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UTAH STATE UNIVERSITY

# Student Showcase

*Celebrating undergraduate research,  
scholarship, and creativity.*

April 3, 2007

The mission of Utah State University is to be one of the nation's premier student-centered, land-grant and space-grant universities by fostering the principle that academics come first, by cultivating diversity of thought and culture, and by serving the public through learning, discovery, and engagement.



*From its initiation, the Office of Research has been committed to facilitating research campus-wide basis as a way to broaden our store of knowledge, enhance the capabilities of staff members, and introduce students to the excitement of scholarly creativity (Research at Utah State University, 1974).*

For over 30 years, Utah State University has formally supported student research, recognizing that “research at USU is inexorably tied to academic programs and student involvement.” In the early 1970s, a report noted that “with each passing year more students are engaged in research.” As is clear from the listing in the back pages of this booklet, USU students are actively disseminating their research at state and national venues and competing successfully for national and international fellowships and scholarships.

Student Showcase has highlighted the marvelous work of undergraduate students at Utah State since 1998; before that time, it was called Scholars Day. It is gratifying to watch students who are excited about inquiry and discovery.

Utah State is recognized across the nation for its emphasis on student-centered, hands-on learning by faculty who care. In the Campaign for Utah State University– Honoring Tradition, Securing Our Future, we seek to enhance and increase the opportunities for students to engage in research. The Campaign for Utah State includes funding to enhance cutting-edge research for undergraduates. These opportunities prepare our students to be leaders in the information age as they head to graduate school or the workforce.

Utah State has invested in student research and will continue to do so as it honors the tradition established several decades ago and also secures the future of the university and its students.



Joyce Kinkead  
Associate Vice President  
Office of Research

# WELCOME

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Greetings!

Throughout the year, many events are held to chronicle the successes of USU's undergraduate researchers. Student Showcase is of particular note, however, because it is the one time when Utah State students gather at their own campus to congratulate each other on their accomplishments. This celebration certainly provides a hometown feel, but the effects of the research are anything but campus-bound.

From tracking lava flows in Yellowstone to controlling erosion at the Grand Canyon, USU students have taken their classroom knowledge into the field to make a difference in the world around them. At this year's Student Showcase, you'll see our students' impact on projects statewide, from tracking the health of ventilator patients at McKay-Dee Hospital in Ogden and exploring the dynamics of stepfamilies in rural Utah towns, to understanding how ants affect the ecosystem of the Eastern Great Basin and discovering how myths inhibit water conservation in Washington County.

Each of the projects displayed at Student Showcase represent a value-added experience for our students, preparing them for the next steps in their schooling and careers, but they also demonstrate the service-based citizenship that abounds among our Utah State student researchers. We are extremely proud of their accomplishments and invite you to get to know them better at this event.

Thank you for your interest in our students' research.  
Best Regards,



Brent C. Miller, PhD

As I have worked with student researchers this year, I have noticed one thing they are truly excited about is the opportunity to present and share their research with others. The Associated Students of Utah State University (ASUSU) understands the vital role research plays in students' education and is committed to supporting and encouraging research. Through the Academic Opportunity Fund, ASUSU is excited to help students travel across the globe to present and share their research.

Utah State University is known for the incredible research opportunities available to students. Undergraduate research provides invaluable hands on learning experience; perhaps Confucius said it the best, "I hear and I forget. I see and I remember. I do and I understand." Student researchers often tell me how hands on learning is not only a benefit to their current education, but an advantage down the road as it enables them get into the graduate school and program they want or to gain knowledge that will help them in their professional career.

It is great to be apart of a University that gives students the opportunity to become student researchers!

Sincerely,

Michelle Lundberg  
ASUSU Academic Senate President  
Vice President for Research

# TABLE OF CONTENTS

---

## **AGRICULTURE**

Katie Brown	18
Justin Johnson	39
Kylara Papenfuss	51
Laura Rowley	57
Michael Sharp	59
Melissa Sleight	62
Mary-Marie Sullivan	63
Jennifer Thurgood	65

## **BUSINESS**

Michael Charles Bailey	16
Vikki Ann Carlisle	22
Margo Farnsworth	22

## **EDUCATION & HUMAN SERVICES**

Aaron Anderson	13
Shaelene Ashby	15
Brianne Bartlett	17
Melissa Bryson	19
Amanda Gibson	28
Adam Kynaston	41
Kristina McDougal	47
Aubree Nielson	17
Cheryl Newbold	41
Amy Poole-Zisette	55

## **ENGINEERING**

Steve Broby	21
Jason Brown	21
Tanya Butt	21
Joseph Irvine	37
Nathan Jack	38
Rachel Simmons	60

# TABLE OF CONTENTS

---

## **HUMANITIES, ARTS & SOCIAL SCIENCES**

Erica Cottam	25
Kim Call Gleason	29
Brandi Harline	31
Devin Hepner	33
Heather Hunsaker	36
Amanda Marinello	46
Benny Nyikos	50
Sarah Platt	54
Katherine Shakespeare	58
Sarah Wagstaff	67

## **NATURAL RESOURCES**

Jesse Poulos	56
Kelly Sivy	61
Tyler Logan	44

## **SCIENCE**

Joseph Abel	10
Jennifer Albretsen	11
Jan Marie Andersen	12
Melody Anderson	14
Andrew Burgon	20
Sydney Chamberlin	23
Angel Cicero	24
Joseph Delka	26
Jennifer Ruth Fisch	27
Katherine Grover	30
Steven Hart	32
Kristi Higgs	34
Anne Howlett	Presenting
Sara Huefner	35
Matthew Jorgensen	40
Uyen Lam	42
Nicholas Lambert	10

# TABLE OF CONTENTS

---

## SCIENCE

Michelle Leavitt	43
Elizabeth Lund	45
Robert Meservy	48
Amanda Mortensen	49
Tristan Parry	52
Tony Pearson	53
Lance Pflieger	52
Janette Starks	42
Anthony Thomas	64
Christopher Tressler	66
Kimberly Warburton	Presenting
Keith Warnick	68
Brittany Webb	48
Ashley Wilkinson	49

## UNDERGRADUATE RESEARCH AWARDS

Jan Marie Andersen	83
Aaron Anderson	75
Kenneth Bartkus	72
Jeannette Blackham	73
John Brinkerhoff	71
Sean Haggarty	85
Brian Higginbotham	74
Lenaye Howard	79
David Law	84
Joseph Li	82
Gerald (Dusti) McEwen	77
Michael Nicholls	78
Kelly Sivy	81
Shanna Wheeler	85
Kenneth White	70
Wayne Wurtsbaugh	80
Anhong Zhou	76
Past Undergraduate Research Awards	87
Research Week Events	95

# **RESEARCH ABSTRACTS**

## **NANOSTUCTURING ON SEMICONDUCTOR SURFACES**

Joseph Abel  
Nicholas Lambert

We report on nanoscale modifications of strained and unstrained semiconductor surfaces using a scanning tunneling microscope (STM). Modified structures will also be studied on different semiconductor crystal planes. The nanoscale modifications are created by varying the

tunneling current and voltage of the STM. The morphology of the nanostructures is studied using the same STM. Scanning tunneling spectroscopy (STS) will be used to explore the electronic states of the nanoscale features on the surface.

## FABRICATION AND ANALYSIS OF NANOCRYSTALLINE COPPER

Jennifer Albretsen

325-mesh copper powder was ball milled under various conditions to produce copper samples of different grain sizes. One well-milled sample was annealed at varying temperatures and for different times to promote grain growth. These two procedures provide a range of grain sizes for study. Crystallite size was determined by analyzing x-ray diffraction peak broadening.

Continuing research would include equal channel angular extrusion (ECAE) of the samples in an attempt to produce bulk nanocrystalline copper, allowing researchers to more easily determine the mechanical properties of this nanocrystalline metal. NOTE: Mentors and fellow researchers for this project were James Hanna, Qi Zeng, and Dr. Ian Baker of Dartmouth College.

# EXTRACTING STRUCTURAL INFORMATION AND VELOCITY DATA OF ATMOSPHERIC AEROSOLS USING REMOTE SENSING TECHNIQUES

Jan Marie Andersen

Rapid elevation scans using a LIDAR pointing in the upwind direction at a fixed azimuth reveal patterns in the spatial structure of aerosols in the low-altitude boundary layer. Typically, these aerosol clouds are borne aloft from air pollution sources and areas of loose soil such as gravel roads and plowed fields. When scanned, aerosol patterns are kinematically distorted due to the combination of finite scan time and cloud motion. It is shown that true motion patterns can be interpreted by means of a joint analysis of successive "up" and "down" scans. Analysis of two fast, successive elevation

scans yields information about the motion of the cloud features and the fluid flow of the air itself - and thus about the turbulent motion within the atmospheric boundary layer. In spite of scan limitations, the temporal and spatial dependence of air flow can be determined by careful analysis of these repeated pairs of rapid scans. Behavior and structure of the aerosols can be constructed. Also, using this technique, wind speed can be measured remotely, without the necessity of setting up meteorological equipment at the exact site of the desired measurement.

## **DIFFICULTIES ASSOCIATED WITH STEPARENTING AS PREDICTORS OF REMARITAL QUALITY AND STABILITY: A STUDY OF RURAL UTAH STEPFAMILIES**

Aaron Anderson

As a result of high divorce and remarriage rates, stepfamilies have become commonplace in today's society. However, there are not societal norms for adults entering a stepfamily. Many couples may feel stressors specific to stepfamily situations that may affect the quality and stability of their marriage. Researchers of stepfamilies have pulled their samples from urban populations. However, urban research may not be generalizable to rural stepfamilies. Rural areas provide fewer financial and relational resources than urban areas which may increase stress for a stepfamily. Utilizing a rural sample, this study

uses regression analyses to assess relationships of stressors regarding stepparenting to marital quality and divorce proneness. Couples are asked to rate the seriousness of certain issues in their stepfamily such as dealing with legal problems that arise from living in a stepfamily, and ensuring the stepparent is viewed as a legitimate representative in the children's school environment. This study investigates differences between male and female responses to these stressors to assess if males or females report higher dissatisfaction as a result of these issues.

# ENHANCED BIOLOGICAL CONTROL OF THE CEREAL LEAF BEETLE

Melody Anderson

Many factors affect biological control of the cereal leaf beetle (CLB). I studied interactions involving lady beetles (predators of CLB eggs and larvae) and sugar (a nutrient source for the parasitoid wasp *Tetrastichus julis*). High lady beetle numbers in sugar-sprayed plots resulted in a small decrease in CLB larvae numbers mid-way through the season. Lab experiments studied lady beetle reproduction on a CLB larvae diet and wasp

longevity on a sugar-water diet. Examination of parasitism of CLB larvae by *T. julis* showed that early in the season sugar-sprayed plots had a much higher parasitism rate than control plots. Our results suggest that providing sugar at select times, in areas containing *T. julis*, could prove to be an effective way of decreasing future CLB numbers, while lady beetles might only keep already low CLB numbers at bay.

## PERFECTIONISM, COPING STYLES, AND RISKY SEXUAL BEHAVIORS AMONG EMERGING ADULTS



Shaelene Ashby  
Member of Psi Chi  
National Honor Society



The relationships among perfectionism, coping styles, and risky sexual behaviors (RSB) were assessed in a sample of 221 college students. Perfectionism has been characterized as a personality trait in which individuals have an intense drive to attain perfection and avoid failure (Hewitt & Flett, 1991). In order to deal with the psychological distress that is often associated with perfectionism, research has shown that individuals will engage in several different types of coping strategies

(Carver, Scheier, & Weintraub, 1989). The current study hypothesizes that an individual's coping style will moderate the relationship between perfectionism and participation in RSB. Thus, individuals with high perfectionism and high maladaptive coping strategies will be at greatest risk for participating in RSB (i.e., multiple sexual partners, unprotected intercourse, intercourse while under the influence of drugs/alcohol, contraction of a STD).

# CONSUMPTION, TIME PREFERENCE, AND THE LIFE CYCLE

Michael Charles Bailey

This paper presents two life-cycle models of consumption implementing novel assumptions about time preference and subjective time. The first model builds upon recent findings about the elasticity of intertemporal substitution (EIS) and the rate of time preference (RTP) in optimizing models of the intertemporal allocation of consumption and the rational consumers in this finite horizon model maximize lifetime

utility based upon a time dependent RTP. The second model investigates consumer behavior in subjective time, or the sense of the speed at which, subjectively, actual time passes. Consumers in this model maximize lifetime utility in subjective time. The optimal subjective consumption and saving functions are then mapped into real time. Both models are then compared to empirical findings on consumption theory.

### **LITERACY-BASED LEARNING ACTIVITIES: READING TO SERVE**

**Brianne Bartlett  
Aubree Nielson**

In an attempt to meet the needs of advanced readers in grades 4-6, the World Class Reader Model (WCRM) was implemented in several classrooms in Utah. The WCRM contains four components; Learning to Read, Reading to Learn, Reading to Serve, and Reading for Leisure. The main focus of this research falls into the Reading to Serve component. In this component, advanced readers apply reading skills in problem solving processes, permitting them to locate, organize, and analyze information that addresses community, state, national, or global issues. Through the

implementation of the Reading to Serve component, we hoped that advanced readers would use a full range of literacy skills as they contributed to the solutions of problems of interest to them. Our question then was which literacy skills were emphasized most frequently in literacy-based learning activities of Utah's Advanced Readers at Risk Project? Results show that a full range of literacy skills are most likely to be used in social service type projects and that social service projects are the most popular type of literacy-based service learning activities.

### **DEFERRAL RATES OF AMERICAN RED CROSS REGISTRANTS IN UTAH – IS LOW IRON STATUS AN ISSUE?**

Katie Brown

Iron is an essential nutrient that aids hemoglobin in the transport of oxygen in the blood.

Young-adult women are at increased risk for anemia largely due to regular blood loss associated with menstruation. Blood donation may also be associated with increased risk for anemia. The American Red Cross provided data on all people who registered to donate blood in Utah in 2005 between the ages of 17 and 30. Differences between deferral rates and reasons for deferral by gender were assessed using ANOVA and Chi-squared statistics. In 2005, 13% of registrants were deferred

at least once. Of those deferred (n=4664), 74% were females, and 61% of deferrals among females were due to low hematocrit. This accounted for only 2% of deferrals among males. In addition, among deferred female donors, the number of deferrals was positively associated with the number of donations. Among deferred blood donors in Utah, females are more likely to both donate blood and to be deferred from donating blood due to low hematocrit than males. Frequent blood donation among females may contribute to increased risk of anemia.

## **GENDER-BASED DIFFERENCES IN MODES OF EMOTIONAL EXPRESSION**

Melissa Bryson

Do gender-based stereotypes about expressing emotions influence men to convey emotions through alternate modes? Three channels of emotionally expressive activities will be examined (playing the guitar, writing in a journal/notebook, and drawing). The central hypothesis is that men, more than women, use guitar playing as a vehicle for expressing emotions, particularly when general forms of emotional expression are considered unacceptable for men. USU students (75 male,

75 female) will complete several assessments of emotional expressiveness (EE) measuring (1) gender-based stereotypes regarding EE, (2) EE in each mode, and (3) individual differences in activity participation. Analyses examine the extent to which social acceptability of each expressive mode predicts the prevalence and intensity of EE. Findings may help clinicians identify accepted forms of emotional expression for young adult males.

# ENTEROSTATIN REGULATION OF CELL PROTEIN EXPRESSION

Andrew Burgon

Genomic approaches showed that Enterostatin regulates dietary fat intake through inhibition of Agouti-related protein (AgRP) gene expression and also may be prevent cell death (apoptosis). To confirm the gene expression data, we used immunohistochemical fluorescent microscopy to study changes in the protein levels of enterostatin target genes. In neuronal cells enterostatin increased cell AgRP protein levels, despite reducing AgRP mRNA suggesting that enterostatin prevents the release of AgRP

protein from cells, consistent with its action to attenuate the appetite for dietary fat. Using brain endothelial cells, enterostatin increased levels of the antiapoptotic protein B cell leukemia/lymphoma 2 and promoted its localization into the cell nucleus consistent with its action to prevent cell death. These data provide new insight into pathways through which enterostatin regulates feeding behavior and inhibits angiogenesis.

## **A COMPARISON OF PROTEIN SECRETION IN SUSPENDED CELL AND IMMOBILIZED REACTORS**

Steve Broby  
Jason Brown  
Tanya Butt

The biotechnology industry currently relies on suspended cell reactors for the production of valuable proteins. However, medically important proteins are often produced in small amounts. This results in an increased price and decreased availability. It has been shown that immobilized cell reactors produce more ethanol than the suspended cell reactor, given the same population, fermentation time and media. It is theorized that this increased production will hold true for

proteins as well. This could make production of expensive, medically significant proteins more affordable and therefore available to people in need. This research focuses on comparing the production of proteins in suspended cell and immobilized cell reactors. Green fluorescent protein was selected due to easy observation of protein concentrations due to green fluorescence. This research will contribute to improved, cost effective protein production.

# THE CONFUSING WORLD OF LABELING CLAIMS: A REVIEW AND ANALYSIS OF CONSUMER FOOD PRODUCTS

Vikki Ann Carlisle  
Margo Farnsworth

Consumers are often confused by product claims. To help mitigate confusion, agencies such as the Federal Trade Commission (FTC), the U.S. Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA) are charged with regulatory oversight. Nonetheless, product claims often remain confusing. The purpose of this study is to further clarify the meaning of claims and to illustrate how even truthful claims can appear misleading. We begin with a historical review. For example, the claim “more food energy” was found to be misleading because it simply meant “more

calories.” From here, we clarify the meaning of claims currently in use today. For example, while the adjectives “low” and “less” appear synonymous, they actually have different meanings. We conclude with an analysis of four strategies that have the potential to confuse consumers: (1) the use of implied awards/endorsements/certifications, (2) the use of manufacturer-based “certifications,” (3) the use of manufacturer claims placed on valid third-party certifications, and (4) the use of third-party awards/certifications that require a monetary payment from the manufacturer.

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## THE SEARCH FOR A SOLUTION: HYDROGEN STORAGE RESEARCH IN REVIEW

Sydney Chamberlin

In the United States alone, Americans consume a total of 18,940 barrels of oil each day. This is greatly contributing to the onset of an energy crisis, which will see the end of usable fossil fuels within the world. Clearly, a solution to the energy dilemma must be reached before crisis hits. One such solution is hydrogen, the most abundant element in our universe. However, hydrogen faces obstacles in providing renewable energy, primarily with

storage. This study analyzes the past five years of hydrogen storage research, outlining primary developments in the field. Different methods are considered, along with their respective strengths and current barriers to their complete success. In addition, this review compares current hydrogen storage capabilities with the US DOE's goals and analyzes progress made since the year 2000.

# FASTER THAN LIGHT PHENOMENA (FTL)

Angel Cicero

The impossible in physics is what makes physics possible. The Earth being rounded sounded impossible, but considering the possibility of it, contributed to a huge progress in Physics. The Earth orbiting around the Sun sounded impossible, but again, the study of it led to a better understanding of the Laws of the Universe. Is

there a possibility of anything faster than light? Even if this hypothesis could never be proved due to the principle of casualty, the study of it can guide us to a better understanding of the basic laws of nature, and a source of better knowledge. What has been considered so far? The answer on the presentation...

**FROM EDEN TO UNCERTAINTY:  
CONFRONTING MYTH AND WATER  
CRISES IN WASHINGTON  
COUNTY, UTAH**

Erica Cottam

Citizens of Washington County are about to face serious water shortages that time-honored myths imposed on the landscape during the pioneer era will make difficult to confront. Biblical views of the desert as undesirable wilderness drove early Mormon settlers to create an Edenic oasis. Twenty-first century residents believe the desert has been conquered and no longer poses a threat, a myth that allows for

aesthetic appreciation of the landscape but also supports extravagant use of water for recreation and development. To admit that the desert is still a formidable opponent is to deny the achievement of previous generations and question the myth of the Garden. While the myth helped early settlers face an alien landscape, it now impedes rational efforts to conserve and develop an important limited resource.

# UNDERSTANDING THE ROLE OF THE PRMT N-TERMINUS IN SUB-CELLULAR LOCALIZATION

Joseph Delka

Protein Arginine N-Methyltransferases (PRMT) are a class of proteins that have been implicated in many cellular processes in both the cytoplasm and the nucleus. PRMT isoforms show a region of high homology and an N-terminal region that varies greatly. It is thought that the N-terminus of the protein has some role in sub-cellular localization. To shed some light on the issue, human

PRMT 6 (resides in the nucleus) and variant 2 of human PRMT 1 (resides in the cytoplasm) were examined. Chimeric proteins were made: one comprised of the PRMT 1 N-terminus and the PRMT 6 core, the other of the PRMT 6 N-terminus and the PRMT 1 core. If the N-terminus is solely responsible for sub-cellular localization, then localization of the chimera will reflect the attached N-terminus.

## GENERATING AN ADMA-SPECIFIC RNA APTAMER FOR QUANTIFYING ADMA

Jennifer Ruth Fisch

Asymmetric dimethylarginine (ADMA) is created when a protein arginine methyltransferase (PRMT) methylates arginine twice. ADMA is a known nitric oxide synthase inhibitor, not allowing nitric oxide, a vasodilator, to be synthesized. This can lead to cardiovascular disease (CVD). Aptamers, short strands of nucleotides, can be synthesized to have high affinity to a number of molecules, including amino acids. My objective is to create

an aptamer with high affinity to ADMA. This will allow an easy, cost-efficient process by which to find ADMA in solutions such as cell lysates. Understanding the full impact of arginine methylation has been hampered by the limited ability to detect protein-associated ADMA. Creating an easier method to find and isolate ADMA in solution opens up many opportunities to study CVD and how methylation affects protein function.

### **DIFFERENTIATED SPELLING INSTRUCTION**

Amanda Gibson

Several studies have concluded that differentiated spelling instruction is the best method to teach spelling. The teacher determines the students' spelling level and then delivers spelling instruction based on their spelling level. I tested this theory and found that differentiated instruction improves students' spelling by providing instruction that is specific to students' ability level and needs while offering high-quality instruction. I compared two groups of students in my

study, an intervention group using Words Their Way, and the control group given only standard spelling instruction. I worked with the intervention group for a seven-week period. At the end of the seven weeks I delivered a post-assessment to determine if the differentiated spelling instruction increased the intervention group's spelling level. The results showed that the intervention group advanced further in spelling levels than the control group.

## **RHYME AND REASON IN LANGUAGE ACQUISITION: INCORPORATING POETRY INTO THE ESL CLASSROOM**

Kim Call Gleason

Utah is seeing a rapid increase in K-12 students whose native language is not English. With this increase, teachers face the challenge of finding new and effective teaching methods to reach their ESL (English as a Second Language) students. My research seeks to establish the study of poetry as a successful instrument to improve ESL students' pronunciation of English. Poetry, with rhyme, meter, and alliteration, can aid in the successful pronunciation

of the English language. When read out loud, poetry can be an exercise in pronouncing consonant sounds (from alliteration), decoding vowel sounds (from rhyme), and acquiring the natural speech rhythm of the English language (from meter). It contains concise, descriptive language that depicts human emotion. I believe poetry is a powerful medium to introduce to ESL students.

# FUNCTIONAL DIVERGENCE OF DUPLICATE GENES IN SACCHAROMYCES CEREVISIAE AND SACCHAROMYCES CASTELLII

Katherine Grover

Gene and genomic duplications are an important source of new gene functions. To learn more about the origins of new genes after a genomic duplication, we are studying two related yeast species, *Saccharomyces cerevisiae* and *Saccharomyces castellii*, whose common ancestor underwent a whole genome duplication. By comparing existing duplicated genes in the species, we can infer whether the functional divergence occurred before or after the speciation event. We used bioinformatics tools and wrote ad hoc Perl scripts to compare the related genes in the two species.

BLAST was used to identify the related gene sequences between the two species. The sequences were extracted from the genomes and aligned with Clustal W in order of similarity. The aligned gene sequences were analyzed to determine when they diverged with respect to the speciation event. Data shows that some functional divergence took place after speciation, but the majority of genes had functionally diverged before the species split. This information can be used to investigate how fast divergence occurs and how many duplicated genes were present during speciation.

## THE CHASM BETWEEN TWO PARALLEL WORLDS

Brandi Harline

I came to Utah State University in 2003 after serving four years in the Navy. My military experience aroused interest in several issues within the military, specifically regarding minorities groups in the military. It seems as though many of the problems within the lower ranks of the military were documented by civilian scholars long before military leadership seemed to be aware of these

issues. Not only does the military seem to ignore the discourse among researchers, but many of the researchers do not give the military credit for handling many of the concerns addressed in the research. My research project is focused on identifying any communication gaps and misunderstandings that exists between the military and the civilians who study military social issues.

# ELECTRIC FIELD INDUCED HOPPING CONDUCTIVITY IN POLYMERS

Steven Hart

Mott and Davis as well as Poole and Frankle describe theoretically the resistivity of disordered semiconductors, when subject to a changing electric field, in terms of hopping conductivity models. Although such models have often been applied to polymers, there is little direct experimental evidence to confirm the validity of these theories when applied to polymers. We present such results for a newly-developed

block co-polymer Hytrel, a highly insulating material. The constant voltage resistivity test method has been used to study Hytrel for a range of electric fields approaching electrostatic breakdown. Previously taken preliminary measurements are suggestive that Hytrel validates hopping conductivity models. With additional data we consider whether the Hytrel results are consistent with existing models of hopping conductivity.

**YANKEE GO HOME!:  
POEMS AND TRANSLATIONS  
WITH A CRITICAL INTRODUCTION**

Devin Hepner

I will be describing how I came to write poetry and what influences both modern and past poets have had on my writing. I will also describe my interests in Russian language and poetry, citing their influence on my writing

as well as the mechanisms of translating poetic language. This exploration into my influences and technique will supply half of my thesis content. The other half will include my personal poetry and translations from Russian poetry.

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# **BASALT FLOW DYNAMICS, COMPOSITION, AND CALDERA FORMATION OF THE BLACK RIDGE BUTTE FLOWS, EASTERN SNAKE RIVER PLAIN, IDAHO**

Kristi Higgs

The basalt flows and calderas comprising the Eastern Snake River Plain are part of the Yellowstone Hot Spot Track, and were produced through interactions of the Yellowstone mantle plume and the overlying continental lithosphere as the North American Plate moved to the southwest between 10.0-8.6 million years ago. As such, they have a distinct chemical and radioactive signature. The basalt flows from the Black

Ridge Crater show distinct flow characteristics. These flows show a very steep angle of the initial crust at the front of the inflation structures, reaching an average of 67 degrees from horizontal. The flow fronts were mapped out using a total station and aerial photos in order to determine the volume of lava involved in the flows and its relation to the steep inflation structures.

# CARBON DIOXIDE REACTIVITY OF A MONONUCLEAR CADMIUM HYDROXIDE COMPLEX

Sara Huefner

Carbonic anhydrases form a family of extraordinarily active enzymes that are essential for many forms of life, including mammals, prokaryotes, and plants. These enzymes, including those found in humans, usually employ a zinc metal center to reversibly convert carbon dioxide and water to bicarbonate and protons. A newly discovered carbonic anhydrase, however, utilizes a cadmium metal center. In this research project I synthesized a molecular model for the new enzyme,

a mononuclear cadmium(II) hydroxide complex, and investigated the model's reactivity with carbon dioxide. I propose that this reaction results in the formation of a binuclear cadmium(II) carbonate complex. This product has been characterized by  $^1\text{H}$  NMR,  $^{13}\text{C}$  NMR,  $^{113}\text{Cd}$  NMR, FTIR, elemental analysis, and mass spectrometry. Reversibility studies show that the cadmium(II) carbonate complex does not perform the reverse reaction.

## A THEATRE STUDENT'S GUIDE TO WRITING

Heather Hunsaker

Theatre students have particular writing needs that often go unaddressed. They simply “survive” any writing assignments that they are given in classes and assume that they will not need to write in their profession because Theatre is predominantly an audio/visual field. Because of this, many

theatre students leave college without the necessary skills to write. My guide is a website that addresses theatre students’ specific writing needs. I go over the different kinds of writing, give examples to illuminate the explanations, and show how to cite sources to avoid plagiarism.

## **GME INTERPRETER FOR SMALL-SATELLITE DESIGN PROJECTS**

Joseph Irvine

As a Research Fellow for Utah State University I have been working with Dr. Eames on designing an interpreter to read a satellite design and interpret the design into a text-based format that can be read by other modeling and structural design languages. I have been using

C++ and have been applying the skills I have learned in the classroom to a real-life application. The C++ application traverses the satellite model and creates an output in the CSP language format through recursive loops.

## UNDERGROUND WIRELESS SENSOR NETWORK COMMUNICATION

Nathan Jack

A great need exists for small, low cost, low power wireless soil moisture sensors, which can be integrated into an automated watering/irrigation control system for need-based application of water. Radio (RF) and other wireless transmission technologies are not capable of reliable wireless data transmission in underground environments, and can therefore not be used for a wireless network of buried soil sensors. Nathan is developing

a method for underground communication using magnetic induction (MI). A wireless, fully-buried soil moisture sensing node will be equipped with a ferromagnetic coil. The soil information, superimposed upon a carrier frequency, excites the coil, establishing an electromagnetic field. This field induces a voltage at the surface receiver from which the data is extracted. Unlike RF, MI may transmit through soil, rock, water, or biological matter.

# THE INCIDENCE OF DIARRHEA IN VENTILATOR DEPENDENT PATIENTS IN THE INTENSIVE CARE UNIT (ICU)

Justin Johnson

In this study we investigated the incidence of diarrhea and its probable causes in ventilator dependent patients in the intensive care unit (ICU) at McKay-Dee Hospital. Chronic diarrhea has been a problem in the ICU, but the etiology has never been understood. Antibiotic therapy and/or use of glutamine have been thought to be potential risk factors. Currently we have found no relationship between the use of glutamine and the incidence of diarrhea; however, our

data suggests that antibiotic therapy is associated with diarrhea. Application of this research could lead to protocols in treatment of diarrhea. Protocols might include patients administered antibiotic therapy be given probiotics to prevent diarrhea. Also, if further evidence is found between glutamine and increased risk of diarrhea, discontinuing or reducing supplementation might be an alternative measure.

## **APPLICATION OF FINITE ELEMENT ANALYSIS TO PHOTOTHERMAL SPECTROSCOPY**

Matthew Jorgensen

A new examination of the temperature solution of a model photothermal sample is accomplished using finite element analysis (FEA). The temperature solution produced by FEA is compared with the solution obtained by solving the differential heat equation directly under the typical semi-infinite cylinder, radially parabolic and negligible

attenuation assumptions. Analysis has shown how to vary experimental parameters to maximize signal as well as to minimize the effect of the semi-infinite cylinder, radially parabolic, and negligible attenuation assumptions. A theoretical value of  $dn/dT$  for a glass model sample was also calculated.

## THE DEVELOPMENT OF SENSITIZATION TO D-AMPHETAMINE USING OPERANT CONTINGENCIES



Adam Kynaston  
Member of Psi Chi  
National Honors Society



Cheryl Newbold

Drug sensitization has been shown to be more likely to occur when drug-related behaviors such as locomotor activities do not impede goal-directed behavior. In this experiment, we examined whether sensitization to d-amphetamine in rats differs for responding maintained by random interval (RI) and random ratio (RR) schedules of food reinforcement. Four Long-Evans rats were trained to respond on a multiple RI RR schedule of food reinforcement. Acute

injections ranging from .1 to 10.0 mg/kg of d-amphetamine were given every three days. The dose that caused at least a 25% change in response rate was administered chronically for 30 days. Subjects then received the same pattern of acute injections. Results indicate that sensitization occurred after chronic administration of d-amphetamine, but was not differentiated between the schedules as was predicted. Future research directions will be discussed.

## **ANALYSIS OF BLUETONGUE VIRAL mRNA DEGRADATION BY qRT-PCR**

Uyen Lam  
Janette Starks

Bluetongue Virus (BTV) transmitted by the biting midge infects only sheep, cattle and other ruminants but not humans. Symptoms of Bluetongue disease include fever, blue discoloration of the tongue, and fetal malformation. BTV remains a disease of international and economical importance. Our research objective was to determine the kinetics, stability and degradation of BTV mRNA transcripts of L1, M3, S1, and S4 which encode for viral protein VP1, NS1, VP7, and NS3, respectively. The transcripts from

BTV-infected BHK-21 and A498 cells were determined and analyzed using PCR and qRT-PCR with primers designed to analyze the 3' end, middle and 5' end of each BTV transcript. We determined the kinetics of these four transcripts and found differential degradation initiated selectively at the 3' end, the middle and the 5' end of the mRNA. These results revealed the kinetics, stability, and degradation of viral mRNA, and can be used for the screening of anti-viral agents against BTV.

# DIHYDROPYRIDINE RECEPTOR INTERACTIONS WITH CALMODULIN AFFECT EXCITATION-CONTRACTION COUPLING

Michelle Leavitt

Excitation-contraction (EC) coupling describes events that connect the depolarization of the sarcolemma and  $\text{Ca}^{2+}$ -release from the sarcoplasmic reticulum (SR) that leads to muscle contraction.

Dihydropyridine receptor (DHPR) senses voltage changes and is mechanically coupled to the Ryanodine Receptor (RyR), or the  $\text{Ca}^{2+}$ -release channel, of the SR. Conformational changes of DHPR cause opening of RyR. Calmodulin (CaM) modulates the activity of DHPR and RyR.

CaM interacts with the IQ motif of  $\delta 1$  subunit of DHPR and effects EC coupling. Dysgenic myotubes will be injected with cDNA of the  $\delta 1$ s subunit and CaM, both of which are tagged to fluorescent proteins. Wild-type and mutated cDNAs will be used to visualize the interactions of DHPR and CaM in vivo using Fluorescent Resonance Energy Transfer (FRET). Patch-clamp will be used to collect physiological data.

### ***POGONOMYRMEX OCCIDENTALLIS* SEED PREFERENCE IN EIGHT VEGETATION TYPES IN THE EASTERN GREAT BASIN, UTAH**

Tyler Logan

*Pogonomyrmex occidentalis* (Western harvester ant) is a common and abundant granivore found throughout the Great Basin. In addition to the influence these animals can have on the physical environment (i.e. soil chemistry, water infiltration, etc.) they can have a profound influence on vegetation structure via sselective seed removal. With the changing physiognomy of many vegetation types

throughout the Great Basin due largely to non-native invasive species, it is important to understand how forging behavior and seed choice may vary spatially for this species. We designed an experiment to assess how the seed preference of *P. occidentalis* varies as a function of vegetation type. Eight vegetation types of interest were selected for this study.

# MECHANISTIC STUDY OF PP-1, A CATALYTICALLY PROMISCUOUS ENZYME

Elizabeth Lund

Protein phosphatase-1 (PP-1) is a catalytically promiscuous metallophosphatase that is able to hydrolyze both phosphomonesters and phosphodiesteres. These compounds undergo chemical hydrolysis by quite different transition states. This study investigates whether PP-1 accomplishes these reactions by stabilizing two different transition states, or if both

reactions occur on the enzyme via a common transition state. The transition states in the PP-1 catalyzed hydrolysis of a monoester substrate, p-nitrophenyl phosphate (pNPP), and a diester analogue substrate, p-nitrophenyl methyl phosphonate (pNPMP), are characterized using Brønsted analyses and kinetic isotope effects (KIE's).

## VIVISECTION AND CHOCOLATE

Amanda Marinello

“Who is your favorite author?” “Do you believe in love at first sight?” “What is the mark of a true friend?” These questions are not mere conversation starters, but are representative of a literary genre - namely the confession book (also called autograph book or friendship album), which became extremely popular both in the United Kingdom and America during the mid-nineteenth century. Precursors to today’s email surveys and magazine questionnaires, these confession albums offer insight into the sexual politics of the Victorian and give direct insight

into the author of the survey. By analyzing autograph albums filled out by young authors, specifically JM Barrie and Willa Cather, as mini-biographies, it is possible to gain rare understanding of their early life influences and trace the beginnings of themes found in their literary works for the remainder of their lives. This project examines the autograph book entries of JM Barrie and Willa Cather and shows how autograph albums function as a literary genre, and can be analyzed by the same critical techniques we use to analyze a novel or a play.

## PARENT'S RELIGIOSITY AND PERCEIVED SELF AND SOCIAL DISTANCING IN A GLBT SAMPLE



Kristina McDougal  
Member of Psi Chi  
National Honors Society



To examine social distancing (e.g., lack of familial support, discrimination) from the point of view of people in the Gay, Lesbian, Bisexual or Transgender (GLBT) population 200 GLBT people were surveyed at the Pride celebration in SLC. Participants were asked how they viewed the relationship with their parents and how they perceived their parents religiosity. Perceived social distancing was positively correlated with extrinsic

religiosity ( $r = .335, p < .01$ ) and intrinsic religiosity ( $r = .199, p < .05$ ). The participants also completed the Beck Depression inventory to examine the relationship of perceived social distancing to depression. Depression showed a mild to moderate positive correlation with perceived social distancing ( $r = .207, p < .05$ ). Implications for these findings and others findings from this study will be discussed.

# CREATION & CHARACTERIZATION OF ROGOWSKI COILS

Robert Meservy  
Brittany Webb

A Tokamak is a toroidal chamber where matter can be pumped inside and isolated in the center of the chamber as plasma. There are two types of magnetic fields that induce motion in the plasma. The first is toroidal, and the second type is poloidal. Having the toroidal field much greater than the poloidal field is the main feature of a tokamak. To determine the toroidal field, it's necessary to

create a Rogowski. It is also necessary to characterize & calibrate the Rogowski by using a Pearson. In order to calibrate the Rogowski, a current divider was manufactured to allow the Pearson to accurately measure current. Through the process of manufacturing a current divider and Rogowski coil, we are a step closer to being able to create plasma.

## CORRELATIONS IN AGGRESSION AND TTX RESISTANCE IN *THAMNOPHIS*

Amanda Mortensen  
Ashley Wilkinson

Garter snakes, genus *Thamnophis*, have evolved resistance to the deadly neurotoxin tetrodotoxin (TTX) found in their prey, newts of the genus *Taricha*. In Monterey Co. California, resistance to TTX is highly variable between species. Snakes from this locality also show different levels of aggressive behavior. We used two distinct behavior trials to assess aggressive behavior in 27 litters of neonate garter snakes of three species. Resistance to TTX also was measured by using a performance assay based on crawl speed. Overall, *T. sirtalis* demonstrated the highest level of aggression and the

highest resistance to TTX (adults of this species, from this locality, are resistant to amounts of toxin that would kill several hundred people). *Thamnophis atratus* is resistant to TTX and aggressive, but at a much lower level than *T. sirtalis*. *Thamnophis elegans* is least aggressive and does not show elevated resistance to TTX. Positive correlations between aggressive behavior and resistance were found within each of the three species, suggesting that as resistance in *Thamnophis* increases, aggressive behavior increases as well.

## HOLDING ONTO BELIEF

Benny Nyikos

This essay explores commonly-held approaches to religion, viewed through Hume's claim that miracles are the least rational explanations for events. The essay considers

how religion has continued to survive in an era of scientific progress and discovery. It attempts to rationally justify the continued usefulness of religion while delineating its limitations.

## **INFLUENCE OF PLANT GROWTH REGULATORS ON TART CHERRY FRUIT QUALITY**

Kylara Papenfuss

Ethephon is a plant growth regulator (PGR) used on tart cherries to promote fruit abscission for mechanical harvesting, but can cause excessive fruit softening. We tested ethephon alone or in combinations with other PGRs to find methods for obtaining adequate fruit abscission while optimizing fruit firmness. PGR combination treatments included an early application of ethephon followed two weeks later by AvglycineHCl (AVG), or an early application of

GibberellinA3 (GA3) followed two weeks later by full ethephon application. Each treatment was applied to four replicate trees in a randomized complete block design. There were no statistically significant differences among ethephon treatments for fruit abscission, ripening or softening. The GA3 treatment delayed fruit abscission, softening, and color development. AVG did not improve fruit firmness, and appeared to accelerate ripening.

# EFFECTS OF CAM ON FAST INACTIVATION OF SKELETAL MUSCLE CHANNEL NAV1.4 & ITS CORRESPONDING CONSTRUCTS

Tristan Parry  
Lance Pflieger

Nav 1.4 is a voltage gated sodium channel found in skeletal muscle. A mutation (F1740I) in the C-terminus of this sodium channel has been linked to muscular myotonia. This mutation may inhibit the binding of Calmodulin (CaM), a cytosolic Ca<sup>2+</sup> binding protein involved in closing sodium channels. We are constructing a

mutant sodium channel, tagged with a fluorescent protein, to be able to see the interactions between CaM (also labeled with a fluorescent protein) and Nav 1.4. Whole-cell patch clamping, confocal microscopy, and FRET will be used to determine interaction and function of the mutant channel.

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# DESIGN AND DEVELOPMENT OF A HIGH VOLTAGE, HIGH CURRENT ELECTRON GUN

Tony Pearson

A high voltage, high current electron gun is being developed as a means to probe the magnetic field of the earth. The electron gun will produce a beam of electrons with a peak energy of 40 keV and a current of 50 mA. To prepare for testing, simulations of the electron gun have been run using SIMION (Ion and Electron Optics Simulator). The simulations have been useful in

determining proper electrode spacing, emitter position, and the necessary voltages. During testing, the electron beam will be accelerated and focused into a copper target. A high energy electron beam striking a metal target creates an array of high energy x-rays. Calculations have been made to determine proper shielding to reduce the x-ray radiation to a safe level.

### **SUSTAINABLE INTERIORS IN HIGH-END RESIDENTIAL DESIGN**

Sarah Platt

In the past generation, sustainable housing was regarded as the result of mundane problem-solving at the sacrifice of aesthetics. My belief is that sustainability is another dimension of beauty and that a building can address environmental concerns without compromising luxury or design. As an interior designer, I aim to conceive houses as coherent, holistic systems and hold interior materials responsible for their

role in contaminants. Very recently though, manufacturers are transitioning towards creating interior products and furnishings that express environmental sensitivity—it is up to the designer to find ones that meet the highest standards. It is an added element to research companies with a dedication to environmental issues, but one that with a short-term investment, will provide exponential long-term returns.

### **WHAT DO FAMILIES WANT? UTAH FAMILIES RESPOND TO CURRENT EARLY INTERVENTION PRACTICES**

Amy Poole-Zisette

This study surveyed Utah families enrolled in six early intervention programs for a child with special needs, birth to three years of age. The purpose of this study was to examine what skills and qualities were important to different demographics of families. Participating families filled out a questionnaire which rated the degree to which they found various skills or

qualities important for an early interventionist to possess. Data were analyzed to determine how the skills or qualities families felt were important changed for different age groups of children, and how skills or qualities that families felt were important changed with the length of time the family had been served by early intervention.

## **PHENOTYPIC VARIATION IN THE FROG, *ELEUTHERODACTYLUS COQUI*, IN ITS NATIVE AND INTRODUCED RANGES**

Jesse Poulos

In this study, we compare phenotypic traits of *Eleutherodactylus coqui* in both its native (Puerto Rico) and introduced ranges (Hawaii) in high and low elevations. We present data on morphology and mating call parameters including snout-vent length, fundamental frequency of each mating call syllable, duration of syllables, time between syllables, and mating call rate. In Puerto Rico, call parameters are significantly

different between high and low elevations. In Hawaii, no differences were found between elevations. Because body size increases with elevation in Puerto Rico, and mating call parameters change with body size, as expected mating call parameters change with elevation in Puerto Rico. Likewise, body sizes did not change with elevation in Hawaii, which likely explains the lack of pattern in mating calls with elevation in Hawaii.

### **SEED PROPOGATION OF CHOKE CHERRIES**

Laura Rowley

Chokecherries are native to North America and widely distributed. Plants are propagated and grown for revegetation projects. The fruit is desirable for home processing and is collected from wild populations, but the fruit is not commercially produced. Little is known about optimum conditions for seed propagation. Seeds collected from a wild stand were cleaned and then subjected to one of 12 treatments. Each treatment consisted of four replicate plates of 50 seeds. Treatments included chilling at 3°C for a single chilling

period of 0, 4, 8, 12, 16, 20, or 24 weeks. Additional treatments included exposure to the growth regulator GA3 followed by 12 weeks of chilling, or two chilling cycles interrupted by 4 weeks at room temperature. None of the seeds chilled for 4 weeks or less germinated after 12 weeks at room temperature. Those seeds chilled for 8 weeks showed germination of 4.5%, compared to 41.0% germination for seeds chilled for 12 weeks. GA3 at 0.3 mM increased germination to 45.5%, with seedlings showing increased internode elongation.

## **CAN'T, SHOULDN'T, AND LOVE JUICE: A MIDSUMMER NIGHT'S DREAM AND THE PHAEDRA-HIPPOLYTUS MYTH**

Katherine Shakespeare

A recurring mythical thread dating from ancient Egypt and Mesopotamia is centered upon a prestigious woman, often married, who attempts to seduce and is spurned by a young man. In the Greek tradition, this "Potiphar's wife" motif is explored in multiple variations of the Phaedra-Hippolytus myth, which depicts the monstrosity of the potential union between a stepmother and stepson. Though well disguised,

Shakespeare's *A Midsummer Night's Dream* (MND) is a subtle and creative modern resonance of the Phaedra-Hippolytus myth, drawn on similar themes and characters. Although Phaedra and Hippolytus themselves are physically absent from MND, the themes of their myth are so intimately interwoven in MND that close examination cannot help but produce a vision of them walking among MND's fairy folk, royalty, and lovers.

# COMPARISON OF THE VIABILITY OF *LACTOBACILLUS CASEI* IN YOGURT VERSUS LOW FAT CHEDDAR CHEESE

Michael Sharp

Probiotics are microorganisms which can exert health benefits beyond inherent basic nutrition. It was my hypothesis that low fat cheddar cheese offers an attractive food-based delivery vehicle for probiotic cultures because of its high pH, solid consistency and high buffering capacity. This study compared the viability and acid-resistance of a probiotic adjunct strain, *Lactobacillus casei*, in a low fat cheese versus yogurt. Cheese

and yogurt were made using *Lb. casei* ATCC334 transformed with pTRKH2, a plasmid that codes for erythromycin resistance. From the data gathered in this study I was able to conclude that low fat cheddar cheese is a viable delivery food for *L. casei* probiotics because it allows for good cell survival during storage and protects cells against low pH conditions that will be encountered during stomach transit.

## **DETERMINATION OF AUTISTIC GENOTYPES USING PCR-SSP ANALYSIS**

Rachel Simmons

Autism is a developmental disability that affects social interaction and both verbal and non-verbal communication skills. Early diagnosis and treatment of Autism can greatly reduce the effects of the disorder, however early treatment is difficult because there are no medical tests for diagnosing autism. We

are testing for several Single Nucleotide Polymorphisms (SNP) on specific genes that are believed to be related to autism. This will lead to a better understanding of the genetic basis of Autism and possible future treatments, as well as early diagnostic testing.

**TALES FROM THE SANDBOX: DO  
PREDATOR CUES INFLUENCE PATCH  
SELECTION AND SEED  
HANDLING BEHAVIORS IN TWO  
HETEROMYID SPECIES?**

Kelly Sivy

Many factors influence rodent seed choice. Of them, predation pressure is thought to have an important role in spatial partitioning of rodent species in deserts. In a feeding arena study, we tested how direct cues (predator vocalization and scent) and indirect cues (protective shrub cover) of predation influence foraging of two Heteromyid rodents, *Dipodomys ordii* and *Perognathus parvus*, harvesting three seed species. Cues did not affect

seed preferences. *P. parvus* mostly cached harvested seeds, whereas *D. ordii* mostly consumed or placed seeds in larders. However, *D. ordii* appeared to alter behavior in response to predation cues, placing more seeds in the larder in the presence of some cues. Our results suggest that predation pressure has only a minimal impact on the outcome of the seed-seed consumer interaction.

# **BONE METABOLISM IN CYSTIC FIBROSIS PATIENTS**

Melissa Sleight

The purpose of this thesis was to review current research and literature as it pertains to the bone health of cystic fibrosis patients. In the first chapter the definition, genetics/incidence, manifestations/diagnosis, nutritional status and management of cystic fibrosis is presented and discussed. The second chapter discusses the evidence of bone disease in cystic fibrosis patients and more

fully, the possible causes of bone disease in this population. Possible factors include chronic disease, lack of optimal nutrient intake, vitamin D and K, fat malabsorption, delayed sexual maturation, medications, and physical activity. Differences seen in children, adolescents and adults and possible indicators of bone disease in cystic fibrosis patients are also discussed.

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# THE ASSOCIATION BETWEEN SLEEP AND BODY MASS INDEX (BMI) IN COLLEGE FRESHMEN AT UTAH STATE UNIVERSITY

Mary-Marie Sullivan

In Logan, Utah, the “USU Freshmen Health Study” was conducted in order to address current health concerns towards the national obesity epidemic. 186 incoming freshmen were recruited to participate in three data collections throughout their first year in college. Aspects of health that were evaluated included eating habits, sleep duration, exercise patterns, and managing stress. Self-reported data, height, weight, blood pressure, and waist circumference were measured. By utilizing data from this health study, the association between sleep duration and body mass

index (BMI) were examined. Several studies have shown sleep duration to be a potential regulator of body weight and energy metabolism. As sleep patterns are often altered among college freshmen, this could be a habit that contributes to rising obesity rates. There was an association between sleep deprivation and higher BMI in college males, but not females. Our objective is to analyze results of all three data collections to determine if there were significant changes in sleep and BMI in the first college year of these freshmen participants.

# THE EFFECT OF VOLTAGE RAMP RATE ON DIELECTRIC BREAKDOWN OF THIN FILM POLYMERS

Anthony Thomas

The electrostatic discharge voltage, or ESD voltage, is the voltage at which the degradation of a polymer occurs. Thin (25 to 125  $\mu\text{m}$ ) samples of polymers are sandwiched between two plates which are charged, creating a voltage potential between them, which when sufficient the charge breaks through the barrier creating a path for the electric current to flow. The ESD voltage can vary with the rate of applied

voltage, larger rates of voltage increase causing premature breakdown compared to slower ramping rates. This may be due to a conditioning of the sample; the stress of the voltage is easier to handle if taken in small increases. This study investigates effects of voltage ramp rates from 20 V/s to 500 V/s on the ESD voltage of ePTFE, Tefzel and Teflon samples.

# **OXIDATION KINETICS AND STABILITY OF ANHYDROUS MILK FAT AND POLYUNSATURATED FATTY ACID BLENDS**

Jennifer Thurgood

Many applications in the edible oils industry have a lipid system composed of a blend of saturated and polyunsaturated fatty acids. However, polyunsaturated fatty acids are relatively easily oxidized by exposure to oxygen, heat, etc. Differential Scanning Calorimetry is a non-chemical, accelerated oil stability test that can be used to study oxidation kinetics of such lipid systems. The objective of this research project was to take

a systematic approach to the determination, by Differential Scanning Calorimetry, both in the isothermal and non-isothermal modes, of the oxidation kinetics of different blends of soybean oil and anhydrous milk fat to observe how the stability of such blends were affected by the variation in chemical composition between blends, and to compare the results obtained from each of the two methods.

# **DEVELOPMENT OF AN EXPERIMENTAL DRAINAGE TO STUDY GULLYING AND EROSION-CONTROL MEASURES AT ARCHAEOLOGICAL SITES IN GRAND CANYON**

Christopher Tressler

This research project attempts to build and calibrate an experimental drainage replicating the overland flow and resultant gullies found in Grand Canyon. Field data collected from six archaeological sites in Grand Canyon have been used to parameterize and calibrate the experimental drainage. These data include survey profiles of gullies, sediment shear strength, particle-size analysis, saturated hydraulic conductivity, and precipitation. Within the 1.2x1.8x5.5 m

experimental drainage box the gully develops in a substrate material closely matching that found in Grand Canyon. An artificial soil crust is developed with a mixture of Portland cement and sand. Overland is produced by the use of a perforated pipe connected to an orifice plate which measures the discharge. Gullies form and propagate up-slope by changing baselevel at the downstream end of the experimental drainage.

## BUSES

### Sarah Wagstaff

An example of poetry by Sarah Wagstaff:

We watch  
a woman waiting for her bus walk by  
chewing a piece of gum while her body trembles.  
Her jaw shakes without stopping, without tiring,  
because the muscles always run on and on  
in some unceasing race to death  
But she doesn't notice because  
age has come upon her like moss,  
slowly and thick.  
Making each breath a chore, that which was once a sigh  
of exasperation or annoyance has now become her sole existence.  
Every inhalation will tell her if she is to continue being  
or if she will, suffocated by that invasive fungus  
become slow and soft too, until she is no longer slow  
but has stopped completely and is no longer soft nor pungent.  
She looks around hesitantly as if she expects some ruffian to

attack her with a knife and triumphantly steal  
her already used tissues and pink inhaler.  
A decade or seven of science has passed her by.  
She seems to sense this now  
as she is among the eager faces that flaunt progress.  
In their presence she wrinkles her face and tightens her neck.  
Her eyes are tired and she wants to sit down but  
the benches are full and she's afraid  
of being vulnerable  
of being left behind  
of dying  
of smiling  
of buses.

## **THE GALERKIN SPECTRAL METHOD FOR MODELING TEMPERATURE VARIATIONS IN AN INSONIFIED GAS BUBBLE**

Keith Warnick

It has been known for years that acoustic waves in a liquid medium can prompt the spontaneous formation and cavitation of gas bubbles. However, the extreme variations in pressure, temperature and size which these bubbles may undergo make it a very dynamic and complex phenomenon. Following the work of Kamath and Prosperetti, the Galerkin

spectral method may be used to express the time-varying temperature field of a bubble as a superposition of Chebyshev polynomials, allowing a numerical solution for the equations which describe this field. This solution has possible application to the study of sonoluminescence, tissue heating in medical ultrasound, and possible methods for nuclear fusion.

# **RESEARCH RECOGNITION**

### **KEN WHITE**

Dr. White is a Professor of Reproductive and Developmental Biology in the Animal, Dairy, and Veterinary Sciences Department. He also serves as Associate Director for Research, Center for Integrated BioSystems. Dr. White has held research opportunities at the University of California, Davis and Louisiana State University before coming to Utah State University in 1991. A prolific researcher and author, Dr. White has more than 100 publications to his credit including book chapters, journal articles, and scientific presentations. He is internationally known for his research, in collaboration with the University of Idaho, to develop the first cloned mule through nuclear transfer

embryos. Dr. White has been a research mentor for three undergraduates in the College of Agriculture in the past. He recently invited into his laboratory undergraduate John Brinkerhoff, a junior majoring in Bio-Veterinary Science. John jumped into the routine of molecular science, first mastering elementary lab techniques and before advancing to in vitro fertilization of Bovine oocytes. John Brinkerhoff was successful in his URCO application with Dr. White as his mentor. Together they plan to isolate and enrich sperm proteins using profound Sulfo-SBED biotin label transfer in conjunction with an immobilized monomeric avidin column.

### **JOHN BRINKERHOFF**

John Brinkerhoff was first selected as an undergraduate research fellow in 2003. This initial research opportunity, with Dr. Doug Hammon as his mentor, involved tracking fetal development of cloned sheep. Following a two-year mission for his church, John returned to USU and the College of Agriculture in 2006 to continue his major in bio-veterinary science. As a bio-veterinary student, John's interests lie primarily in the animal kingdom. He enjoys seeing the chemical interactions and reactions in the biological world, specifically at the tissue and organ or the molecular level. John has many years of experience in veterinary medicine. His father is a veterinarian in Washington County, Utah. However, the subjects of chemistry and biology

have sparked an interest in new areas. John was invited to join Dr. Ken White's lab in the Center for Integrated BioSystems. John jumped into the routine of molecular science, first mastering elementary lab techniques and before advancing to in vitro fertilization of Bovine oocytes. John Brinkerhoff was successful in his URCO application with Dr. White as his mentor. Together they plan to isolate and enrich sperm proteins using profound Sulfo-SBED biotin label transfer in conjunction with an immobilized monomeric avidin column. And along the way, John will complete a minor in Portuguese. For John Brinkerhoff, the next step is graduate education. He plans to complete a DVM degree with specialization in equine medicine.

### **KENNETH R. BARTKUS**

Dr. Bartkus is professor of marketing and director of undergraduate research in the College of Business. His students have presented research at a variety of scholarly venues including Research Day on Capitol Hill, the Student Showcase, the Utah Conference on Undergraduate Research, and the National Conference on Undergraduate Research. Research collaborations with

students have appeared in peer-reviewed conference proceedings and scholarly journals. He is the founder and managing director of the Excellence in Business Research Group, a consortium of business scholars dedicated to the advancement of undergraduate research. This is Dr. Bartkus' third recognition for this award, a record in the university.

undergraduate researcher of the year

## **JEANNETTE BLACKHAM**

Jeannette Blackham is a senior in the College of Business who is majoring in marketing. Her project, Are Guest Comment Cards Valid? Empirical Evidence from the U.S. Hotel Industry, was presented at Research on

Capital Hill Event and at the Utah Conference on Undergraduate Research. Her faculty mentors for the project were Professors Ken Bartkus and Stacey Hills. Jeannette will be employed at Sinclair, Inc. following graduation.

### **BRIAN HIGGINBOTHAM**

Dr. Brian Higginbotham received his Bachelor's degree in Psychology from Brigham Young University. He earned a Master's of Science in Marriage and Family Therapy and a Ph.D. of Human Development and Family Studies from Auburn University. He joined the faculty of Utah State University in 2005, and his current position includes Extension, research, teaching, and service. Dr. Higginbotham's programmatic and research interests center around the development and enhancement

of healthy relationships over the life course. Of particular interest are factors influencing remarriage quality and stepfamily functioning. His current projects include a five-year, federally funded project to strengthen stepfamilies, a longitudinal research study on newly remarried couples, and a State-wide mentoring program for at-risk youth. Dr. Higginbotham enjoys the beauty of Cache Valley and working with wonderful USU students.

### **AARON ANDERSON**

Aaron I. Anderson, a senior majoring in Family, Consumer, Human Development with an emphasis in Family and Community Services, has worked as a research assistant since October 2005. He is currently working with Dr. Brian Higginbotham on a variety of projects focusing on divorce, remarriage, and stepparenting. Aaron is currently second author of an article that is currently under review in the Journal of Personal Finance. He has also assisted with the preparation of a \$42,000 grant to the Utah Agricultural Experiment Station. Recently he proposed and won a \$1,000 Undergraduate Research and Creative Opportunities grant. Aaron has already shared his research in three

different venues: Undergraduate Research Day at the Utah State Capitol, the Utah Conference on Undergraduate Research at the University of Utah, and the Legislator spouses' luncheon in Salt Lake City. Aaron currently has written two proposals to present nationally at the National Conference on Family Relations in Pennsylvania and the Undergraduate Research Day in Washington DC. In addition to his research, Aaron has contributed to the Department of Family, Consumer, Human Development in many ways. He is currently serving as the president of the student Marriage and Family Therapy Association and is on the Board of Directors for the Utah Conference on Family Relations.

### **ANHONG ZHOU**

Dr. Zhou has an outstanding record of grantsmanship and has demonstrated a consistent successful campaign to involve both undergraduate and graduate students in conducting research and in presenting papers at professional meetings. His area of expertise is electrochemical processes applied to engineering technologies, devices, and systems. His strength in grantsmanship is demonstrated by his total external funding awards this past year of nearly \$580,000. Another strength is Dr. Zhou's successful mentoring and involvement of undergraduate students in his research in addition to his graduate students and postdocs. He has taken a lead role in the BIE Department to utilize, mentor, retain, and reward undergraduate students with regard to involving them in

state-of-the-art research methods and procedures. He encourages them to go to professional meetings to present results as posters or papers. Dr. Zhou's students have consistently been awarded URCO grants (through USU) that have produced sufficient quality results that enabled the students to attend professional meetings for presentations. Therefore, a significant strength of the record is Dr. Zhou's "team building and mentoring" skills that include undergraduate students as well as graduate students. Dr. Zhou's research activities have resulted five invention disclosures and one patent application in 2006 through the USU Office of Technology Management and Commercialization associated with new electrochemical sensor technologies.

undergraduate researcher of the year

## **GERALD (DUSTI) MCEWEN**

Dr. Anhong Zhou says, "Gerald McEwen is my best undergraduate student working in my research lab at BIE." A senior, he joined the research lab in 2005. Because of his hard work, Gerald has presented (or co-authored) in more than 5 conferences for his research since 2005. These presentations include: the Research on Capitol Hill Event (2006,2007), the Utah Conference of Undergraduate Research Event (2007), the Rocky Mountain Snowbird Bioengineering Conference (2006), Biomedical Engineering

Society (2006), IBE Conference (2006,2007), and the Biosensor Congress World Conference (2006). Gerald was also a recipient of the ASUSU travel award (\$250), in which he was able to present his work at this year's Institute of Biological Engineers (IBE) Conference in March 2007 at St. Louis. Gerald has been a student member of IBE in past two years. Along with two other undergraduates, Gerald also helped the Biotechnology Summer Academy for high school students in 2005.

### MICHAEL NICHOLLS

Michael L Nicholls joined the History Department in 1970, teaching the history of colonial America and the early Republic. Over the past 36 years he has served the University as one of its best teachers and most dedicated servants. Named the Teacher of the Year for the College of HASS, Alumni Association Professor of the Year, a Student Services “Friend of Students,” and Outstanding Undergraduate Research Mentor for HASS, he has modeled good teaching and an ethical commitment to historical truth for thousands of students. He served as Interim Dean of the Graduate School and did a superb job as Director of Graduate Studies for History. Always concerned about the

quality of history teaching in the public schools, he organized and taught workshops for school teachers, as well as participating in a number of federally sponsored programs for improving the teaching of history. As a scholar, he has earned a wide reputation for his detailed knowledge of the Free Black population of Virginia. Described by an eminent colleague as “one of the leading scholars of slavery in Colonial America,” his research shows the same meticulous attention to detail as does his teaching and his service. The Department of History and the College of Humanities Arts and Social Sciences deeply appreciate all he has done for our students and our colleagues.

### **LENAYE HOWARD**

Lenaye Howard is a double major in History and Law and Constitutional Studies with a minor in Mathematics. Since the fall of 2005 she has worked with Professor Michael Nichols developing a database for a study of the first generation of free people of color in Petersburg, Virginia, 1780-1820. It will be published as an introduction to an edited and annotated edition of the Petersburg Free Black Register, 1794-1818. Handwritten records of manumissions found on microfilm of Virginia County records have been abstracted and an Excel file created of the Free Black Register. The notes of the manumission have been mounted on the internet to share with African American genealogists and historians. Already nearly two

hundred searches have been conducted of the records and the evidence has been used in web discussions focused on Virginia history. Lenaye Howard and Michael Nicholls gathered the manumission data but Lenaye was the sole creator of the Excel data file. For her Honors Thesis, Lenaye is using the case of Greenock, a slave man convicted of rape in early nineteenth-century Virginia, to explore the complex interweaving of race, class, status, and gender pervading the case. She plans to submit a version of it and the supporting key documents for publication in an appropriate professional historical journal. Lenaye is a native of Smithfield and Presidential Scholar at Utah State University.

# NATURAL RESOURCES

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undergraduate research mentor of the year

## WAYNE WURTSBAUGH

Dr. Wayne Wurtsbaugh, Professor of Watershed Sciences, enjoys introducing students to the challenge and excitement of research, both in the classroom and with independent study projects. In one class, students carry out individual research projects concerning the Great Salt Lake, and these are consolidated into a report for State Agencies that manage the ecosystem. Other students have done independent research projects,

and six of these have been published in leading scientific journals. Most of these students have gone on to graduate school and careers in environmental management. Dr. Wurtsbaugh's nominator noted, among other kudos, that it was his first time conducting an experiment on his own, but that Wayne was very willing to sacrifice his own time to help and made it a really great experience.

### **KELLY SIVY**

Kelly Sivy, a Conservation and Restoration Ecology major, has worked as an undergraduate research assistant with Dr. Eugene Schupp on a number of research projects. This past summer Kelly conducted an independent research project in collaboration with Dr. Schupp and Steve Ostoja. Kelly worked collaboratively with her mentors on all aspects of this project, including developing the initial questions, designing the experiments, meeting with the statistical consultant, reviewing the literature, conducting the research and statistical analyses, and interpreting the

results. Importantly, to conduct this research, she effectively managed a field crew of NASA-funded high school students. This research was supported by a University-wide CURI grant and a CNR undergraduate research grant. Kelly is presently writing the research for publication, and she is submitting an abstract to present a poster on this work at the annual meetings of the Ecological Society of America in August. Kelly is a very bright student, and we look forward to seeing many more great things from her in the years to come. Kelly is a Seely-Hinckley scholar.

### JOSEPH LI

Dr. Joseph Li takes a very active role in promoting undergraduate research at USU. In the words of his department head, Daryll Dewald, "In his 22 years at Utah State he has consistently provided research opportunities for undergraduates. Few of our faculty has had as large an impact on the lives and careers of our students." Dr. Li's approach involves training students in the "3Ls (Listen, Learn and Lead)" and "3Ts (Tomorrow's Technology Today)". To date, more than 60 undergraduate students have worked in his laboratory. Of these students, more than half have gone on to either graduate or medical school. While in earlier years undergraduates typically performed research for only 3-6 months in his laboratory, in the last 3-5 years, Dr. Li has incorporated sophomores and juniors into his lab who participate

in the project for a longer period of time. Many of his students have made presentations at local, national, and international meetings. Dr. Li encourages his students to independently identify the objectives of the research and then plan and perform experiments of good design. In his own words, Dr. Li describes his commitment to undergraduate research: "Investing time and effort in undergraduate research is discovering a dream to face the future, seeing potential success in an innovative mind and building a better tomorrow in humanity by touching a budding life today." Dr. Li's impact on his students' development as scientists is evident. A current undergraduate student, Uyen Lam, stated, "Through his guidance, I have pushed the limits of my abilities, and it has helped me to reach my potential."

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undergraduate researcher of the year

## JAN MARIE ANDERSEN

While pursuing a double major in Physics and Mathematics, Jan Marie Andersen became involved in undergraduate research during her freshman year when she joined the Microgravity Research Team. This team designed experiments to fly on the space shuttle. After her sophomore year in college, Jan Marie spent a NASA summer internship working at the Ames Research Center in Moffett Field, CA. A poster presentation and paper resulted from this internship. Since summer 2005 she has worked at the USU Space Dynamics Laboratory, performing research under the direction of Dr. Tom Wilkerson. This research is performed using Lidar and involves studying aerosol transport in the atmosphere. In his letter of nomination, Dr. Wilkerson noted that, "The methods developed by Jan Marie provide new insight on the basic processes of atmospheric

dispersion of pollutants." Jan Marie has made numerous professional presentations, including a poster presentation at the American Physical Society Fall Meeting, Four Corner Section (Logan, Utah, Oct. 2006) where her poster was selected for an Outstanding Student Presentation Award. She has been accepted to make an oral presentation of her atmospheric research work at the 21st National Conference on Undergraduate Research (NCUR), which will be held at Dominican University, San Rafael, California, in April 2007. Jan Marie has also performed research in mathematics, under the direction of Dr. Ian Anderson. In support of her undergraduate research, Jan Marie has been the recipient of a Physics Department Undergraduate Research Award, and a USU College of Science Undergraduate Research Minigrant.

# REGIONAL CAMPUS

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undergraduate research mentor of the year

## DAVID LAW

Dr. Law has incorporated his parenting program developed at BYU with Gawain Wells into an outstanding opportunity for undergraduates to participate in applied research. Love, Limits, and Latitude will most likely become one of the most sought-after parenting programs available. This is primarily because he is systematically collecting outcome data that show progress in the parent's relationships with their children. There are few parenting programs available

that are theoretically based, which include data supporting the success of the project. The students are integrally involved in the experiences of the parenting program by attending the classes, presenting some of the concepts to the parents, and participating in the data collection process. Law's project allows students to participate in good research as undergraduate students. He reports that undergraduates are on par with graduate students!

undergraduate researcher of the year

## **SEAN HAGGARTY SHANNA WHEELER**

Sean and Shanna both participated in a class project that is designed to incorporate students in the research process. In the FCHD 3530 Adolescence class, students are required to generate questions each week that can be incorporated into a research project at the end of the semester. Sean and Shanna rose to the top of the group in their skills as future researchers. Sean participated in the class, volunteering to round up adolescents for a focus group to be held before the end of the semester. The process for this activity was time consuming as he worked with the administration of a boarding school to allow the entire class to hold a focus group. He also worked with the parents and students to collect letters of consent and assent. He arranged for a room, and made sure the students showed up for

the activity. Sean was invited to present our poster at a luncheon in Salt Lake City with the First Lady, Joyce Albrecht. Once the project was over, Shanna wrote an abstract and submitted it to the first Utah Conference on Undergraduate Research (UCUR) on behalf of the entire class. Shanna has just started her degree program after serving as a nurse for several years. She was integral in the research process, generating excellent questions for every class. Even though she expressed hesitation to develop an abstract without ever having taken a research methods class, she did an outstanding job. Her leadership ensured that the rest of the class was able to go to the conference. Since she generated the abstract, she has also attended other research conferences on her own time.



## **PAST AWARDS**

# STUDENT SHOWCASE

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past award recipients

## **Undergraduate Research Mentor of the Year**

### **Agriculture**

Heidi J. Wengreen	2006
Dan Drost	2005
Janis Boettinger	2004
Jeanette Norton	2003

### **Business**

Kenneth Bartkus	2006
Ruby Ward	2005
Kenneth Bartkus	2004
E. Bruce Godfrey	2003

### **Education & Human Services**

Melanie Domenech-Rodriguez	2006
Scott Hunsaker	2005
Eadric Bressel	2004
Tamara Ferguson	2003

### **Engineering**

Barton Smith	2006
Todd Moon	2005
Barton Smith	2004
Robert Spall	2003

### **Humanities, Arts & Social Sciences**

Susan E. Manon	2006
Steven Simms	2005
Bonnie Glass-Coffin	2004
John Seiter	2003

### **Natural Resources**

Phaedra Budy	2006
Chris Luecke	2005
Helga Van Miegroet	2004
Mark Brunson	2003

### **Science**

Lisa Berreau	2006
David Peak	2005
Daryll DeWald	2004
Dennis L. Welker	2003

### **Extension**

Lianna Hatfield Etchberger	2006
Susan Talley	2004
Richard Etchberger	2003

# STUDENT SHOWCASE

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past recipients

## **Undergraduate Researcher of the Year**

### **Agriculture**

Katie Brown	2006
Aaron Davis	2005
Caralee Wilcock	2004

### **Business**

Zachary Ames	2006
Anne Israelsen	2005
Jeffrey Lynn Reece	2004

### **Education & Human Services**

Brianne Bartlett	2006
Tracey Reeve	2005
Cheryl Jones	2004

### **Engineering**

Zac Humes	2006
John Crockett	2005
Todd Bigelow	2004

### **Humanities, Arts & Social Sciences**

Sarah Hatch Thompson	2006
Kacey Udy	2005
Jennifer Hulse	2004

### **Natural Resources**

Jake Gibson	2006
Hayley Olsen	2005
Jessica Evans	2004

### **Science**

Glen de Guzman	2006
Dustin Keele	2005
David Hatch	2004

### **Extension**

David A. Evans	2006
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# STUDENT SHOWCASE

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## national and international scholarships

### **Goldwater Scholars**

Heidi Wheelwright	2006
Logan McKenna	2006
Keith Warnick	2006
Stephanie J. Chambers	2004
David Hatch	2004
Jamie B. Jorgensen	2002
Lara Anderson	2001
Jeffrey L. Jacobs	1998

### **James Madison Scholars**

Julie Major	2006
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### **Rhodes Scholars**

Lara Briana Anderson	2004
James E. Butcher	1982
William S. McEwan	1938
George Piranian	1937
G. Fred Somers	1936
Karl E. Young	1926
James Morris Christensen	1921

### **Udall Scholars**

Josh Hirschi	05-06
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### **National Security Education Program**

Eric Hilleman	02-03
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### **Fulbright Scholars**

Abigail Jensen	2005
Justin Randolph	2003
Jason van Tassell	2000
Mark Poe	1998
Travis Lybbert	1997
Michael Sawyer	1996

### **Gilman Scholarship**

Amanda Wiberg	2004
Mark R. Morris	2003
Sebrina Wright	01-02

# STUDENT SHOWCASE

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national science foundation graduate fellowships

## **Awards**

Jonathan Beck	2006
Rex Wayne Watkins	2006
Kristine Perry	2005
Lara Briana Anderson	2004
Nathan Allen Hammond	2004
Christine Turner Merrill	2003
Ryan Richard Sargeant	2003
Michael David Larsen	2002
Alyssa Janel Magleby	2002
John Paul Haskell	2001
Marc Melchior Nielson	2001
Katherine Frances Smith	2001
Chandra Brie Heaton	2000
Jeffrey L. Jacobs	2000
Rebecca Ann Brown	1999
Eric Bair	1999
Gregory Nolan Nielson	1999
Deryl Owen Snyder	1999

## **Honorable Mention**

Aaron J. Katz	2006
John S. Crockett	2005
Marriner H. Merrill	2005
Rex W. Watkins	2005
Dewain Keith Garner	2004
Aaron Jon Katz	2004
Kristine Perry	2004
John Price Calvin	2003
John Barton Visser	2003
Kevin Alan Hall	2002
Michael D. Mills	2002

## **Phi Kappa Phi Scholars**

Jason Larkin	2006
Rex Wayne Watkins	2005
Kurtis Reed	2004
Michael Wilkinson	2001

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# STUDENT SHOWCASE

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## undergraduate research conferences

### **2007 National Conference for Undergraduate Research**

Jan Marie Andersen	Physics
Douglas Anderson	Psychology
Vikki Carlisle	Business
Nicole Frank	Biology
Margo Farnsworth	Business
Katherine Grover	Biology
Uyen Lam	Biology
Carly D. Larsen	Psychology
Tyler Logan	Wildland Resources
Amanda Marinello	English
MaKenzie Martin	Business
Brett Merrill	Psychology
Natalie Naegle	Business
Paul M. Nielsen	Psychology
Dallin Stephens	Psychology
Kimberly Warburton	Biology
Brittany Webb	Biology

### **2007 Utah Conference on Undergraduate Research**

Aaron Anderson	FCHD
Brianne Bartlett	Elementary Education
Jeanette Blackham	Business
Wayne Breon	Animal Science
Sue Buckalew	FCHD
Vikki Carlisle	Marketing
Sydney Chamberlin	Physics
Daniel F. Child	Biology
Randy Christofferson	Theatre
C. Dustin Clark	Biology
Benjamin Cummings	Psychology
Chad Dallon	Biology
Amrita Dubey	Biology
Margo Farnsworth	Business

# STUDENT SHOWCASE

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undergraduate research conferences

## **Fall 2006 Undergraduate Research & Creative Opportunities**

Aaron Anderson	FCHD
Shaelene Ashby	Psychology
Ross Booth	Biological & Irrigation Engineering
Gary Brimley	Biological & Irrigation Engineering
Steve Broby	Biological & Irrigation Engineering
Jason Brown	Biological & Irrigation Engineering
Shay Chapman	Geology
Tanya Butt	Biological & Irrigation Engineering
Shaun Cornia	Biological & Irrigation Engineering
Joseph Delka	Chemistry
Erick Griffiths	Biological & Irrigation Engineering
Sara Huefner	Chemistry
Kristina McDougal	Psychology
Gerald (Dusti) McEwen	Biological & Irrigation Engineering
Greg Olsen	Biological & Irrigation Engineering
Kylara Papenfuss	Plants, Soils & Biometeorology
Sara Parker	Biological & Irrigation Engineering
Tristan Perry	Biology
Sarah Platt	Interior Design
Laura Rowley	Plants, Soils & Biometeorology
Michael Sharp	Nutrition & Food Sciences
Reese Thompson	Biological & Irrigation Engineering
Christopher Tressler	Geology

## **Spring 2007 Undergraduate Research & Creative Opportunities**

Jennifer Albretson	Physics
Lance Andreasen	Nutrition & Food Sciences
Shannon Babb	Geology
Sherry Baker	Biology
Scott Barrett	Psychology
Pamela Bendio	Art
John Brinkerhoff	Animal, Dairy & Veterinary Sciences
Andrew Burgon	Center for Advanced Nutrition
Matthew Chambers	Biology

# STUDENT SHOWCASE

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undergraduate research conferences

## **Spring 2007 Undergraduate Research & Creative Opportunities**

**(cont'd)**

Cade Charlton	Psychology
Benjamin Cummings	FCHD
Lynsie Daley	Geology
Chad Dallon	Biology
William Fish	Mechanical & Aerospace Engineering
Steven Hart	Physics
Melissa Jackson	Geology
Scott Johnson	Chemistry
Alicia Kimball	Psychology
April Lockwood	Special Education
Elicia Lord	Theater
Brad Oliverson	Health, Physical Education & Recreation
Benson Price	Physics

**RESEARCH WEEK  
SCHEDULE OF EVENTS**

# RESEARCH WEEK 2007

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schedule of events

## **MONDAY, APRIL 2**

### **FACULTY RESEARCH DAY**

#### **Sponsored Programs Workshops** **All day (Eccles Conference Center)**

*Workshops will be offered on different funding and award topics. Visit [www.researchweek.usu.edu](http://www.researchweek.usu.edu) for complete agenda.*

#### **Research Awards Luncheon**

**11:30am-1:30pm (Merrill Caizer Library, Room 101,  
By Invitation)**

*Luncheon will honor Utah State's researchers of the year and will announce the 2007 D. Wynne Thorne Research Award winner.*

#### **D. Wynne Thorne Lecture**

**1:00pm-1:30pm (Merrill Caizer Library, Room 101)**

*DeeVon Bailey, professor of economics and 2006 D. Wynne Thorne research award winner, will give the annual address.*

## **TUESDAY, APRIL 3**

### **UNDERGRADUATE RESEARCH DAY**

#### **Student Showcase**

**9:00am-2:00pm (TSC International Lounge)**

*Utah State students celebrate their research, scholarship, & creative activity.*

**Undergraduate Research Awards 12:00pm-1:00pm  
(TSC International Lounge)**

*Undergrad researchers and mentors of the year will be honored.*

## **WEDNESDAY, APRIL 4**

### **GRADUATE STUDENT RESEARCH DAY**

#### **Graduate Student Symposium**

**9:30am-5:00pm (TSC Walnut Room & International Lounge)**

*This interdisciplinary conference highlights graduate research in all fields. Visit [www.usu.edu/usugss/gsm2007](http://www.usu.edu/usugss/gsm2007) for full agenda.*

## **THURSDAY, APRIL 6**

### **INNOVATION, DISCOVERY & INVENTION DAY**

#### **USTAR Reception and Presentation**

**10:30am-11:30am (Alumni House)**

*Presentations will focus on research by USU's new USTAR faculty teams.*

#### **Technology Commercialization Luncheon**

**12:00pm-1:30 pm (Alumni House, By Invitation)**

*Luncheon will honor USU faculty and business leaders with 2007 technology commercialization achievements.*