital sex are not concepts that one associates with the work of American musical theatre's most admired duo, Richard Rodgers and Oscar Hammerstein II.

However, the pair's 1945 musical *Carousel* contains these elements and, most importantly, a marked bias against women and their situation in society and in the familial and relationship structure. This bias is reinforced by the Rodgers and Hammerstein formula of characterization along with other factors such as the time period of the show and of the story/plot, the audience, and the female gender and the ingrained social stereotypes of female behavior. *Carousel* serves as a great example of the Rodgers and Hammerstein model and formula for characters as well as being a primary example of the inherent bias against women that is woven into the Rodgers and Hammerstein musical structure. With the information from my research, I have put together a presentation that will serve not only as an example, but also the basis of my future research and critical analysis in the American musical theatre.

Supported by: FURSCA

NATHANIEL SOWA, '03

Changes in RpoS Levels of *Pseudomonas aeruginosa* in Response to Environmental Stress

Faculty Sponsor: E. Dale Kennedy

Major: Biology

Hometown: Clifford, Mich.



RpoS is a stationary phase sigma factor protein that is known to regulate genes involved in resistance to environmental stress in several species of bacteria, including *Pseudomonas*

aeruginosa. To determine how levels of the protein are affected when the bacterium is exposed to certain stresses, liquid cultures were exposed to ionic, osmotic, temperature, and nutritional stresses after they had reached exponential growth phase. Lags in the growth of these cultures in response to stress corresponded with an increase in levels of RpoS. These increased levels decreased as the cells became adjusted to their new environment. As the cultures grew, a second, smaller protein that was recognized by anti-RpoS antibodies appeared. This protein could be a degradation product of RpoS cleavage or could be the result of differential translation of the RpoS transcript.

This research was conducted on-site at the National Cancer Institute, National Institutes of Health, Bethesda, Md. under the guidance of David FitzGerald and Susan Gottesman.

TARA SPRINGER, '03**Preschool Parental Satisfaction and Its Relation to Parental Stress Levels, Involvement, and Social and Emotional Functioning**

Faculty Sponsor: Jamie Walter

Major: Psychology, Human Services Concentration

Hometown: Rochester Hills, Mich.



Parental satisfaction is an important issue that needs to be understood by preschool directors and teachers. Parents need to feel satisfied in order to keep their child enrolled at the preschool.

Therefore, the more these preschools can understand about what factors increase parental satisfaction, the more effective their programs may be. The present study examined parents' satisfaction with their child's preschool. More specifically, it explored how parental satisfaction is related to parental involvement at the preschool, parental stress levels, and the child's social and emotional functioning in the classroom. Four measures were used in order to investigate this relationship. Twenty-five parents of children two through five years old completed three questionnaires: the Parenting Stress Index (PSI), the Family Involvement Questionnaire (FIQ), and the Parent Questionnaire. Teachers completed the Social Competence and Behavioral Evaluation—Preschool Edition (SCBE). It was hypothesized that parental satisfaction would be negatively related to parental stress levels and positively related to involvement in the classroom. In addition, it was hypothesized that children whose parents report higher satisfaction with their child's preschool would score higher on the SCBE summary scale of social competence than would children whose parents are low in satisfaction. Results are discussed in terms of implications for practice in preschools in order to increase levels of parental satisfaction.

Supported by: FURSCA

MICHELLE STEBER, '04

(See Adam Herrman, '04, Michelle Steber, '04)

SARAH STORBECK, '03**The Representation of Rotational Motion**

Faculty Sponsor: Michael Anes

Major: Psychology

Hometown: Kalamazoo, Mich.



In two experiments the processing of rotational motion was investigated in a same/different task. In Experiment 1, participants viewed eight 33 ms frames (20° apart) or four 67 ms frames (40°

apart) of a rotating (right-to-left and left-to-right) Greeble (courtesy Michael Tarr), followed by a pre- and post-masked, briefly presented (167 ms) test probe. Test probes were presented in differing orientations: in an orientation prior to the first exposed rotation frame, at all four exposed 40° rotations, and in an orientation beyond the exposed rotational sequence. Same judgment accuracy of probes beyond the exposed rotational sequence was less accurate than for probes in the final exposed position in the 40° rotation condition [consistent with Vuong and Tarr (Vision Sciences 2002)] but not in the "smoother" 20° rotation condition. In Experiment 2, rotation duration was varied; participants viewed four 67 ms frames (40° apart) or four 133 ms frames (40° apart) of a rotating Greeble followed by a pre- and post-masked, briefly presented (100 ms) test probe. Same judgment accuracy decreased for test probes beyond the exposed rotational sequence, and accuracy was lower at the first exposed position than at later exposed positions in the sequence. A consistent rotational representation facilitates responding to test probes further along in the rotational sequence (Experiment 2), but the effect is quite specific; accuracy for test probes beyond the exposed rotational

sequence was not facilitated (Experiments 1 and 2). Further research using test probes at interpolated positions will be discussed.

Supported by: FURSCA

RICK STRAUGHEN, '03**Simple Program Generation for Tutoring Novice Computer Science Students**

Faculty Sponsor: David Reimann

Majors: Computer Science, Mathematics
Hometown: Sterling Heights, Mich.

A challenge in learning programming is to understand the syntax and semantics of computer languages. The syntax of a programming language is often represented by

syntax diagrams, or equivalently, in Backus-Naur Form. In most cases, the syntactical structure of a language is recursively defined using non-terminal units, which ultimately lead to terminal units. The language syntax only specifies structure, but many structures have an implied meaning. A program is comprised of numerous syntactical units. The meaning of a program is derived from the relationship among all of the comprising syntactical units.

A Java program was developed that randomly generates simple programs in Pascal. Java functions were created corresponding to each of the syntax diagrams defining Pascal. To generate a program, all non-terminal units need to be expressed as a collection of terminal units. The Java program combines these units randomly, following rules specified by the syntax. Many constraints are placed on the output, in order to assure programs relevant for novice computer science students are produced. A simple program occurs when terminals are reached in a few steps. Another issue is that syntactically correct programs can be created which have no real meaning. Variables have different types, so type

matching within each expression is also critical. Further work includes providing a Web-based user interface and testing in a classroom setting. This program can be generalized for other programming languages and for subject areas such as mathematics.

Supported by: FURSCA-Kresge Fellowship

CRAIG STREU, '04

Progress toward the Synthesis of an Aliphatic Hypervalent Iodine Reagent

Faculty Sponsor: Andrew French

Majors: Physics, Chemistry
Hometown: Caro, Mich.



More than 150 years after Louis Pasteur discovered chirality, or molecular handedness, researchers are still working feverishly to completely harness it. Today, it is widely understood that

molecules that are arranged identically can, by virtue of their spatial orientation, fill biologically distinct roles. Conceptually, the impact that chirality has for biological molecules can be likened to trying to place a right-handed glove on the left hand. Using such an example equates each hand to an enantiomer, or identical, but spatially distinct molecule. This "handedness" is apparent in a variety of biological processes, such as a substrate binding to an enzyme, as a right hand would only fit in a right-handed glove.

Since the Thalidomide tragedy in the 1950s and '60s, scientists have widely understood the importance of creating pharmaceuticals of a single "handedness." To date, the most widely used and successful method of creating individual enantiomers is to synthesize the desired product using reagents that produce asymmetric products. One such class of these reagents is a chiral, and specifically, a chiral hypervalent iodine reagent.

While iodine reagents show much potential for use in many types of synthetically useful reactions, much remains to be

learned about their potential as chirality inducing agents.

Supported by: FURSCA, American Chemical Society-Petroleum Research Fund-B

JENNIFER TOBIN, '03

Designing a LabVIEW Program to Determine the Electrical Properties of Four New Superconducting Materials

Faculty Sponsor: Charles Moreau

Majors: Physics, Chemistry
Hometown: Middleville, Mich.



Superconductivity has the ability to revolutionize the distribution of energy in the form of electrical power. The negligible resistance in superconductive materials makes them much more efficient than

existent materials as carriers of electricity. Currently, materials found to be superconductive do so at low temperatures (near the boiling temperature of liquid nitrogen, 77K). A cryocooler is a mechanical device with the ability to reach and maintain these low temperatures using compressed helium gas. In a cryocooler, superconductivity was measured on the sample through a four-terminal reading of electrical resistance. This type of measurement, taken while cooling and warming, increases the accuracy for small values of current and voltage.

LabVIEW (a graphical programming language) was used to develop a program to control the temperature, evaluate the amount of current forced through four potentially superconductive film samples, and measure the voltage across each of the samples. These values were stored in LabVIEW and were used to calculate resistances that were then graphed against the sample temperature. The program was customized to provide a sufficient density of recorded values during the abrupt resistance decrease that occurs at the superconducting transition temperature, T_c , below which the resistance is zero. The plot also examined the direct relationship between resistance and temperature in the normal state above T_c .

Materials tested in this manner include thin film samples of $YBa_2Cu_3O_7$ and $NdBa_2Cu_3O_7$ compounds synthesized on assorted substrates and composite $Bi_2Sr_2Ca_2Cu_2O_x/Ag$.

Supported by: U.S. Department of Energy-Energy Research Undergraduate Laboratory Fellowship (ERULF)

ERIN TOTH, '05

Structural Analysis of the *Anabaena* Group I Intron Sub-Domains

Faculty Sponsor: Christopher Rohlman

Major: Chemistry
Hometown: Bloomfield Hills, Mich.



Introns are segments of genetic sequences that can be spliced out of RNA, the transcribed carrier of the DNA genetic code, and are present in almost all life forms on earth.

The intron segments are therefore not translated into protein, or processed out of structural RNA molecules. The differential splicing of these introns can determine the function and metabolism of a cell or organism. The Group I self-splicing introns have the ability to splice themselves out of immature RNA molecules, without the assistance of protein-based catalysts.

Our research focuses on the study of the molecular structure and chemistry utilized by Group I self-splicing introns, including stereochemistry, thermochemistry, and the chemical mechanism for splicing and catalysis. *Anabaena* is just one of many organisms that has a Group I RNA intron. I am studying this *Anabaena* intron because it is comparable to other well-characterized Group I introns. My study focuses on examining the structure of the intron and the function of the different regions of the structure. I will be performing experiments to separate the intron into three independent molecules (domains), in order to examine the necessary three-dimensional (tertiary) interactions within and between these domains.

Supported by: FURSCA-Bethune Fellowship

Laurie Vance, '03**The Social Benefits and Implications of the Cochlear Implant and Its Effects on the Deaf Community**

Faculty Sponsor: Amy Terstriep

Major: Chemistry

Hometown: Saginaw, Mich.



I spent this summer conducting research at the University of Michigan's Cochlear Implant Program. With over 800 patients, the program is the largest of its kind in the nation.

Cochlear implants are surgically implanted electronic devices that provide improved hearing and communication to adults and children with severe to profound hearing losses. In 1984, the U.S. Food and Drug Administration approved the first cochlear implant. Since that time, the field of cochlear implants has expanded and progressed tremendously.

Proponents of deaf culture are highly opposed to cochlear implant surgery, although it has minimal risks. Deaf culture activists strongly believe that deafness is not a disability, and therefore is not something that needs to be "fixed." "To people who understand Deaf culture, hearing loss is a sign of community membership rather than a limiting characteristic" (Marschark, 1997).

Conversely, the benefits deaf people receive from a cochlear implant are astounding. If implanted at a young age, deaf children can obtain normal listening and speech skills and participate in mainstream schooling. Cochlear implants afford children with the opportunity for a better education, an advanced career, an improved self-esteem, and a fuller life.

Adults deafened later in life also experience improved communication with the cochlear implant. One patient states, "My implant has been the most positive and most wonderful experience in my life. Let there be no hesitation when deciding

whether or not to get one. It is unbelievable what the world of sound brings into a person's life." Future technologic advancements will likely result in continued improvements in cochlear implant patient performance. Because of its direct positive impact on deaf individuals and their families, this technology should be implemented.

Supported by: FURSCA

Emily Williams, '03**Dental Anxiety: Dental Patients' Physiological and Psychological Responses to a Specific Procedure**

Faculty Sponsor: Barbara Keyes

Major: Psychology

Hometown: Redford, Mich.



Dental anxiety is the dental patient's response to stress that is specific to a dental procedure or situation. The experience of dental anxiety is an important problem because it frequently results in the avoidance of

dental care. Previous research has examined the development of dental anxiety, as well as differences in the way it is experienced among various populations, through the use of measurements such as the Dental Fear Scale and the Dental Anxiety Scale.

The current study examined variances in levels of dental anxiety according to the type of procedure being performed. It was hypothesized that women would experience a greater level of dental anxiety than men, and that patients being treated with a bridge, crown, or root canal would experience a greater level of dental anxiety than patients being treated with a prophylaxis and oral examination.

Forty patients in a small, private general dentistry practice participated in this study. Twenty participants were being treated with a semi-annual prophylaxis and exam, and twenty participants were being treated with a bridge, crown, or root canal. Each participant was administered the Dental Fear Scale and the Dental Anxiety Scale to measure the level of psychological anxiety, and three blood pressure measurements were taken to measure the participant's level of physiological stress.

Significant differences were found between the level of dental anxiety experienced by patients treated with a prophylaxis and exam and patients treated with a bridge, crown, or root canal, as well as between men and women. These results hold important implications for the future of dental treatment.

Supported by: FURSCA

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 became athletic director at University of the Pacific and retired there in 1984. He now lives in Kalamazoo, Mich., 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 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.

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