

CREATE @ STATE

A Symposium of Research & Scholarship

Tuesday, March 29, 2011 • Arkansas State University Student Union

CREATE @ STATE

A Symposium of Research & Scholarship



Welcome to the premier event of CREATE @ STATE: A Symposium of Research & Scholarship, an annual event dedicated to research and creativity at Arkansas State University! The Office of Research and Technology Transfer is pleased to sponsor this event combining Undergraduate Scholars Day with Graduate Scholars Day. The posters, panel sessions, and performances offer a unique and exciting cross section of the scholarly activity emerging all across our campus. They likewise demonstrate the rich learning experiences that are available to our students outside of the classroom.

I encourage you to participate in as many of the day's activities as you are able. I am certain you will be inspired by the quality and depth of ASU student work as well as the innovative collaborations occurring among many academic disciplines.

Please ENJOY!

Best regards,

A handwritten signature in black ink, appearing to read 'Michael E. Dockter'.

Michael E. Dockter, Ph.D.



On behalf of the Graduate Student Council, we cannot express how happy we are to be a part of the first ever Create @ StAte Symposium and would like to take the opportunity to welcome each and every participant, whether undergraduate or graduate. The GSC is very proud of your hard work and you should be proud as well. Today is your day to shine where you can display your hard work, research and creative efforts. We would also like to say welcome to all family, friends, faculty and fellow students that are here today to support the participants this year.

The GSC would like to convey its gratitude to the professors and instructors who work hard in creating educational programs, providing excellent instruction and setting high standards that deepen the lives of so many students in countless ways. GSC is proud to participate in this event that will showcase the results of hardworking individuals that call Arkansas State University their institution of opportunity.

Through the hard work of students, faculty, staff and the administration at ASU, we have managed to set in motion an event that will become as traditional on campus as homecoming bonfires and tailgating. Together we are fulfilling the ASU Mission of educating leaders, enhancing intellectual growth, and enriching lives!

LaDesta 'DiDi' McCann
Graduate Student Council President



To Create @ stAte attendees,

The student government association is honored to be one of the sponsors for the Create @ stAte event. I have enjoyed working with the Graduate Council and Mrs. Julie Thatcher's Office throughout this process.

I am glad that each of you have decided to participate in this grand occasion and showcase some of the posters, panels, creative arts, and other works that have been put together on Arkansas State University's campus. Although some of you may have traveled other places to present, we are privileged to have you as members of the student population here at Arkansas State University.

SGA is glad to assist with hosting Create @ stAte which provides undergraduate and graduate students with the opportunity to present to the student body, staff, and faculty members on campus.

I hope that this opportunity is a positive experience for your educational career, and it inspires you to continue along the path that you are taking and one day, you will achieve your degree in whatever area you are majoring in.

If there is anything that the Student Government Association can assist you with, feel free to contact us. We are located on the Second Floor of the Student Union down the hallway from the Leadership Center. Our email address is sga@smail.astate.edu.

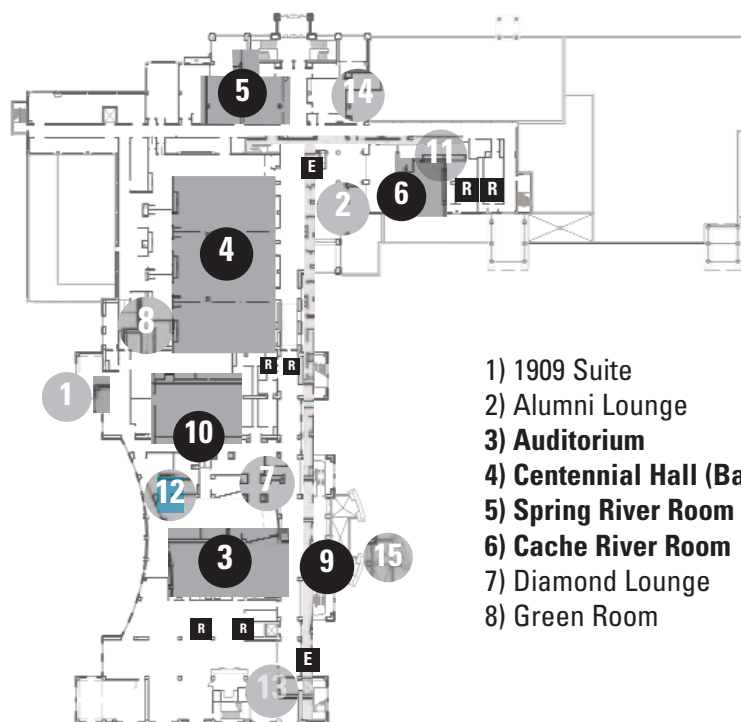
Sincerely,

Adrian Everett
SGA President

CREATE @ STATE

A Symposium of Research & Scholarship

TIME	EVENT	LOCATION
9:00 – 9:30	Refreshments	Centennial Hall
9:30 – 10:45	Plenary Session Welcome Remarks Faculty Research Perspective Student Research Perspective	Auditorium
11:00 – 12:15	Panel Presentations Papers & Research Findings	See following pages for session details
12:30 – 1:45	Poster Session	Centennial Hall
	Tuba & Euphonium Ensemble	Heritage Plaza Lounge
	Refreshments	Centennial Hall
2:00 – 3:15	Panel Presentations Papers & Research Findings	See following pages for session details
3:30 – 4:45	Panel Presentations Papers & Research Findings	See following pages for session details
5:00 – 5:30	Awards Ceremony	Auditorium



- 1) 1909 Suite
- 2) Alumni Lounge
- 3) Auditorium
- 4) Centennial Hall (Ballroom)
- 5) Spring River Room
- 6) Cache River Room
- 7) Diamond Lounge
- 8) Green Room
- 9) Heritage Plaza Lounge
- 10) Mockingbird Room
- 11) Saint Francis River Room
- 12) Pine Tree Room
- 13) Under Renovation
- 14) Testing Center
- 15) Heritage Plaza Veranda

11:00 a.m. - 12:15 p.m.

Cache River

Cultural Study

- n **Silence in Teaching and Learning: An Emic Perspective**
Krishna Bista, Education (Graduate)
- n **Dialectic Tensions in Intercultural Relationships**
William Hinson, Communication Studies (Graduate)
- n **Character Strengths are Prominent as Mate Preferences of Turkish Students**
Hannah Holloway, Psychology (Undergraduate)
- n **Racial Discussions**
Tabitha Reynolds, Psychology (Undergraduate) & Charmaine Conner, Psychology (Undergraduate)

Mockingbird 1

Social Media & Gaming

- n **Examining Identity on XBOX Live: Gamertags on Call of Duty: Modern Warfare 2**
Natalie Culbreath, English (Undergraduate)
- n **Video Games and Their Effects**
Abbigal Robinson, Radio-TV (Undergraduate)
- n **Arkansas State University Students' Perceptions about Online Risk Taking**
Elizabeth Snow, Communication Studies (Undergraduate) & Erna Bass, Communication Studies (Undergraduate)
- n **Social Media Use: An Exploratory Test on the Daily Lives of College Students**
Barbara Barnett, Public Relations (Undergraduate) & Katherine Cothorn, Public Relations (Undergraduate)

Mockingbird 2

Heat, Anxiety & Freud

- n **Comparison of Positive and Negative Heat Reinforcement in Chicks**
Loren Skye Roberson, Psychology/Philosophy (Undergraduate)
- n **Impact of Anxiety on Analogy Production and Retrieval**
John Robertson, Psychology (Undergraduate)
- n **Freud and the Brain**
Edna Thompson, Psychology (Undergraduate)

Spring River 1

Nicotine Effects

- n **Cotinine, Nicotine's Metabolite: Detection in Sera of Sprague-Dawley Rats**
Shaela Wright, Biology (Undergraduate)
- n **Nearing the Concentration Threshold for Voluntary Intake of Oral Nicotine in Rats**
Jeffrey Lynch, Psychology (Undergraduate)
- n **Sera Cotinine Detection Using ELISA Following Oral Nicotine Consumption of Sprague-Dawley Rats**
Swapnali Halder, Molecular Biosciences (Graduate)
- n **Effect of rTMS on Nicotine-Induced Suppression of Rat P-13 Auditory-Evoked Potential**
Stephanie Myal, Biological Sciences (Undergraduate)
- n **Message in a Bottle: Investigating Oral Nicotine and its Effects on the Estrous Cycle**
Grant Cagle, Biology (Undergraduate)

Spring River 2

Mathematics & Statistics

- n **Stone-Weierstrass Approximation Theorem, A Constructive Approach**
Orhan Kaplan, Mathematics (Graduate)
- n **Residues and Real Variable Integration**
Johnny Stitts, Mathematics (Undergraduate)
- n **Generalized Design Criteria for Regular and Nonregular Designs for Statistical Experiments**
Kelsea Brewer, Mathematics, Statistics Minor (Undergraduate)
- n **Confidence Intervals for the Autoregressive Parameter**
Ashton Erwin, Mathematics & Statistics (Undergraduate)
- n **The Motion of Particles with Signorini's Contact Conditions in the Absence and Presence of Adhesion**
Jared Wolf, Mathematics & Statistics (Undergraduate)

Cache River

Music & TV Influence

- n **Drumming and Rhythmic Medicine: Group Mindfulness Sessions on the ASU Campus**
Alicia Butler, Psychology (Undergraduate); Melanie Gurley, Psychology (Undergraduate); and Meagan Mothershed, Psychology (Undergraduate)
- n **Influence of Hip Hop on Young Adults**
Darius Rutling, Radio-TV (Undergraduate); Jessica Holmes, Radio-TV (Undergraduate); and Robert Richmond, Radio-TV (Undergraduate)
- n **The Man in the Box: Connecting Family Oriented T.V. Shows to the Perception of Positive Father Figures**
James Hudson, Communication Studies (Graduate)
- n **Television Violence and Its Effects on Viewers**
Morgan McKenzie, Journalism-Public Relations (Undergraduate); Eugene McCann, Journalism-Public Relations (Undergraduate); and Kyle Scott, Journalism-Radio-TV (Undergraduate)

Mockingbird 1

Violence & Gentrification

- n **Human Rights Issue: A Critique of Rape as an Instrument of War**
Sommer Allen, Philosophy (Undergraduate)
- n **Race and Perceptions of Stalking**
Eleny Davis, Psychology (Undergraduate)
- n **Perceptions of Stalkers' Personality and Motivations as a Function of Stalker Gender**
Lauren Tyler, Psychology (Undergraduate); Kristy Liles, Psychology (Undergraduate); and Tonya Witt, Psychology (Undergraduate)
- n **A Content Analysis of Media Framing and Gentrification**
Gabrielle Crumble, Radio-TV (Graduate)

Mockingbird 2

Students' Perceptions & Performance

- n **Post-Secondary Reading Instruction for Students Enrolled in College Preparatory Reading Courses: Preliminary Findings**
Melanie Campos, MSE-Reading (Graduate)
- n **Silence in Teaching and Learning: An Emic Perspective**
Krishna Bista, Education (Graduate)
- n **Arkansas Collegiate Performance**
Morgan Fincher, Mathematics (Undergraduate)
- n **Students' Views of Arkansas State University**
Jessica Hill, Psychology (Undergraduate) & Crystal Griffith, Psychology (Undergraduate)
- n **Students' Experiences of Instructor Self-Disclosure**
Shaina Nicholson, Communication Studies (Undergraduate) & Jody Cason, Communication Studies (Undergraduate)

Spring River 1

Herds, Herbarium & High-Performance

- n **Human Elephant Conflict in Trans-border Region of Nepal**
Dinesh Neupane, Environmental Sciences (Graduate)
- n **The Greene County Vascular Flora Project**
Kari Harris, General Science (Undergraduate)
- n **DMarshal: A Data Marshaling Toolkit for High Performance Heterogeneous Computing**
Zhu Wang, Computer Science (Graduate)

Spring River 2

Solar Innovation

- n **Electrodeposition of Indium Sulfide Films From Organic Solutions-Part I**
John Hall, Electrical Engineering (Undergraduate)
- n **Electrodeposition of Indium Sulfide Films From Organic Solutions-Part II**
Maqsood Mughal, Environmental Science (Graduate)
- n **Survey of the Case for the Environmental Efficacy of Cadmium Telluride Solar Cells**
M. Jason Newell, Environmental Sciences (Graduate)
- n **Design of Experimental Simulator for Long-Term Performance Evaluation of Advanced Heat Transfer Fluids for Concentrating Solar Plant Application**
Michael Earls, Mechanical Engineering (Undergraduate)

Cache River

History & Presence

- n **Perceptual Presence and the Representationalist**
Michelle Manus, Philosophy (Undergraduate)
- n **The Circle**
Richard Hartness, Heritage Studies (Graduate)
- n **Arkansas' 'Family' Civil War and its Effect on the Secession Debate in Arkansas Prior to the U.S. Civil War**
Thomas Henry, History (Graduate)
- n **Theory of the Extraordinary Man in Dostoevsky's "Crime and Punishment"**
Alana Holland, History (Undergraduate)

Mockingbird 1

Athletic Participation

- n **Homeschoolers' Accessibility to Extracurricular Activities in Public Schools: Trefelner et al. v. The Burrell School District (2009)**
Katie Beineke, Health, Physical Education and Sport Sciences (Graduate)
- n **Factors of Attendance at Japan Basketball League**
Goichi Hagiwara, Sports Administration (Graduate)
- n **Supplement Use in Sports**
Jessica Guy, Radio-TV (Undergraduate) & Julian Green, Digital Media (Undergraduate)

Mockingbird 2

General Education & Critical Thinking at ASU

- n **ASU Adrift? Perceptions and Products of General Education at Arkansas State University**
Cassie Blevins, Psychology (Undergraduate); Justin Jones, Psychology (Undergraduate); Jessica Parks, Psychology (Undergraduate); and Benjamin Reagan, Psychology (Undergraduate)

Spring River 1

Media Influence on Sex, Porn & Religion

- n **Advertising Sex Appeal: An Exploratory Test on the Effects of Sex Appeal in Advertising**
Shawn Smith, Radio-TV (Undergraduate)
- n **How Students View Pornography**
Robert Radler, Radio-TV (Undergraduate) & Arda Senel, Radio-TV (Undergraduate)
- n **A Case Study of Social and Media Influence on Religion**
Miranda Emery, Mass Communications (Graduate)

Spring River 2

Engelken Scholars

- n **Improvement in Photoconductance of Chemically Deposited Bismuth Sulfide Films by Annealing**
Frederick Felizco, Engineering (Graduate)
- n **Improvement of Electrodeposited Cadmium Telluride Film Uniformity and Adherence by pH, Temperature, and Mass Transport Control**
Joshua Vangilder, Electrical Engineering (Undergraduate)
- n **Optimization and Characterization of Binders, Encapsulants, and Densification for Biofuel Pellets**
Shyam Thapa, Environmental Sciences (Graduate)

A black and white photograph of a woman with long hair, wearing a light-colored blouse, standing at a podium and speaking into a microphone. She is smiling. In the foreground, the backs of several audience members' heads are visible, looking towards the speaker. The background consists of vertical curtains and a large screen displaying a faint architectural drawing.

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A Symposium of Research & Scholarship

PANEL ABSTRACTS

Listed in alphabetical order by lead presenter

Allen, Somer – Philosophy, Undergraduate

somer.allen@smail.astate.edu

▮ **Human Rights Issue: A Critique of Rape as an Instrument of War**

Rape as an instrument of war is a current problem in many war torn countries around the world. To address the issue of rape in war, this paper assumes that in order for a life to be fully human it must have the capacity for flourishing, something obviously denied to the victim of war rape. This falls in line with a contemporary approach to human rights known as the Capabilities Approach defended by Martha Nussbaum. What I attempt to show is that rape as a crime of war may be better critiqued by this approach to human flourishing than by a contrasting rights theory.

Faculty Mentor: Dr. Jeanine Schroer, English & Philosophy

Barnett, Barbara – Public Relations, Undergraduate

barbara.barnett@smail.astate.edu

Cothorn, Katherine – Public Relations, Undergraduate

katherine.cothorn@smail.astate.edu

▮ **Social Media Use: An Exploratory Test on the Daily Lives of College Students**

Today's college students are the most wired generation in history. Also known as the Net Generation or the Millennials, college students use technology such as internet, e-mail, blogs, and social networks in their everyday repertoire of communication and connection tools at a higher rate than individuals from any other generation (Junco & Cole-Avent, 2008). Social networking sites are websites that encourage people to establish a "network of connections" to others. In 2007, R. Kay defined social media as unique because it allows the "ability to define one's own social network and interact in new ways".

Faculty Mentor: Dr. Po-Lin Pan, Radio-Television

Beineke, Katie – Health, Physical Education and Sport Sciences, Graduate

kaitlin.beineke@smail.astate.edu

▮ **Homeschoolers' Accessibility to Extracurricular Activities in Public Schools: Trefelner et al. v. The Burrell School District (2009)**

Data from the National Household Education Surveys Program shows 1.5 million U.S. children were taught at home in 2007(NCES, 2008). In 1991, Washington was the first state to allow homeschooled students on public school teams. Plaintiffs' arguments are usually focused on statutory and constitutional rights to participate in extracurricular activities. Opponents cite a double standard under which public school students must follow academic and attendance rules to play sports while homeschoolers do not. Are homeschoolers' constitutional rights violated when they are not allowed to participate in interscholastic athletics? Cases involving participation regulations in public school extracurricular activities for these students are analyzed.

Faculty Mentor: Dr. David LaVetter, Health Physical Education and Sport Sciences

Bista, Krishna – Education, Graduate

krishna.bista@smail.astate.edu

▮ **Academic Dishonesty Among International Students in Higher Education**

Instructors of higher learning institutions address and want to eschew academic misconduct of their students. These educators may presume that students understand fully what cheating and plagiarism are. However, analyzing is a very complex and dynamic issue. This study included 230 undergraduate and graduate students from eighteen countries studying at Southern U.S. university. The purpose of the study was to identify possible causes for academic misbehavior. The results reveal several variables: previous learning style, English language proficiency, unfamiliarity with American academic cultures, the relationship between student and teacher, and availability of technical and educational resources associated with academic dishonesty.

Bista, Krishna – Education, Graduate

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▮ **Silence in Teaching and Learning: An Emic Perspective**

Silence among international students can be a major concern for instructors who want students to orally participate in class for learning. The nature of silence is complex in any classroom with foreign or domestic students. Instructors, sometimes, fail to recognize the nature of the silence of foreign students unlike their native counterparts. With an emic perspective in a narrative voice by the author, this paper explores the nature of silence among international students by examining the existing body of literature relating to cultural norms. It also suggests a number of ways of dealing with silent students in a diverse classroom setting.

Blevins, Cassie – Psychology, Undergraduate
cassie.blevins@smail.astate.edu

Parks, Jessica – Psychology, Undergraduate
jessica.parks@smail.astate.edu

n **ASU Adrift? Perceptions and Products of General Education at Arkansas State University**

Critics of higher education argue that universities are failing fulfill their most basic mission: producing graduates who are competent in general education skills such as writing, and critical thinking. As part of ASU's ongoing assessment, the Office of Student Learning Outcomes examined faculty and student perceptions of general education goals, student performance on a standardized test of critical thinking, and student recommendations of ASU courses. Multivariate analyses on the overlap of ASU's ten goals for general education revealed four constructs. Analyses of faculty syllabi indicate increased documentation of curriculum goals and student learning outcomes. Findings and implications will be discussed.

Faculty Mentor: Dr. Josephine Welsh, Psychology & Counseling

Jones, Justin – Psychology, Undergraduate
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Reagan, Benjamin – Psychology, Undergraduate
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Brewer, Kelsea – Mathematics, Statistics Minor, Undergraduate
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n **Generalized Design Criteria for Regular and Nonregular Designs for Statistical Experiments**

Fractional factorial designs are statistical experimental strategies for minimizing the aliasing of effects and protecting the estimation of main effects and two-factor interactions. Resolution and minimum aberration are traditional criteria for comparing the quality of regular fractional factorial designs. Regular designs have a simple aliasing structure; however, the number of runs must be power of two, leaving large gaps in the choices of run size. In contrast, nonregular fractional factorials exhibit a more complex aliasing structure but can be constructed for every run size that is a multiple of four. Generalized versions of the resolution and minimum aberration criteria allow investigators to effectively use these nonregular designs.

Faculty Mentor: Dr. Debra Ingram, Mathematics & Statistics

Other Authors/Collaborators: Latia Carraway, Department of Mathematical Sciences, University of Memphis

Butler, Alicia – Psychology, Undergraduate
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Gurley, Melanie – Psychology, Undergraduate
melanie.gurley@smail.astate.edu

Mothershed, Meagan – Psychology, Undergraduate
meagan.mothershed@smail.astate.edu

n **Drumming and Rhythmic Medicine: Group Mindfulness Sessions on the ASU Campus**

Juggling classes, work, and extracurricular activities cause stress among many college students. Research suggests that being exposed to specific types of music or creating one's own rhythms helps to relax and get focused. The participants in our study have been attending weekly mindfulness sessions that utilize either listening to recorded music by Janalea Hoffman (Rhythmic Medicine) or being engaged in drumming exercises. Our presentation will discuss the effects of these sessions on participants' stress levels as well as their general feelings about their experience.

Faculty Mentor: Dr. Irina Khramtsova, Psychology; Dr. Patricia Glascock, Counseling Center

Cagle, Grant – Biology, Undergraduate
grant.cagle@smail.astate.edu

n **Message in a Bottle: Investigating Oral Nicotine and its Effects on the Estrous Cycle**

We aim to use a voluntary intake model and monitor the female estrous cycle of female rats. After a 10-day baseline of 5 bottles of water, rats will be given a 20 µg/ml nicotine solution and 1 bottle of water for 15 days. The control group will continue to drink water. Using Differential Interference Contrast microscopy, we will assess the four stages of estrous: proestrus, estrus, metestrus, and diestrus. Body organs and blood serum will be collected at the end of the study and by using advanced analytical techniques, we hope to detect pharmacologically relevant amounts of nicotine or its metabolites in tissue. We anticipate data will reveal that rats will consume the 20 µg/ml nicotine solution and alterations in the estrous cycle.

Faculty Mentor: Dr. Amy Pearce, Psychology & Counseling

Campos, Melanie – MSE-Reading, Graduate
melanie.campos@smail.astate.edu

n **Post-Secondary Reading Instruction for Students Enrolled in College Preparatory Reading Courses: Preliminary Findings**

This paper discusses the preliminary findings of a research study conducted with twenty students enrolled in college-preparatory reading courses at Arkansas State University - Mountain Home. The purpose of the study is to address the following questions: What reading skills need to be the focus of reading instruction for adults enrolled in college-preparatory reading courses? What instructional methodologies are effective in teaching reading skills to adults enrolled in these courses? Preliminary findings suggest the need for targeted systematic instruction in the morphological features of words to promote fluency. The research further suggests the use of technology and peer collaboration to enhance literacy growth in adult learners.

Faculty Mentor: Dr. Deborah Owens, Teacher Education

Crumble, Gabrielle – Radio TV, Graduate
 gabrielle.crumble@smail.astate.edu

A Content Analysis of Media Framing and Gentrification

This study explores how gentrification is covered in print media. Using a qualitative content analysis, documents were examined for common themes relevant to the topic of gentrification and urbanization. The prevalent themes that emerged were poverty among displaced residents, political agents influencing community revitalization, and the observation of old inner city communities being replaced with new ones. This data suggest that there is a possible link between media framing and influences of gentrification.

Culbreath, Natalie – English, Undergraduate
 natalie.rickey@smail.astate.edu

n Examining Identity on XBOX Live: Gamertags on Call of Duty: Modern Warfare 2

Microsoft's Xbox 360 is a video game console that provides a virtual space for millions of gamers to communicate and engage in video game battles together. Every interaction brings together multitudes of people from different backgrounds, and each session of gaming presents a text in which culture is reflected. The online community on Xbox Live for Call of Duty: Modern Warfare 2 (CoD: MW2) is massive. Individuals of this enormous community have definite identities as players. The pseudo-anonymous nature of this online society does not require a body for each individual with which to secure their identities. Players are identified by a gamertag, a selected name which provides a clue concerning their representation online.

Faculty Mentor: Dr. Deborah Chappel-Traylor, English & Philosophy

Davis, Eleny – Psychology, Undergraduate
 eleny.davis@smail.astate.edu

n Race and Perceptions of Stalking

Stalking is increasingly becoming a problem on college campuses across the United States (US Department of Justice, 2009). Researchers have investigated many factors of whether or not people perceive a behavior as stalking. The study examined whether or not race has an effect on behaviors being perceived as stalking. Participants were given one of four scenarios of a Caucasian or African American male demonstrating hyper-intimate activities, such as excessive calling or leaving notes and flowers, towards a Caucasian or African American female. Questions evaluating the consequences experienced by the target, the conduct, and the perpetrators intent to cause fear or harm were then asked.

Faculty Mentor: Dr. Karen Yanowitz, Psychology & Counseling

Earls, Michael – Mechanical Engineering, Undergraduate
 michael.earls@smail.astate.edu

n Design of Experimental Simulator for Long-Term Performance Evaluation of Advanced Heat Transfer Fluids for Concentrating Solar Plant Application

An experimental simulator has been developed to simulate the Andasol-I solar power plant in Spain in order to evaluate long-term performance of advanced heat transfer fluids. The simulator system consists of two thermal storage tanks, steam generator and condenser, etc. In this presentation, the overall design processes including fundamental analogies and calculations will be discussed. The facility will be constructed at ASU and simulate virtual scenarios selected from the real plant with both synthesized novel and current fluids which will be periodically sampled, tested and compared through thermal, chemical and corrosion analysis of materials for long term base.

Faculty Mentor: Dr. David Jeong, Mechanical Engineering

Other Authors/Collaborators: Brad Edgar, Mechanical Engineering Faculty; Joe Murphy, Engineering Instruction Faculty

Emery, Miranda – Mass Communications, Graduate
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n A Case Study of Social and Media Influence on Religion

This paper seeks to understand different religions and cultures by comparing and contrasting the similarities, differences, opinions, etc. found within two religious/cultural groups. This study uses the Social Learning Theory of communication to illustrate how perceptions of others are formed in a community with a growing Muslim population. It also uses the Cultivation Theory to illustrate the effect of news media on perception. This research seeks to explore the opinions of individuals in regards to how they feel their religion/culture is portrayed in the media and to what extent they feel media coverage has an effect on stereotypes put on their religion/culture. Results include a significant media influence.

Erwin, Ashton – Mathematics & Statistics, Undergraduate

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n **Confidence Intervals for the Autoregressive Parameter**

This research project involves constructing confidence intervals for the unknown parameter of an autoregressive time series. Traditionally, these intervals are centered around either an ordinary least-squares estimator (OLSE) or a Cauchy estimator, but we wish to construct an interval centered around a weighted-average of two weighted least-squares estimators. This has already been tried with both Cauchy and OLSE with reasonable success, but we wish to explore the properties of other possible combinations. Once an interval estimate for the autoregressive parameter is obtained, one can use this estimate to see how the time series in question might behave in the future, which has many applications in both climatology and finance.

Faculty Mentor: Dr. Ferebee Tunno, Mathematics & Statistics

Felizco, Frederick – Engineering, Graduate

frederickfelizco@live.com

n **Improvement in Photoconductance of Chemically Deposited Bismuth Sulfide Films by Annealing**

We report on the heat treatment/annealing improvement of bismuth (III) sulfide thin films synthesized by chemical bath deposition in predominately organic solutions of bismuth salts and thiosulfate ion. Heat treatment or annealing is expected to improve thin film crystal structure at the molecular level. Thin films were subjected to heat at varying time and temperature values, typically ranging from 5 minutes to 24 hours, and from 100 °C to 600 °C. Improvement was quantified by a measured increase in sample photoconductance, which was observed in samples that have been annealed for at least 2 hours, or at a temperature of at least 200 °C.

Faculty Mentor: Dr. Robert Engelken, Engineering

Other Authors/Collaborators: John Hall, Zachery Hill, David McNew, Maqsood Mughal, Jason Newell, Shyam Thapa, Joshua Vangilder; and Dr. Zariff Chaudhury

Fincher, Morgan – Mathematics, Undergraduate

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n **Arkansas Collegiate Performance**

Arkansas Collegiate Performance Research will investigate the meaning of performance as it applies to higher education. With the use of both existing resources and surveying of randomly selected students, the performance of all 4-year institutions of higher education in the state of Arkansas will be analyzed. "Factor Analysis" will be used to reduce the number of variables included in the performance definition. The final data from each University/College will be compared to all others through the comparison of these factors as well as through the process of "Cluster Analysis". The final results will rank these schools according to their performance.

Faculty Mentor: Dr. Seo-eun Choi, Mathematics & Statistics

Guy, Jessica – Radio-TV, Undergraduate

jessica.guy@smail.astate.edu

n **Supplement Use In Sports**

This research paper explores the world of sports, media, and performance enhancers and how they tie together. If one were to interview players that have come out about using steroids or other illegal performance enhancers, one argument that you may hear is that everyone has access to it. Others who are opposed to the use of supplements and artificial hormones to increase performance may say that is about integrity. Another important aspect of this research paper is how the media influences the reaction of society on this issue.

Faculty Mentor: Dr. Po-Lin Pan, Radio-TV

Green, Julian – Digital Media, Undergraduate

julian.green@smail.astate.edu

Hagiwara, Goichi – Sports Administration, Graduate

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n **Factors of Attendance at Japan Basketball League**

The purpose of this study is to identify the segmentation of Japan Basketball League's fans and search their attraction factors for game attendance. This research will identify the consumer's demands of Japanese professional basketball and help increase game attendance. Fifteen attendance items comprise a questionnaire using a Likert 4-point scale to describe the relative importance of each factor extracted from previous literature. The questionnaire was proved by two specialists. The surveys were implemented by the researchers for five game days: January 28th and 29th, 2010, at Kanagawa in Japan (Toshiba Brave Thunders v. Panasonic Trians), February 19th and 20th, 2010, at Tokyo in Japan (Toyota Alvark v. Panasonic).

Faculty Mentor: Dr. David LaVetter, Health, Physical Education & Sport Sciences

Halder, Swapnali – Molecular Biosciences, Graduate

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▮ **Sera Cotinine Detection Using ELISA Following Oral Nicotine Consumption by Sprague-Dawley Rats**

Our study assessed voluntary intake of oral nicotine using an established multiple bottle approach (Biondollilo & Pearce, 2007) and measured the nicotine biomarker and primary metabolite, cotinine, in sera after chronic nicotine exposure. Adult Sprague-Dawley rats (N=20) were exposed to 4 bottles of 15 microgram/ml nicotine solution and 1 bottle of water or 5 bottles of water for 14 days in their home cage. Sera were collected from the highest drinkers and analyzed by competitive cotinine enzyme-linked immunosorbent assay (ELISA) which revealed between 2.6- 5.5ng/ml of cotinine in sera of experimental animals. This is the first known report of sera cotinine detection by ELISA following voluntary oral nicotine consumption.

Faculty Mentor: Dr. Amy R. Pearce, Psychology & Counseling

Other Authors/Collaborators: Varun Katta, Dr. Rebecca Parr, and Dr. Amy Pearce

Hall, John – Electrical Engineering, Undergraduate

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▮ **Electrodeposition of Indium Sulfide Films From Organic Solutions-Part I**

We report on organic solutions of indium salts, NaCl, and elemental sulfur for electrodepositing films of In₂S₃ a promising solar cell material. Our work targets electrodeposition of In₂S₃ films from organic solvents for eventual coupling with CdTe or CuInS₂ films to form heterojunction solar cells. Two promising solvent systems are (1) an indium chloride-based ethylene glycol bath and (2) an indium sulfamate-based mixed 1, 2-propanediol/water bath. Yellow-orange films of In₂S₃ have been plated from both baths. A major problem to-date is poor adherence/uniformity. Part I will discuss the deposition procedure and Part II film data. This work is jointly sponsored by EPSCoR grants from both NASA/Arkansas Space Grant Consortium and the NSF/Arkansas Science and Technology Authority.

Faculty Mentor: Dr. Robert Engelken, Engineering

Other Authors/Collaborators: Fred Felizco, Zachery Hill, David McNew, Jason Newell, Shyam Thapa, Joshua Vangilder

Harris, Kari – General Science, Undergraduate

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▮ **The Greene County Vascular Flora Project**

The Greene County Vascular Flora Project seeks to create a preliminary flora of Greene County, Arkansas. Data comes from accessioned specimens in the STAR Herbarium and from new collections. Currently, there are 1499 specimens representing 542 species from Greene County in the Herbarium. Using the USDA Plants Database, plant families will be analyzed according to whether or not they are native to the county as well as whether they have been previously documented as occurring in the county. I have found many previously undocumented species and one species not yet documented in the state. The STAR Herbarium is emerging as a critical resource to understanding botanical diversity in the eastern counties of Arkansas.

Faculty Mentor: Dr. Travis Marsico, Biology

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▮ **The Circle**

In 1970 ASU employed C. Calvin Smith as a history department instructor. He began teaching the same semester he was completing his MA degree from ASU. The 2010-2011 academic year marks the fortieth anniversary of his employment. Why the significance? He was the first tenured-track Black instructor on campus, and remained so for two years. During this time he and his wife, Earline, endured various forms of racist behaviour from faculty, students, and the Jonesboro community. But, change came! From 1972 to 1973 three other Delta area black male instructors joined the faculty. The other men were Herman Strickland, Wilbert Gaines, and Mossy Richmond. The four families formed the first black faculty support group known as "The Circle."

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▮ **Arkansas' 'Family' Civil War and its Effect on the Secession Debate in Arkansas Prior to the U.S. Civil War**

This paper will evaluate the ways in which the increased democratization of Arkansas's electorate, as a result of "the 'Family' Civil War," either aided or hindered the debate on secession in Arkansas. To study one's 'effect' inherently requires extra evaluation. Before one can determine 'effect', the researcher must first recognize pre-existing conditions and eliminate all other credible explanations. These studies are more arduous, but certainly possible; and much more rewarding. Therefore, this paper requires an evaluation of Arkansas before the secession debate, the promise and problems of early Arkansas, economic considerations, immigration patterns, crisis events, Arkansas party politics, and even Thomas C. Hindman.

Hill, Jessica – Psychology, Undergraduate
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n **Students' Views of Arkansas State University**

What do Arkansas State students like or dislike about their University? The study we conducted explored this topic through the use of two student surveys (1) a sample of students were asked to rate the importance of and satisfaction with different aspects of campus, and (2) a different sample of students were given a more in depth survey that asked whether they agreed or disagreed with specific statements made about offices and areas on campus. For example, do students agree or disagree that "parking citations are reasonably priced" ? The preliminary results of the project suggest that students are very satisfied with some elements of the university (e.g., the Red Wolf Center), but very dissatisfied with others (e.g., parking services).

Faculty Mentor: Dr. David Saarnio, Psychology and Counseling

Other Authors/Collaborators: Eleny Davis, Charmaine Coleman

Hinson, William – Communication Studies, Graduate

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n **Dialectic Tensions in Intercultural Relationships**

Dialectic tensions represent the "unified oppositions" that all human beings experience in relationships. These dialectic tensions are unique in every relationship. Even more so, perhaps, dialectic tensions exist in intercultural communication and relationships. A qualitative study examining culturally-influenced dialectics was conducted with the participation of a Japanese-Caucasian American married couple.

Holland, Alana – History, Undergraduate

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n **Theory of the Extraordinary Man in Dostoevsky's "Crime and Punishment"**

In the Russian classic "Crime and Punishment" by Fyodor Dostoevsky, the central character, Raskolnikov, has committed a crime which he believes is justifiable. This idea stems from an article he has published entitled "On Crime" in which he claims that there are two types of men: the ordinary and extraordinary. Everything is permitted to the extraordinary man - that is, he has a full right to crime. Project: There is no direct manifestation of Raskolnikov's article within the novel. Through character analysis, research, and speculation I have attempted to write Raskolnikov's article as he may have written it.

Faculty Mentor: Dr. Cyndy Hendershot, English

Holloway, Hannah – Psychology, Undergraduate

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n **Character Strengths are Prominent as Mate Preferences of Turkish Students**

Mate preferences have been addressed by many areas of psychological inquiry, including sociobiology, cross-cultural theory, and evolutionary psychology, but few studies highlight the positive psychology perspective. We collected quantitative and qualitative data on characteristics desired in long-term romantic partners from Turkish students (N=104). Like our previous cross-cultural studies, positive attributes were rated highly. Specifically, dependability and love were the most important traits. Results suggest that positive internal states are among the most desired qualities in a romantic partner by Turkish students and lend support for these as universal preferences.

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Other Authors/Collaborators: Michelle White, Eleny Davis and Dr. Irina Khramtsova

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n **The Man in the Box: Connecting Family Oriented T.V. Shows to the Perception of Positive Father Figures**

The study seeks to answer the question: has a decline in the viewing of family oriented T.V. shows contributed to a lack of positive father figures? The study will examine agenda-setting aspects as well as explore and reflect upon the views and findings concerning the role of fathers which may be linked to cultivation theory. The author asserts that based on the principle of agenda-setting that with the absence of positive father figures in the family settings on television, men won't find the traditional male role to be as important as previously considered. It is also suggested that based on cultivation theory, negative depictions of males in relation to their role in the home will cause a change in the perceived meaning of fatherhood.

Faculty Mentor: Dr. Lily Zeng, Radio-TV

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n **Stone-Weierstrass Approximation Theorem, A Constructive Approach**

In this paper, we look at the classical Stone-Weierstrass Theorem which states any continuous function defined on a closed bounded interval can be uniformly approximated by polynomials. We derive a new scheme for obtaining such polynomials for not only one variable, but also multiple variables, and we also implement the scheme using the popular software Mathematica.

Faculty Mentor: Dr. Jie Miao, Mathematics & Statistics

Lynch, Jeffrey – Psychology, Undergraduate

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n **Nearing The Concentration Threshold for Voluntary Intake of Oral Nicotine in Rats**

Previous studies from our lab reported that rats will voluntarily consume oral nicotine, with an unreachd concentration threshold. In the current study, adult rats were assigned to 4 separate groups, by sex and solution. An established 5 bottle method was used to increase fluid availability. Subjects had an all water baseline period. During the experimental stage 2 groups had 1 bottle of water and 4 of a nicotine solution of 2 high concentrations. The consumed nicotine:water ratio was not the 4:1 observed in previous studies. Most rats drank the fluids in either 1:1 or 1:2 ratios. Without coercion 30 µg/ml is the highest known concentration of oral nicotine ingested. Therefore, we are nearing threshold concentration for consumption.

Faculty Mentor: Dr. Amy Pearce, Psychology

Other Authors/Collaborators: Grant Cagle, Swapnali Halder, Shaela Wright

Manus, Michelle – Philosophy, Undergraduate

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n **Perceptual Presence and the Representationalist**

My presentation is about the philosophical topic of perceptual presence. My paper attempts to identify the relevant aspects of the phenomenal character of visual experiences by comparing visual experiences to imagination. I feel this comparison will allow for a clearer, more concrete definition of perceptual presence than the typical comparisons of visual experience to thoughts or beliefs have yielded, and so better identify what an adequate theory of perceptual experience should be able to explain.

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n **Television Violence and Its Effects on Viewers**

Modern television embraces violence. Television violence is prevalent and it greatly affects its viewers in many different ways. The audience of this widespread theme of violence in television may have altered views of the reality of violence in the real world. One must also study the question that has dominated the debate of media violence for years - whether or not media violence causes real-life violence. This study is designed to examine how gender, frequency of television viewing, religious beliefs, and social relationships, particularly parasocial interaction, will be factors in people being more or less susceptible to television violence and its effects. We will examine each key concept and study the role they play in TV violence.

Faculty Mentor: Dr. Po-Lin Pan, Radio-TV

Mughal, Maqsood – Environmental Science, Graduate

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n **Electrodeposition of Indium Sulfide Films From Organic Solutions-Part II**

We report on organic solutions of indium salts, NaCl, and elemental sulfur for electrodepositing films of In₂S₃ a promising solar cell material. Our work targets electrodeposition of In₂S₃ films from organic solvents for eventual coupling with CdTe or CuInS₂ films to form heterojunction solar cells. Two promising solvent systems are (1) an indium chloride-based ethylene glycol bath and (2) an indium sulfamate-based mixed 1, 2-propanediol/water bath. Yellow-orange films of In₂S₃ have been plated from both baths. A major problem to-date is poor adherence/uniformity. Part I will discuss the deposition procedure and Part II film data. This work is jointly sponsored by EPSCoR grants from both NASA/Arkansas Space Grant Consortium and the NSF/Arkansas Science and Technology Authority.

Faculty Mentor: Dr. Robert Engeleken, Electrical Engineering

Myal, Stephanie – Biological Sciences, Undergraduate

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n **Effect of rTMS on Nicotine-Induced Suppression of Rat P-13 Auditory-Evoked Potential**

rTMS has been studied extensively as a potential treatment for neuropsychiatric dysfunctions, including nicotine addiction. However, the mode of action of rTMS is poorly understood, so we have developed an animal model to elucidate its mechanism. The goal of this study is to characterize the effects of rTMS treatments on responses to nicotine (NIC) in the rat. We have shown that NIC rapidly and reversibly attenuates the sleep-state dependent P-13 arousal response from the brainstem. If rTMS can prevent these changes in arousal, it may represent an effective treatment for nicotine addiction. Adult male rats were exposed to rTMS for 20min at 1,10 or 20Hz and their P-13 responses recorded for 60min after exposure.

Faculty Mentor: Dr. Roger Buchanan, Biological Sciences

Other Authors/Collaborators: Margarita Escovedo; Julius Franz, UAMS; Dr. Abdallah Hayar, UAMS CTN; Dr. Robert D. Skinner, UAMS CTN; Dr. Roger Buchanan

Neupane, Dinesh – Environmental Sciences, Graduate

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n **Human Elephant Conflict in Trans-border Region of Nepal**

My research studies small herds of wild elephants in the entire Terai of Nepal and migratory herds of the northern India/Nepal region. Human Elephant Conflict (HEC) is critical for several reasons: 1) elephant damage to croplands and property has increased in recent years; 2) elephants have been killed in retaliatory killings; and 3) HEC causes human casualties. Our research has several components including field observation, public meetings, and collaring and tracking elephants to gain an understanding of their habitat and movements. Once completed, my research will ultimately support long-term conservation.

Faculty Mentor: Dr. Thomas Risch, Biological Sciences

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n **Survey of the Case for the Environmental Efficacy of Cadmium Telluride Solar Cells**

Cadmium telluride thin films have demonstrated great promise for terrestrial applications, but are a source of environmental concern because of the use of cadmium. An analysis of life cycle assessments regarding these and other solar cells is presented. It is found that cadmium telluride cells are considered to have the lowest potential for environmental harm of all solar cell types currently in production. Possible difficulties with the assumptions of the research and shortages of requisite knowledge are addressed in regards to real world use. This paper is a survey of the field motivated by our own research with CdTe thin films and concerns about the environmental feasibility of CdTe solar cells.

Faculty Mentor: Dr. Robert Engelken, Electrical Engineering

Other Authors/Collaborators: Frederick Felizco, John Hall, David McNew, Maqsood Ali Mughal, Shyam Thapa, Joshua Vangilder, and Dr. Robert Engelken

Nicholson, Shaina – Communication Studies, Undergraduate

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n **Students' Experiences of Instructor Self-Disclosure**

This study is focused on student's experiences of instructor self-disclosure. This study has determined whether any of the factors such as student's sex, age, and rank, as well as, teacher's sex, correlates with the instructor's self-disclosure and the amount the student approaches them. This may help us find a breakthrough in reducing uncertainty between instructors and students through self-disclosure thus making them more approachable. A survey of sixteen questions was administered and the results were run through SPSS to determine significance. Results indicated that instructor self-disclosure did not influence student in-class behavior.

Faculty Mentor: Dr. Matthew Thatcher, Communication Studies

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n **How Students View Pornography**

Pornography is printed or visual material containing the explicit description or display of sexual organs or activity, intended to stimulate erotic rather than aesthetic or emotional feelings. It is a growing issue that each and every one of us has heard about or been exposed to through movies, the internet, magazines, etc. Our research found that, in 2006, the porn industry reported revenue of \$13.3 billion in the U.S. and \$97 billion worldwide and an average adult website visitorship of 72 million per month. But, what dictates a persons' point of view on the issue of pornography and whether or not it is appropriate?

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n **Racial Discussions**

Racial discussions are a part of everyday life. How we view racial discussions and how often we have them can greatly impact the way we look at racial issues. In the present study, students from a mid-south university will be asked how often they have racial discussions, and how comfortable they are when they have these discussions in public and private settings. The objective of this study is to determine if college students from minority backgrounds feel more comfortable when participating in discussions about race, and if these students discuss race more often than White students.
Faculty Mentor: Dr. David Saarnio, Psychology

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n **Comparison of Positive and Negative Heat Reinforcement in Chicks**

The distinction between positive and negative reinforcement has been discussed on many occasions, but the direct comparison has never been made. Previous research has compared the effects of reinforcement, but the reinforcing stimulus is not equivalent. The purpose of this study is to prove that positive and negative reinforcement are the same when presented with an identical stimulus in both conditions. The anticipated results will show that baby chicks will have equal latency to respond across conditions of positive and negative reinforcement.
Faculty Mentor: Dr. Kris Biondolillo, Psychology & Counseling
Other Authors/Collaborators: Cassie Blevins, Tammy Hagood, Elizabeth Snow, and Dr. Kris Biondolillo

Robertson, John – Psychology, Undergraduate
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n **Impact of Anxiety on Analogy Production and Retrieval**

This study tests the effects of stress on analogy production and retrieval. Participants will be students currently attending Arkansas State University. These participants will complete a task producing analogies from a source and a task connecting target passages to source passages. There will be two separate groups of participants, an anxious group and a non-anxious group, and each subject will be tested individually for each task. The participants in the anxious group will be instructed to complete a difficult counting task and told explicitly that there is a right response and wrong response to each problem in the test. Participants in the non-anxious group will complete a simple counting task and told that there is no right or wrong responses.
Faculty Mentor: Dr. Karen Yanowitz, Psychology

Robinson, Abbigail – Radio-TV, Undergraduate
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n **Video Games and Their Effects**

Video game playing has become a widespread leisure activity around the world. However, extreme game playing has several adverse consequences. "Research to date has identified a minority of players who sacrifice sleep, school, and job productivity, household chores, time spent with significant others, and other major responsibilities in order to play video games offline (King, 2010)." Our research is to prove that playing video games has a bad effect on academic performance and to show the gender differences in video game playing frequency. We also want to explore age differences and loneliness factors. Our goal is to pass out 100 surveys to college students and 100 surveys to high school students and compare the results.
Faculty Mentor: Dr. Po-Lin Pan, Radio-TV
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n **Influence of Hip Hop on Young Adults**

Over the years Hip Hop has influenced how many Americans live their everyday lives and view of the world. Hip Hop also gives Americans a new innovative opportunity to express themselves in a way that they could not years ago. Hip Hop has influences on race, gender, age, and lifestyle. Whether people recognize it or not Hip Hop influences everyone. Even if a person has never heard a Hip Hop song, just being around people who have or does listen to Hip Hop, they are influenced through them. Whether through fashion, swagger, or lifestyle Hip Hop is all around. Hip-Hop is a modern culture consisting of music, fashion, and art.
Faculty Mentor: Dr. Po-Lin Pan, Radio-TV

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▮ **Advertising Sex Appeal: An Exploratory Test on the Effects of Sex Appeal in Advertising**

This study explores how sexual elements are used to sell products in media advertisements. What effects do these advertisements have on the consumer? The genre of an advertisement has a great effect on the overall persuasiveness in selling a product. Commercials that are best remembered are those that use sexual themes, because sex sells. One would think that gender would be a significant factor in determining the appeal of a commercial, but this study proved that gender had no significant effect on the consumer. This study also found that political views also play a part in determining the effectiveness of an advertisement.

Faculty Mentor: Dr. Po-Lin Pan, Radio-TV

Other Authors/Collaborators: Evan Butler, Jayalakshmi Tenali

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▮ **Arkansas State University Students' Perceptions about Online Risk Taking**

For this generation social-networking websites have become an epidemic. While they have many benefits there are also several growing risk factors such as cyber-bullying and potential identity theft. The goal of this study is to broaden the scope to include the social networking websites as a general theme. The current study is interested in the perceptions of risk behaviors, particularly when concerning cyber-bullying and posting of personal information on internet social networking websites. The study is not designed to determine why the participants have these perceptions. The study surveyed undergraduates of Arkansas State University.

Faculty Mentor: Dr. Mathew Thatcher, Communications Studies

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▮ **Residues and Real Variable Integration**

We use functions of a complex variable and a contour integral to evaluate certain improper integrals of functions of a real variable. Cauchy's residue theorem provides a fundamental framework for our research.

Faculty Mentor: Dr. Jie Miao, Mathematics & Statistics

Thapa, Shyam – Environmental Sciences, Graduate

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▮ **Optimization and Characterization of Binders, Encapsulants, and Densification for Biofuel Pellets**

Annual U.S. agri-crop residue production is 500 million tons. Farmers often burn these, and release gases, smoke, and thermal energy. More research/commercialization is needed for better economic/environmental utilization of residues. We study durability/storage of densified pellets of agri-residues, using binders and encapsulants, to alleviate these problems. Objectives are to: 1) develop environmentally benign, low cost, and robust binders and encapsulants, 2) tailor properties of pellets to optimize densification, energy density, and combustion efficiency, and 3) compare the quality of pellets produced from stored vs. fresh feedstock, to potentially bring new economic opportunities to farmers and processors.

Faculty Mentor: Dr. Robert Engelken, Electrical Engineering

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▮ **Freud and the Brain**

Back in the early 1900's, Freud explained personality based on the theory of the id, ego, and superego. On one hand, Freud's theory has been discredited. On the other hand, it may have been that Freud anticipated how humans really operate. Research in the last decades has shown that brain regions and development, parallel the ideas of the id, ego, and superego, reflected in the amygdale, working memory, and the prefrontal cortex. Through comparing Freud's personality theory with the associated areas of the brain, it can be determined that although possibly unintended, Sigmund Freud predicted personality development in the human brain.

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n **Perceptions of Stalkers' Personality and Motivations as a Function of Stalker Gender**

This research examines how perceptions of stalkers change as a function of stalker gender. Results reveal significant differences in perceptions of personality, motivations, and effort needed to get the pursuer to stop pursuit. The male stalker is described as obsessed with the target and needing third-party intervention to stop the pursuit.

Faculty Mentor: Dr. Karen Yanowitz, Psychology & Counseling

Vangilder, Joshua – Electrical Engineering, Undergraduate
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n **Improvement of Electrodeposited Cadmium Telluride Film Uniformity and Adherence by pH, Temperature, and Mass Transport Control**

We report optimization of electrodeposition of CdTe films as absorber layers in solar cells with In₂S₃ window layers. Good film uniformity/adherence on indium tin oxide-coated glass substrates in aqueous and organic electrolytes of cadmium and tellurium salts are challenging to achieve, with thickness/color variations and cracking frequently occurring due to multiple factors. Recent efforts have focused upon control of not only potential and current, but also pH (in aqueous baths), temperature, mass transport, substrate configuration/preparation, anode type/configuration, and illumination, to enhance uniformity and adherence. This work is jointly supported by NASA/ASGC and NSF/ASTA EPSCoR (ASSETT II; VICTER) grants.

Faculty Mentor: Dr. Robert Engelken, Electrical Engineering

Other Authors/Collaborators: Frederick Felizco, John Hall, Zachery Hill, Ali Mughal, M. Jason Newell, Shyam Thapa

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n **DMarshal: A Data Marshaling Toolkit for High Performance Heterogeneous Computing**

In distributed systems, data generated on one machine might not be directly usable by others because of the incompatibility issue caused by data type, endianness, size and padding situation. The data marshaling procedure is indispensable, especially in open systems. So far, there is no widely accepted data marshaling software in the high performance computing community, especially for aggregate type data. Most of the time, programmers have to marshal and unmarshal data manually. In this paper, a data marshaling toolkit, DMarshal, is proposed to achieve high programmability and efficiency in both homogeneous and heterogeneous open systems. Data items are attached by binary tags and data conversion only happens when necessary.

Faculty Mentor: Dr. Hai Jiang, Computer Science

Other Authors/Collaborators: Dr. Chonglei Mei, University of Minnesota; Dr. Hai Jiang

Wolf, Jared – Mathematics & Statistics, Undergraduate
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n **The Motion of Particles With Signorini's Contact Conditions in the Absence and Presence of Adhesion**

For the past year, we have considered a moving particle which drops down onto a stationary rigid foundation and bounces off after its impact. Based on Newton's laws and Signorini's contact conditions, this dynamic impact problem is formulated by a second ordinary differential equation (ODE) and the complementarity conditions. In our current work, we consider a similar situation where a particle drops down onto an adhesive station. The existence of solutions for those problems is proved. A major concern is to show conservation of energy, which has been investigated both theoretically and numerically.

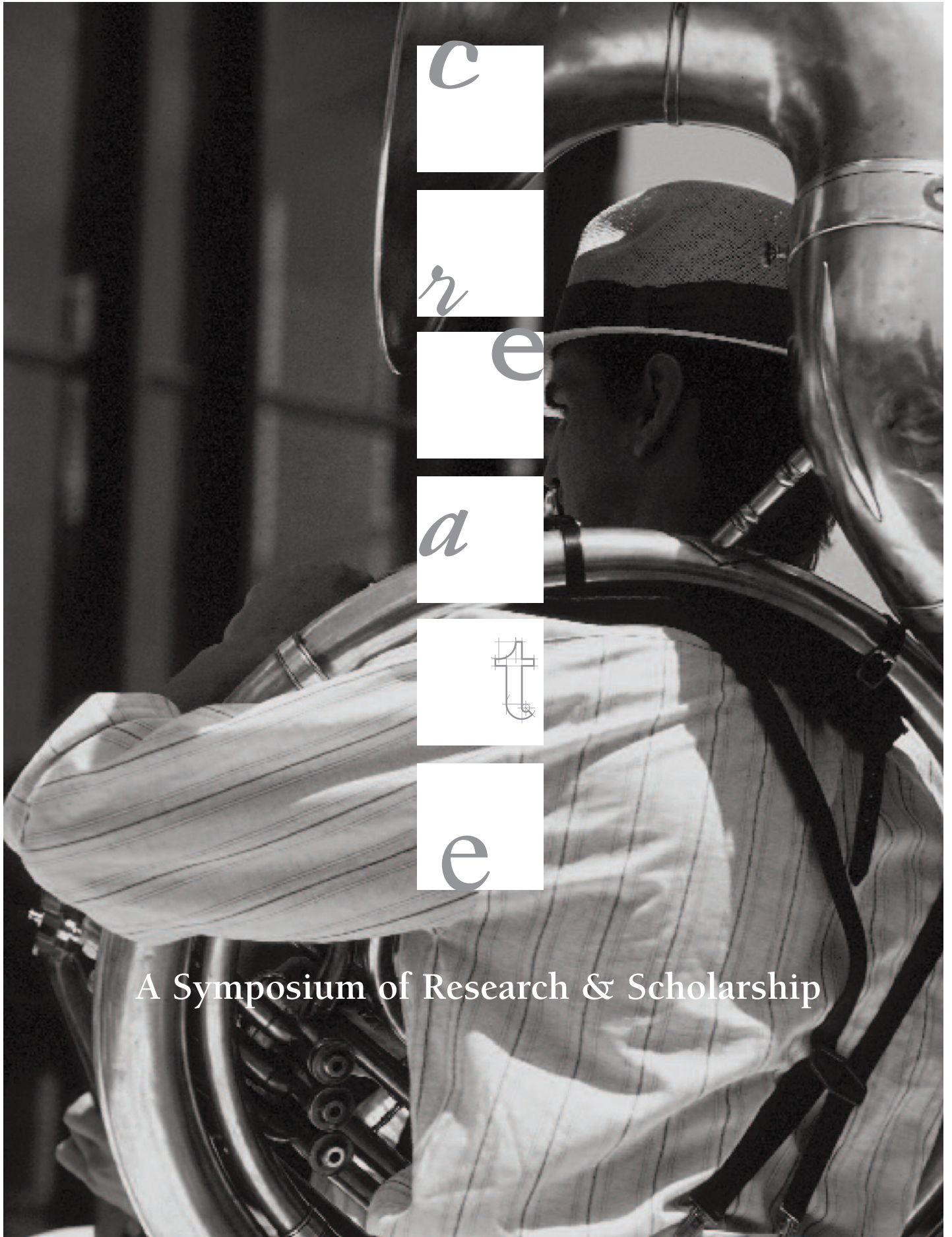
Faculty Mentor: Dr. Jeongho Ahn, Mathematics & Statistics

Wright, Shaela – Biology, Undergraduate
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n **Cotinine, Nicotine's metabolite: Detection in Sera of Sprague-Dawley Rats**

Alternative routes of nicotine delivery such as the oral route hold promise as aids to smoking cessation in humans. This study examined voluntary oral nicotine intake in rats using a multiple bottle procedure (Biondolillo & Pearce, 2007) and measured serum levels of cotinine, nicotine's primary metabolite, after nicotine exposure. Following nicotine exposure, sera were collected and analyzed by enzyme-linked immunosorbent assay (ELISA; Calbiotech). Results: Rats consumed the nicotine solutions and serum cotinine levels exceeded 100 ng/ml in experimental animals. Conclusion: This is the first known report of rats drinking such high concentrations of oral nicotine without sweetening the solution, or depriving subjects of food or water; it is also the first known report of cotinine detection in sera following voluntary exposure to oral nicotine.

Faculty Mentor: Dr. Amy Pearce, Psychology



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A Symposium of Research & Scholarship

ASU TUBA & EUPHONIUM ENSEMBLE

Dr. Ed Owen – Music

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ASU Tuba & Euphonium Ensemble Concert Presentation

The Arkansas State University Tuba & Euphonium Ensemble presented a concert, by invitation, at the Southeast Regional Tuba Euphonium Conference at the University of Tennessee Chattanooga on March 11, 2011. Included in the concert were original compositions by Dr. Tom O'Connor and Dr. Timothy Crist, as well as an arrangement by Dr. Ed Owen. This presentation will include performances of selected compositions and a discussion of important aspects of individual and ensemble preparation including practice and rehearsal techniques.

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A Symposium of Research & Scholarship

POSTER ABSTRACTS

Listed in alphabetical order by lead presenter

Aboobucker, Siddique – Molecular Biosciences, Graduate

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n **Identification and Characterization of a Functional L-Gulonolactone Oxidase in Arabidopsis**

Vitamin C (AsA), the most abundant water-soluble antioxidant, is essential for plant and animal health. There are 4 known AsA biosynthetic pathways in plants: the mannose/galactose, gulose, galacturonate, and myo-inositol routes. This work focuses on the study of L-gulonolactone oxidase (GLOase), the last enzyme in the inositol route. Homology searches with the rat GLOase against the Arabidopsis database identified 7 candidate genes. Bioinformatics and screening of T-DNA knockout lines led us to focus on 2 genes. Their expression in a transient system in *Nicotiana benthamiana* and stable expression in Arabidopsis indicate that substrate availability is a bottleneck in the conversion of gulonolactone to AsA.

Faculty Mentor: Dr. Argelia Lorence, ABI/Chemistry & Physics

Other Author/Collaborator: Dr. Walter Suza

Acosta, Walter – Molecular Biosciences, Graduate

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n **RTB: A Novel Strategy to Deliver Enzyme Replacement Therapeutics into Mammalian Cells**

RTB, the non-toxic carbohydrate binding subunit B of ricin, mediates endocytotic uptake into mammalian cells and trafficking to lysosomes or ER of associated proteins or "payloads". RTB may be particularly well suited for transmucosal delivery, efficient glycan-independent cell uptake, and lysosomal accumulation of associated lysosomal enzymes. In order to test the potential of RTB to deliver lysosomal ERTs, RTB was genetically fused to human L-alpha-iduronidase (IDUA), the enzyme that is deficient in Hurler Disease patients. Plant-based bioproduction of these RTB:human enzyme therapeutics may provide replacement enzymes that address key delivery and targeting issues as well as a safe and scalable commercial production platform.

Faculty Mentor: Dr. Carole Cramer, ABI/Biology

Other Authors/Collaborators: Jorge Ayala, Michael Reidy, Dr. Maureen Dolan

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n **Genetic Analysis of Bass in Arkansas Lakes Using Microsatellites**

The Arkansas Game and Fish Commission has been stocking Florida bass (FB) into native largemouth bass (LMB) populations for many years. We used microsatellites to determine the effectiveness of stocking in 9 Arkansas lakes, having the following characteristics: only FB; primarily FB; mixed stocking; and primarily LMB stocking regimens. The program STRUCTURE was used to determine the proportion of FB alleles. For lakes stocked only with FB, FB allele frequencies ranged from 17 to 18%; for primarily FB stocking, from 4 to 93%; for mixed stocking, from 13 to 15%; and for primarily LMB stocking, from 2 to 8% FB alleles. Stocking regimens are therefore inconsistent with desired management outcomes.

Faculty Mentor: Dr. Ronald Johnson, Biology

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n **The Effects of a Patient Education Handout Tool to Improve Blood Pressure and Overall Health**

Hypertension continues to be a significant health problem in the United States and around the world. Despite successful therapies such as medication management and lifestyle modification, proper control of blood pressure (BP) remains a challenge for many patients in part due to lack of knowledge about the disease or poor adherence to pharmacological and lifestyle therapies. Educating hypertensive patients remains the single most important strategy to reduce its impact on cardiovascular disease. However does further knowledge, including an educational handout tool help improve blood pressure and overall health?

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n **Substrate Choice by Parasitic Gnathiid Isopods: Implications for the Effects of Coral Decline on Host-Parasite Dynamics**

Gnathiid isopod larvae are common coral-reef fish ectoparasites that emerge from the benthos to feed on fish blood. Little is known about the types of substrate they inhabit. In the first experiment individual *Gnathia marleyi* collected were each placed on a sample of one of the following types of substrate: Dictyota, sand, sponge, soft coral, and pieces of coral rubble with and without live polyps and their use or avoidance of the sample was recorded. *G. marleyi* occupied all non-cnidarian substrata at levels exceeding chance. Preference was assessed by offering individual gnathiids samples of all substrates. Coral rubble without live polyps and sponge were chosen at above-chance levels. Implications of coral decline are discussed.
Faculty Mentor: Dr. Sikkel Paul, Biology

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n **Production of Resveratrol and its Prenylated Analogs in Pilot-Scale Hairy Root Cultures**

The occurrence of resveratrol and its prenylated analogs in peanut has been linked to exposure to biotic and abiotic stresses. In order to study the biosynthesis and biological activity of these polyphenols, we established hairy root cultures of peanut as a sustainable and inducible bioproduction system of resveratrol analogs. Herein we describe the effect of the stressors methyl jasmonate and cyclodextrin on production of these compounds in 1 liter hairy root cultures. Our results highlight the benefits of this scalable bioproduction system for producing unique natural products and discovering bioactive compounds with potential applications in human health.
Faculty Mentor: Dr. Fabricio Medina-Bolivar, ABI/Biological Sciences

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n **Immunomagnetic Bead-Based Detection of Escherichia Coli O157:H7**

Foodborne pathogens have posed serious problems in public health and food industry. *E. coli* is one of the most common foodborne pathogens. Because of deleterious effects of *E. coli* on public health and economy, it is highly desirable to develop a detection method that can identify *E. coli* in food, before they reach the consumers. In this study, we developed a 96-well microplate-based immunoassay for detection of *E. coli* O157:H7. *E. coli* O157:H7-specific immunomagnetic beads and test samples were added to individual wells in a microplate and a sandwich assay was performed with HRP-labeled antibodies to the target organism.

Faculty Mentor: Dr. Soohyoun Ahn, Food Science & Technology

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n **Using Bead-Based Suspension Flow Cytometry to Detect and Characterize Salmonella**

Salmonella is the leading cause of foodborne illnesses in the United States. Recent outbreaks associated with Salmonella-contaminated foods and related economic loss show the importance of timely control of this harmful pathogen. Because of deleterious effects of Salmonella on public health and economy, it is highly desirable to develop a detection method that can identify Salmonella in food before they reach the consumers. While conventional detection methods can identify pathogens with good sensitivity, they are laborious and time-consuming. Alternative methods suffer from a lack of specificity, and require repetitive tests to detect multiple pathogens in a sample. We are using BioPlex flow cytometer to overcome these problems.

Faculty Mentor: Dr. Soohyoun Ahn, Food Science & Technology

Other Author/Collaborator: Dr. Jacqueline Carter, University of Arkansas Medical Science

Bailey, Brittany – Communication Disorders, Undergraduate
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n **A Preliminary Investigation of the Potential, Subtle, Middle Ear Differences in Children with Language and Reading Impairments**

The purpose of this investigation is to find and use middle ear pressure and compliance to compare the middle ear function of children with language impairments and/or reading delays. Children in grades 2 through 5 will be tested. The control group will consist of 50 normal developing children with no history of ear problems or language or reading delays. A second group of 50 children will be those who have been diagnosed and received intervention for language delays. A third group of 50 children will be consist of those who have been diagnosed with and received intervention for reading delays. The hypothesis is that there may be a link between middle ear pressure and compliance and children with language impairments and/or reading delays.

Faculty Mentor: Dr. Mike McDaniel, Communication Disorders

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■ **Synthesis of Medicines Towards the Treatment of Glaucoma**

Glaucoma, a disease in which the nerve cells in the front of the optic nerve dies due to increased intraocular pressure (IOP), effects over a million elderly Americans a year. Although there is no cure, glaucoma treatment uses vasodilators such as alpha adrenergic agonists, prostaglandin analogs, brimonidine, and timolol to relieve IOP. In an attempt to make more effective glaucoma medicines a series of cyclic imides, which structurally have been found to be as effective as alpha adrenergic agonists, has been synthesized. Specifically, furfuryl amine derivatives of specific cyclic imides were synthesized under microwave irradiation in good yields.

Faculty Mentor: Dr. Ellis Benjamin, Chemistry & Physics

Banks, Tamara – Nursing, Graduate

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■ **Hypertension in African Americans**

In the United States, hypertension is more common in African American females over the age of 65. The treatment goal is to control hypertension to prevent further damage to the heart and other organs. Ace inhibitors have proven to work well and are beneficial in preventing target organ damage and cardiovascular events. Calcium channel blockers help reduce stroke and cardiovascular events in African Americans, but they are less protective of the kidneys than Ace inhibitors. The ultimate goal of antihypertensive therapy is to delay, prevent, or reverse blood pressure related end organ damage. The objective of this study is to determine which medication best controls hypertension in African Americans.

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■ **The Impact of an Asthma Maintenance and Control Plan on the Newly Diagnosed Asthma Adult Patient**

Asthma is a chronic inflammatory disease which affects more than 22 million people. Factors that can stimulate the onset of asthma can include outdoor pollen, indoor allergens and occupational exposure to workplace materials. The purpose of this study is to determine a correlation between the use of an asthma action plan and control in the asthmatic patient as measured by number of office visits. A random sampling of 50 medical records will be reviewed. Correlation data analysis will be used to determine the usage of an asthma action plan and control of asthma as demonstrated by number of office visits for asthma exacerbations in patients with rescue inhalers ordered for these patients.

Faculty Mentor: Dr. Deborah Gilbert-Palmer, Nursing

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■ **Rats Discriminate Nicotine Concentration in Oral Solutions Based on Post Oral Stimuli**

Using a multiple bottle method we demonstrate that rats initially consume equal amounts of two nicotine solutions indicating that gustatory factors are not responsible for avoidance of high concentration solutions. With chronic exposure rats learn to discriminate between solutions and regulate consumption to equalize nicotine received from each solution.

Faculty Mentor: Dr. Kris Biondolillo, Psychology & Counseling

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■ **The Effects of Pregnancy and Education on Pregnancy Outcomes**

In the United States, approximately five hundred thousand mothers do not receive prenatal care. This research study was conducted to assess the effects of teaching and education on pregnancy outcomes. Ten pregnant women ages 20-35 were interviewed to assess their current needs such as smoking cessation, alcohol abuse, domestic violence, and nutrition. Demographics included Caucasian and African-American pregnant women. Group educational forums were held that provided information on nutrition, safety concerns, and developmental issues. After each session, questionnaires were completed by the participants to analyze any significant differences in the level of education of the females after the intervention of the group sessions.

Faculty Mentor: Dr. Lisa Waggoner, Nursing

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■ **Current Treatment Practices of Otitis Media**

Otitis media (OM) is a common illness which is characterized by a short-term inflammation of the middle ear. The purpose of this research is to examine the current treatment habits of health providers in relation to the current treatment guidelines set forth by the American Academy of Family Physicians in the treatment of adult OM. Descriptive analysis will be conducted to determine if a significant difference exists between patients who are willing to participate in alternative treatments for OM and patients who feel as though antibiotics are necessary for treatment.

Faculty Mentor: Dr. Debbie Shelton, Nursing

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n **Impact of a Patient Education Tool on Clinical Guideline Practices for Dyslipidemia in the 20-35 year old, Obese Population**

When obesity starts at a young age it can cause lifelong health care co-morbidity. The adult treatment panel (ATP III) guideline states that family physicians and practitioners should institute diagnostic testing at age 20 with risk factors when assessing dyslipidemia. Healthcare effectiveness data and information set (HEDIS) recommends recording body mass index (BMI) on young adults as well. This study will take a descriptive analysis of the barriers of diagnosing dyslipidemia in obese, young adults. This study addresses the following research questions: Are the primary care providers of one clinic in North central Arkansas evaluating obese, young adults? Did the use of the tool increase the number of patients identified with obesity?
Faculty Mentor: Dr. Deborah Gilbert-Palmer, Nursing

Chen, Xiaowei – Agriculture & Technology, Undergraduate
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n **High-Yield Secretion of Recombinant Proteins in Plant Cell Suspension Culture**

"Molecular farming" in plant cells with significant advantages in cost and safety is touted as a promising platform for the production of pharmaceutical proteins. However, low protein productivity remains a major obstacle towards commercialization. We develop a novel technology that allows recombinant proteins to be secreted from cultured tobacco cells in high yields. Our approach involves the expression of a protein as a fusion with a novel tag consisting of tandem repeats of "Ser-Pro" motif. This peptide tag directs extensive hydroxyproline-O-glycosylation in plant cells and significantly enhances the protein secretion. Here we report the kinetics of cell growth and protein secretion as well as the manipulation of culture medium for improved protein production.
Faculty Mentor: Dr. Jianfeng Xu, Agriculture & Technology

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n **The Impact of the JNC-7 Patient Education Instrument on Hypertensive Adults**

One in three adults in the United States has hypertension which is a significant risk factor for cardiovascular disease. Patient education is key to ensure compliance in the treatment of high blood pressure. The purpose of this study will be to determine the effectiveness of the JNC-7 education instrument in educating adult patients with hypertension and reducing blood pressure. A questionnaire will be administered to a random sample of patients 18 and older concerning blood pressure, lifestyle, and other risk factors. Patient education will then be administered utilizing the JNC-7 education tool. A one month follow-up visit concerning their blood pressure readings/lifestyle modifications will then be conducted. Data collection is currently in progress and will be entered into SPSS for formal analysis. This study will give insight into what degree our advice influences our patients and their health.
Faculty Mentor: Dr. Deborah Gilbert-Palmer, Nursing

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n **Development of a Multiplex PCR Assay for the Identification of 8 Different Salmonella Enterica Serovars**

Salmonella enterica is one of the leading causes of food related illness in America, posing a serious problem for public health and in the food industry. In this study we developed a sensitive multiplex PCR assay that can simultaneously detect and identify 8 different Salmonella serovars including Enteritidis and Typhimurium. This multiplex PCR was able to correctly identify samples containing different serovars and did not show any cross-reactivity with non-Salmonella foodborne pathogens. The study demonstrated that the developed multiplex PCR can be a rapid and sensitive tool for the identification of specific Salmonella serovars present in foods, while maintaining cost efficiency.
Faculty Mentor: Dr. Soohyoun Ahn, Food Science & Technology
Other Author/Collaborator: Stephanie Myal

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n **Parental Smoking Cessation Pamphlet**

Children exposed to tobacco smoke are prone to increased health care issues. Statistics suggest that 70% of smokers expose children to tobacco smoke. This study evaluates smoking cessation pamphlet effectiveness on adults. The pamphlet contains information concerning the harmful effects of second and third-hand smoking and children. A survey was conducted concerning the current beliefs of participants. Participants were then given a pamphlet to read at their leisure. A telephone survey was conducted to re-assess the beliefs related tobacco exposure risk. A t-test was used to determine any influence. The goal is to reinforce the need to keep children away from smoke to improve health.
Faculty Mentor: Dr. Deborah Gilbert-Palmer, Nursing

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▮ **Can Earlier Intervention Have an Effect on Childhood Obesity?**

According to the Center for Disease Control (CDC), along with results from the 2007-2008 National Health and Nutrition Examination Survey (NHANES), it is estimated that 17 percent of children and adolescents ages 2-19 years are in fact, obese. Due to this statistic, programs like the NEA Center for Healthy Children are finding their way into mainstream society. Retrospective chart reviews of this program will look at BMI rates of improvement and maintenance according to age answering the question: Does earlier intervention through health and wellness programs have an increased effect on a child's ability to lower their BMI? An attempt will be made to shed light on the rising rate of childhood obesity and the need for early intervention.

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▮ **Student Attitudes Toward Marijuana**

According to the National Institute on Drug Abuse (2008), many American young adults do not believe that smoking marijuana is dangerous. Previous research has shown a correlation between individuals that have negative perceptions of the use marijuana and their disinterest to participate in risky behavior such as marijuana use (LaBrie, Grossbard, & Hummer, 2009). The data collected for this study will be used to measure student perceptions on marijuana use, specifically how it affects GPA and relationships with friends and family. This perceived risk may also be influenced by the gender and social support of the individual. This presentation will include an overview of our study of student perceptions of marijuana risks.

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▮ **Hyperlipidemia: The Effects of Statins on Low - Lipoprotein, High - Lipoprotein, and Total Cholesterol**

Hyperlipidemia is a common cause and a major risk factor for cardiovascular disease (CVD). Hyperlipidemia can be defined as an increase of low-lipoprotein cholesterol > 100 mg/ dL and total cholesterol > 200 mg/ dL along with a decrease of high-lipoprotein < 40 mg/dL. Statin drugs are one of the most common medications used to treat hyperlipidemia. However, other drugs that have been used to treat hyperlipidemia are fibrates, bile acids resins, and nicotinic acid (niacin). The purpose of this study is to determine if statin drugs will affect low-lipoprotein, high-lipoprotein, and total cholesterol levels in patients with hyperlipidemia and establish which statin drug is most commonly used by the provider.

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▮ **RTB-Mediated Delivery: Developing Vaccine Antigen Fusion Proteins in Proteins in Plants**

Plant based vaccine production, offers a safe and inexpensive alternative to traditional vaccine production. Targeting antigens is a current limitation for vaccines and the nontoxic B subunit of Ricin (RTB) offers a promising delivery system. RTB targets sugars on the cell surface and facilitates transport of fused proteins across the cell membrane. Various fusions of RTB with Ovalbumin, a model antigen, were produced using the tobacco transient expression system. By modifying RTB with a variety of signaling tags, antigen fusions were directed to different cell organelles, targeting different immune responses. This also provides an essential tool for exploring the use of RTB as an adjuvant/carrier of recombinant vaccine antigen.

Other Authors/Collaborators: Dr. Jorge Ayala, Dr. Carole Cramer, Dr. Maureen Dolan, Dr. Ross Fergus

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▮ **Perspectives on Aggressive Acne Treatment**

Acne strikes teenagers equally, regardless of sex, race or ethnicity. This study determines whether acne is addressed in primary care, how aggressively acne is treated in the pediatric and adolescent populations, identifies the primary barrier to initiation of treatment regimens, and examines the psychosocial burden suffered by those inflicted. Thirty patients who suffered from acne during their adolescent years will be asked a series of questions pertaining to their history of acne, acne treatment, and barriers prohibiting treatment. Results will be used to gain insight and assist in providing pro-active acne management among health care professionals to improve patient outcomes and quality of life.

Faculty Mentor: Dr. Debbie Shelton, Nursing

Guest-Fincher, Casey – Nursing, Graduate

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n **Evaluation of Proper Education for Diabetes Type II**

The purpose of this study is to evaluate if there is a difference with individualized re-education to patients with Type II diabetes. Type II diabetes is prevalent in our communities and is responsible for millions of healthcare dollars. Can re-educating the patient on the effects of long-term levels of high blood glucose make a significant difference? This is a convenience study of 10 patients that are established patients that have been diagnosed with Type II diabetes and not on insulin. Their knowledge on the proper diet will be evaluated by a questionnaire and the education will be tailored to their responses. The patient will be followed in office and phone calls. Blood glucose levels will be assessed before the re-education and after.

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n **Polypharmacy and Fall Occurrence**

The aim of this study is to prove patients with lengthier medication lists fall more than those on lesser amounts of medications. Data obtained in an internal medicine clinic of Jonesboro, AR. A total of 30 randomly selected patients completed a 16 item questionnaire. Patient age ranged from 50-85yrs. The focus was on number of current prescriptive/OTC medications in use and number of falls in the past yr. Exclusionary factors included many pre-existing conditions also known to cause falls. Correlation analysis will be used to note a significant positive correlation in number of medications and number of falls. Falls can be financially costly and even life-threatening due to injury; prevention is vital. Findings and suggestions underway.

Hardesty, Erikson – Computer Science, Undergraduate

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n **Device-Aware Computing with Multiple GPUs**

The research focuses on improving GPU programming, a cutting edge platform. General purpose computing on GPU greatly impacts software and hardware industries. GPU enables software developers to solve problems once deemed impractical. While parallel programming is becoming well established on CPU, GPU is a relative computing frontier. Tools easing parallel programming for CPU do not yet exist for GPU. These tools enable software targeting the CPU to run optimally on multiple hardware configurations. The research seeks similar solutions for GPU that work in heterogeneous environments. Through the use of a daemon to collect current hardware configuration data, a program can modify its behavior dynamically to best suit available resources.

Faculty Mentor: Dr. Hai Jiang, Computer Science

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n **Immunomagnetic Bead-Based Detection of Salmonella Coupled with Biotinyl-Tyramide Signal Amplification**

Foodborne (FB) pathogens are serious problems in public health and food industry. Recent outbreaks clearly show the damage that FB illness can cause in public health and economy. Due to its serious effect on public health and food safety, it is imperative that we use rapid and sensitive assays to detect FB pathogens. In this study, we developed a 96-well microplate-based immunoassay for detection of one the most common FB pathogens, Salmonella spp. Immunomagnetic (IM) separation and BT signal amplification were coupled to the assay to increase its sensitivity and specificity. Salmonella specific IM beads and test samples were added to individual wells in a microplate and an assay was performed with HRP-labeled antibodies to target organism.

Faculty Mentor: Dr. Soohyoun Ahn, Food Science & Technology

Other Authors/Collaborators: Muhsin Aydin, Samantha Dunigan, Parth Shah

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n **Hypertension in the Heart of Children: Childhood Obesity**

Studies have shown obesity has become an immense problem among youth. The objective of this study is to determine if having a BMI>30 in childhood leads to/ predispose a child to hypertension (HTN). Retrospective chart reviews of 26 charts of youth aged 0-17 years with at least a 6 month established history were randomly selected. 38% had a BMI>30 with a confirmed diagnosis of HTN. 54% had a BMI>30 without a diagnosis of HTN. 0.08% had HTN with BMI< 30. Obesity is on the rise. Obesity does not directly correlate with HTN, but it predisposes to the possibility.

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n **Overview of the ASU Optoelectronic Materials Research Laboratory**

An overview of past and ongoing research on semiconductor materials, thin film deposition, optoelectronic devices, and alternative energy, and related personnel and infrastructure associated with the ASU Optoelectronic Materials Research Laboratory directed by Dr. Robert Engelken and involving close to 100 student research assistants over the last 29 years. Recent NASA/ASGC and NSF/ASTA EPSCoR grants for solar cell material research, in partnership with the Fayetteville, Little Rock, and Pine Bluff campuses of the University of Arkansas, add particular relevance to the group's research and educational missions. The presentation will also survey the specific semiconductor film deposition methods used by the group.

Faculty Mentor: Dr. Robert Engelken, Electrical Engineering

Other Authors/Collaborators: Frederick Felizco, John Hall, David McNew, M. Ali Mughal, M. Jason Newell, Shyam Thapa, Joshua Vangilder, and Dr. Robert Engelken

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n **Evaluating Environmental and Structural Influence on Ecosystem Metabolism in Drainage Channels**

While greater emphasis is being placed on ecosystem valuations and water mitigation measures, functional system integrity, in terms of ecosystem processes, often fails to be considered in systematic assessments of the ecological conditions of streams. This study in Jonesboro, AR investigated ecosystem metabolism within ditch systems and examined environmental and structural attributes that influence the rates of gross primary productivity (GPP) and ecosystem respiration (ER). GPP ranged from 0.30 to 1.38 g O₂ m⁻²day⁻¹, and ER ranged from -0.27 to -1.46 g O₂ m⁻²day⁻¹. After conducting factor analysis, GPP appeared to be significantly influenced by environmental attributes such as temperature, chlorophyll a, and phosphate (p=0.029).

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n **The 'Virtual Dementia Tour': A Training Tool to Help Nursing Students Better Understand the Day to Day Struggles of Individuals with Dementia**

Through a collaborative effort among nursing students and faculty at ASU-Jonesboro, the Center on Aging-NE, and the Schmieding Center of Jonesboro, 30 BSN students will be invited to participate in the "Virtual Dementia Tour", to evaluate the effectiveness of simulation as a reliable method of improving knowledge and understanding of dementia in student nurses. Currently Alzheimers dementia affects over 60,000 Arkansans with this number projected to increase 36% by 2025. Current and future nursing students will be the healthcare workforce faced with the challenge of caring for this population of individuals, however, there is limited research to assess their knowledge and understanding of dementia. Results of the study will be presented.

Faculty Mentor: Dr. Phyllis Skorga, Nursing

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n **Use of Dynamic Reaction Cell Inductively Coupled Plasma Mass Spectrometry (DRC ICP-MS) to Detect and Measure Cadmium in Mice Tissue Following Inhalation of Semiconductor Nanocrystals**

Because of their utility as fluorescence markers, use of semiconductor nanocrystals in a variety of applications is increasing. Nanoparticles are difficult to measure in biological matrices and some varieties contain toxic metals such as Cd. Therefore we have developed a DRC ICP-MS method for detecting and measuring Cd in tissue samples from animals that inhaled QDs. Mice were exposed to aqueous aerosols containing QDs (Qdot® 545 carboxyl quantum dots, Fisher Scientific and Invitrogen, Inc) followed by organ collection which were digested and analyzed as liquids using DRC-ICP-MS to measure cadmium. This technique allowed the detection and measurement of Cd which was associated with semiconductor nanocrystal accumulation within the tissues.

Faculty Mentor: Dr. Roger Buchanan, Molecular Biosciences

Other Author/Collaborator: Kenton Leigh

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n **Transport of Nanomaterials from Airways to Neurons**

Materials present in the environment can enter the body through exposure via inhalation, dermal exposure, or ingestion. Among these, the most common mode of entry into the body is via inhalation. With an explosion in nanotechnology applications, increasingly nanomaterials (NM) are handled during manufacturing and research. Due to the very small, nano size of these materials, they can interact with the cellular environment once they gain entry into the airways via inhalation. Therefore we designed experiments to introduce NMs into upper part of airway (beginning of trachea) and to determine if those NMs will be retrogradely transported into neurons (present in nodose ganglia, NDG) which innervate the airways.

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■ **The Use of Microbial Exopolysaccharides to Aid in the Reduction of Soil Erosion**

Soil erosion is a natural problem of soil degradation. Polyacrylamide (PAM) has been previously used as a polymer to decrease the susceptibility of soil to erosion; however, PAM could contain unpolymerized acrylamide, which is a neurotoxin. A possible substitute for PAM is the exopolysaccharide (EPS) layer produced by some bacteria. The goals of this research project are 1) to maximize EPS production by supplementing R2A growth medium with additional carbon sources (glucose, sucrose, fructose, lactose and soluble starch) while minimizing the cost 2) to understand the kinetics of EPS production 3) to identify the bacteria used for this study by PCR and 4) to scale up EPS production.

Faculty Mentor: Dr. David Gilmore, Biology

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■ **Developing Plant-Expressed RTB Fusion Protein Tools for Animal Cell Targeting and Delivery**

Transgenic plants hold much potential as an expression platform for production of vaccine antigens and recombinant protein therapeutics with applications to both human and animal health. One challenge in pursuing this is designing recombinant proteins so that they reach their target cells and cross animal cell membranes. Holding significant potential for therapeutic protein delivery, the lectin-binding protein of ricin (RTB) binds sugars on the outer membranes of mammalian cells. A model fluorescent protein, EGFP, was expressed as a genetic fusion with RTB and expressed transiently in plants. This important tool will enable fluoroscopy studies for understanding RTB uptake and targeting of payload proteins into animal cells.

Faculty Mentor: Dr. Maureen Dolan, Arkansas Biosciences Institute

Other Authors/Collaborators: Dr. M. Ross Fergus, Dr. Carole C. Cramer

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■ **Comparison of the Effects of Maternal Smoking on Nicotinic Acetylcholine Receptor Subunit Expression Variability Among Related and Unrelated Pups**

Studies show that 13% of pregnant mothers smoke. While maternal smoking has serious consequences for all children, the effects vary greatly. To elucidate the effects of nicotine, we will use qRT-PCR to measure nAChR subunit mRNA expression of 8 siblings and 8 unrelated pups born to mothers who were exposed to cigarette smoke during gestation. By comparing the variation in expression in these groups to similar groups born to unexposed dams, we will be better able to characterize the influence of nicotine on these receptors. Our hypothesis is that by exogenously exciting specific neurons, prenatal smoke exposure directs prenatal neurodevelopment and narrows variability in receptor gene expression.

Faculty Mentor: Dr. Roger Buchanan, Molecular Biosciences

Other Authors/Collaborators: Dr. Maureen Dolan, Dr. Emily Weiss, Dr. Paula Williamson

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■ **Analyzing Genetic Factors Involved in Recombinant Protein Expression Enhancement**

Understanding the factors that promote recombinant protein accumulation in transgenic plants will provide insightful strategies for protein biofactory efficiency. Through combining biological and bioinformatics analysis, our work is to determine genetic and biological factors effecting increased protein accumulation of a bacterial cellulase enzyme in transgenic maize.

Other Authors/Collaborators: Cody Ashby, Dr. Elizabeth Hood, Dr. Xiuzhen Huang, Dr. Keat Teoh

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■ **Patients Understanding of the Hemoglobin A1C and eAG in the Type II Diabetic Patient Population**

The study was performed to determine how well patients understand the HgA1C/estimated average glucose and information that is provided by the health care provider. The study also examined how well the patient understood the impact of the HgA1C, effects of diet and exercise and effects of these on overall health. A questionnaire was given to 14 adult type II diabetics. The participants were both male and female Caucasians and African American from 41-86 years of age. This was a quantitative study that used descriptive statistics. Findings show that a majority of type II diabetics are obese so continued education is needed because obesity complicates diabetes and leads to other health problems.

Faculty Mentor: Dr. Deborah Palmer, Nursing

Kulkarni, Shashank – Chemistry, Graduate
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■ **Development of High-Vitamin C Tomatoes**

Vitamin C (ascorbate, AsA) is the most abundant water-soluble antioxidant and is essential for numerous metabolic processes in animals and plants. Over-expression of enzymes involved in the inositol pathway including myo-inositol oxygenase (MIOX) and glucuronate reductase (GlcUR) enhance foliar AsA levels in Arabidopsis. These high-AsA lines grow better and are more tolerant to stresses compared to controls. The aim of this study is to enhance AsA content in tomato by constitutively expressing the Arabidopsis MIOX4 and GlcUR genes. Tomato was chosen because it is an important vegetable crop throughout the world and elevated vitamin C levels in vegetative and fruit tissues will have a direct relevance to agriculture and human health.

Faculty Mentor: Dr. Argelia Lorence, Chemistry & Physics /ABI

Other Authors/Collaborators: Dr. Walter P Suza; Dr. Fiona L. Goggin, Department of Entomology, University of Arkansas, Fayetteville

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■ **BET Surface Area Analysis of Etched and Coated Surfaces**

The BET theory explains the adsorption of gas molecules to a solid surface. One of the major applications of this theory is to measure the surface area of irregularly shaped objects. We have tried to use a Beckman Coulter SA 3100 Surface Area analyzer (BET SA Analyzer) to measure surface area of a variety of solid substrates (stainless steel and ceramic cartridge heaters) and the effects of acid etching on the surface area of those objects. Both heater types were etched with Hydrofluoric Acid and the surface area was then measured. Both etched and unetched heaters were coated with PEG and PDMS-DVD. It was found that the etched heaters had an increase in surface area and also a greater adherence for the two coatings.

Faculty Mentor: Dr. Roger Buchanan, Molecular Biosciences

Other Authors/Collaborators: Hunter Smith, Jerome Stegall

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■ **Measurement of Uptake and Accumulation of Semiconductor Nanocrystal Quantum Dots by Pimephales Promelas**

Because their chemical, physical, and optical properties make them useful in applications such as biomedical imaging, photo-voltaics, and LEDs, the use of semiconductor nanocrystal quantum dots (QDs) is increasing rapidly. Although QDs hold great potential in a variety of industrial and consumer applications, the environmental implications of these particles is largely unexplored. Many QD cores contain cadmium (Cd), so Cd release is cause for concern. Because many types of QDs are miscible in water, QD interactions with aquatic ecosystems require more attention. Here we used fluorometry to measure time and dose dependent bioconcentration and depuration of accumulated QDs in gut tissue by the aquatic vertebrate Pimephales promelas.

Faculty Mentor: Dr. Roger Buchanan, Molecular Biosciences

Other Author/Collaborator: Dr. Jennifer Bouldin

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■ **Vitamin C Metabolism in Rice**

Vitamin C (ascorbic acid, AsA) is a major antioxidant that protects cells from oxidative damage by scavenging reactive oxygen species that are a result of abiotic and biotic insults. Our laboratory has shown that high-AsA Arabidopsis lines with 2-3 fold AsA content are tolerant to multiple abiotic stresses and have enhanced biomass. We are now extending our work to rice, an agriculturally important crop. Our measurements show that instead of a steady decline with age, in rice AsA follows a different pattern peaking at two key developmental stages. These studies will help identify varieties with high-AsA levels to generate stress-tolerant germplasm.

Faculty Mentor: Dr. Argelia Lorence, Chemistry & Physics / ABI

Other Authors/Collaborators: Dr. John Hubstenberger; Dr. Gregory Phillips; Helen Belefant-Miller, USDA-ARS Dale Bumpers National Rice Research Center

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■ **Bioprotection from Beetles: Investigating the Untapped Secrets of the Neem Tree**

Using neem and bean beetles, we developed two new undergraduate biology experiments. Bean beetle infestation affects stored beans, causing food loss especially in poor countries where beans are a primary nutrient source. Neem has been used as a beetle deterrent, and may prevent beetles from laying eggs on beans. Our goals were to execute and evaluate inquiry-based and cookbook methods of lab experimentation; in each, students determined whether the presence of neem alters bean beetle movement patterns or deters oviposition in the beetles. Although neem seemed ineffective as a bioprotectant at the concentrations tested, we found that the inquiry-based approach to lab teaching improved students' test and final lab grades.

Other Authors/Collaborators: Dr. Amy Pearce, Dr. Malathi Srivatsan, Dr. Anne Grippo

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n Attention Deficit Hyperactivity Disorder and Combined Therapy: A Compliance Issue?

Attention-deficit/hyperactivity disorder (ADHD) is a chronic behavioral condition, which medications appear to be effective, but pharmacotherapy combined with behavioral interventions may optimize treatment outcomes. Purpose of this study was to determine compliance with referrals. A questionnaire determined if multimodal therapies were prescribed and if the patient attended. Descriptive analysis was used to analyze the questionnaire and to determine barriers to attend. This research is important to family practice because awareness to the diagnostic criteria and treatment for ADHD with the help of multimodal treatment could perhaps reduce impairments with this chronic disorder.

Faculty Mentor: Dr. Debbie Shelton, Nursing

Montalvo, Brandon – Biological Sciences, Undergraduate

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n The Role of Red Food Dye in Allergic Inflammation

We used rats to study a suspected allergic reaction observed in dogs' ears. We hypothesize that red dye 40 used in dog foods causes hypersensitivity response, likely via histamine release leading to ear inflammation. We treated rats with dog food/treats containing red dye or with rodent diet alone over two months. We found that rats on diets highest in red dye demonstrated middle ear exudates and some thickening of the keratin layer. In future studies we hope to determine the effects of red dye in rats to fully investigate immune/inflammatory responses involved in ear inflammation that often develops in dogs, thus reducing unnecessary discomfort in canines and costs for pet owners.

Faculty Mentor: Dr. Anne Grippo, Biological Sciences

Other Author/Collaborator: Mr. Anthony McMickle

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n The Efficiency of Wireless Sensor Networks and the Use of Energy from Solar Cells to Recharge Sensors

Wireless sensor networks (WSN) are responsible for many consumer and industrial applications. WSN are composed of multiple sensors spatially distributed in a network, sensing various parameters. Parameters may be vibration, temperature, pressure, sound, etc. The sensors/nodes are powered and can transmit and receive information. In WSN, power dissipation is a main issue due to battery operated sensors. Yet, our concerns are the efficiency as to data capturing and relaying data to the base station. Currently, we are working on creating a reliable base station with 10 nodes, each node communicating and signaling with one another. Our research intent is to use solar cell for recharging the battery.

Faculty Mentor: Dr. Shubhalaxmi Kher, Electrical Engineering

Other Author/Collaborator: Lee Nutt

Myal, Stephanie – Biological Sciences, Undergraduate

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n Effect of rTMS on Nicotine-Induced Suppression of Rat P-13 Auditory-Evoked Potential

rTMS has been studied extensively as a potential treatment for neuropsychiatric dysfunctions, including nicotine addiction. However, the mode of action of rTMS is poorly understood, so we have developed an animal model to elucidate its mechanism. The goal of this study is to characterize the effects of rTMS treatments on responses to nicotine (NIC) in the rat. We have shown that NIC rapidly and reversibly attenuates the sleep-state dependent P-13 arousal response from the brainstem. If rTMS can prevent these changes in arousal, it may represent an effective treatment for nicotine addiction. Adult male rats were exposed to rTMS for 20min at 1, 10 or 20Hz and their P-13 responses recorded for 60min after exposure.

Faculty Mentor: Dr. Roger Buchanan, Molecular Biosciences

Other Authors/Collaborators: Margarita Escovedo; Julius Franz, Research Assistant, UAMS; Dr. Abdallah Hayar, UAMS CTN; Dr. Robert D. Skinner, UAMS CTN

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n Analysis of Short Wavelength LED Intensity as a Function of Biofilm Decontamination

Beam profiles of short wavelength light emitting diodes (LEDs) reveal a distribution of intensity with the greatest intensity at the center of the beam. Ultraviolet (UV) light has been shown to be germicidal. It is expected that biofilms of *Escherichia coli* will exhibit photolysis in a pattern that is consistent with the characteristics of the short wavelength LED beam to which it is exposed. This study will examine the effects of energy differences in LED beams on biofilms by using a UV-CCD camera to measure the intensity distribution. Image analysis software will be utilized to form three dimensional plots of the measured intensity and to create a function relating bacterial death to the UV light dose.

Faculty Mentor: Dr. Susan Davis Allen, Physics & Chemistry

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▮ **The Comparison of Abnormal Weight Gain to Normal Weight Gain on Blood Pressure During Pregnancy**

The need to maintain a healthy weight during pregnancy has been stressed in an effort to alleviate problems such as hypertension. The purpose of this study is to determine if a correlation exists between females who gain excessive weight during pregnancy and the development of hypertension during and after pregnancy. A retrospective review of 100 charts was surveyed at an Obstetrician/Gynecology clinic in Tennessee. Included in the chart review were women who delivered in the last three months, and were therefore in the postpartum period. Data analysis will be used to determine if there is a significant positive correlation in weight gain during pregnancy and the development of hypertension.

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▮ **The Correlation of Cortisol Markers in ASD and Non-ASD Children**

There are many reports associating aberrations in cortisol levels with atypical development and Autism Spectrum Disorder (ASD) symptoms. However, for majority of children exhibiting ASD there are no available data documenting cortisol levels during neurodevelopment. At the population level this makes generalizations about the effects of cortisol impossible. Fortunately a database of medical records in which the presence of conditions known to be associated with cortisol pathology exists. These conditions can serve as proxies for aberrant cortisol levels and may be useful markers for distinguishing group differences in children with and without an ASD diagnosis.

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▮ **Development of Bead-Based Suspension Flow Cytometry to Detect and Characterize Salmonella**

Salmonella is the leading cause of foodborne illnesses in the United States. Because of deleterious effects of Salmonella on public health and economy, it is highly desirable to develop a detection method that can identify Salmonella in food before they reach the consumers. While conventional detection methods using culture or biochemical tests can identify pathogens with good sensitivity, they are laborious and time-consuming. Alternative methods suffer from a lack of specificity, and require repetitive tests to detect multiple pathogens from one sample. The goal of this study is to develop a sensitive, rapid, and specific bead-based suspension array to detect and identify Salmonella serotypes by identifying their characteristics.

Faculty Mentor: Dr. Soohyoun Ahn, Nutrition & Technology

Other Author/Collaborator: Jackie Carter

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▮ **The Effects of an Educational Handout on Antibiotic Overuse**

Interest in antibiotic resistant bacteria has gained popularity in communities in the U.S. and around the world. The purpose of this study is to evaluate the effectiveness of an educational handout in a primary care clinic in N. Arkansas to reduce antibiotic overuse. The diagnosis URI included nasopharyngitis (NP), and URI. Every 10th chart, out of 448, was pulled and evaluated for antibiotic use in the treatment of URI (n=38). An informational handout was given to the providers and patients of the clinic providing the CDC guidelines for treatment of URI. Results indicated those diagnosed with URI (n= 16), 12% of the patients had been treated with antibiotics. Of those diagnosed with NP (n=22), 32% were treated with antibiotics.

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▮ **Exercise Education in Pre-Hypertensive and Hypertensive Patients**

It is estimated that by 2025, hypertension will affect up to a third of the worldwide population. Cardiovascular disease is the leading cause of death in the United States, and hypertension is a major modifiable risk factor. Hypertension plays a large role in morbidity associated with heart, brain, and kidney dysfunction. Although pharmacotherapy is effective in a large percentage of patients with hypertension, drug therapy has several drawbacks such as inconvenience, expense, and side effects/adverse effects in some patients. This highlights why attempting non-pharmacological lifestyle modifications prior to prescribing anti-hypertensives, or even after diagnosis and pharmacological treatment of hypertension, is an important intervention.

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n **Does Ejection Fraction Correlate with Quality of Life in Heart Failure Patients?**

Heart Failure is a major public health problem. Clinical symptoms can be distressing for patients and may impact quality of life. Clinical measurement of left ventricular function is effective for quantitatively assessing treatment results; however it may not reflect the qualitative impact on the patient. The purpose of this study is to determine if a correlation exists between left ventricular function and the patient perceived quality of life. Patients were selected from a Cardiology congestive heart failure clinic. Participants completed the Minnesota Living with Heart Failure Survey to assess quality of life related to heart failure. Charts were reviewed for echocardiogram within the last six months that revealed ejection fraction.

Faculty Mentor: Dr. Debbie Shelton, Nursing

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n **Detection of Nitrogen Based Compounds Using SPME/GC/MS**

We are detecting chemical signatures using solid phase micro extraction (SPME) coupled with gas chromatography and mass spectrometry (GC/MS). SPME is a fast way to collect samples without using solvents. SPME fibers can be coated with different materials that will chemically attract particular types of compounds. This study demonstrates our ability to select the proper SPME fiber coating for the detection of chemical signatures in nitrogen based compounds. We compared the peak response from headspace samples collected using SPME fibers coated with polyethylene glycol (PEG) and polydimethylsiloxane (PDMS)/ divinylbenzene (DVB). The results indicate that the PDMS/DVB coated SPME fiber is more suitable.

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n **Analysis of Volatile Organic Compound (VOC) Emissions of Plant Tissue with Ultra-fast Gas Chromatograph Sensor Technology (zNose GC/SAW)**

This research is focused on detecting volatile plant emissions with the goal of enhancing agricultural weed control. This requires differentiation between volatile compound signatures from crop plants and pest plants. Plant produced volatiles will be detected using a handheld ultra-fast gas chromatograph with a surface acoustic wave detector (GC/SAW). This instrument is similar to conventional detectors in that it can identify volatile chemicals based on unique spectral fingerprints. The GC/SAW uses a short column to separate volatile compounds and a quartz microbalance that detects changes in vibrational frequency as molecules of volatile compounds adsorb and desorb to its surface. The GC/SAW is useful for the identification of volatile compounds and can detect parts-per billion concentrations with rapid multispectral data acquisition and fast qualitative estimations.

Faculty Mentor: Dr. Roger Buchanan, Molecular Biosciences

Other Authors/Collaborators: Greg Lance, Cristy Phillips, Danielle Smith

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n **Enriched Housing Conditions Reduce Voluntary Nicotine Self-Administration in Female Rats**

Using a multiple bottle method we demonstrate that basic environmental housing conditions exert an influence on female rat's consumption of nicotine solutions. Providing basic enrichment does not eliminate nicotine self-administration but it does result in lower levels of intake. Pre-enrichment levels of intake are reestablished upon return to standard conditions.

Faculty Mentor: Dr. Kris Biondolillo, Psychology & Counseling

Other Author/Collaborator: Anthony McMickle

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n **Reasons for Quitting Methamphetamine and Other Drugs**

Intake data from a methamphetamine specific treatment program were analyzed and reasons for quitting and sources of motivation were examined. This presentation will include the most and least popular reasons for quitting. Furthermore, sources of motivation behind the reason will be discussed. The most often cited reasons for quitting were primarily intrinsic; however, the sample had both high internal and external motivation.

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▮ **Childhood Second-Hand Smoke Exposure & Otitis Media in Adults**

Otitis media (OM) is one of the most common illnesses seen in children. While much research has been done linking OM in children with exposure to secondhand cigarette smoke there is general lack of available research regarding childhood secondhand smoke exposure and the development of OM as an adult. The objective of this study will be to determine if there is an association between childhood secondhand smoke exposure and the development of OM as an adult. Data will be obtained per a questionnaire given to patients 18 and older presenting to an ENT office with diagnosis of otitis media. After data is collected it will be entered into SPSS to see if a significant correlation exists between adult OM and childhood secondhand smoke exposure.
Faculty Mentor: Dr. Stacy Troxel, Nursing

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▮ **The Use of Mini-TOF Spectrometry to Detect and Identify Low-Molecular Weight Volatiles**

The miniTOF II system is a complete Time-of-Flight (TOF) system including the mass spectrometer, vacuum pumps, all power supplies, data acquisition electronics, acquisition software, and computer system. This instrument uses existing time-of-flight mass spectrometry, in which, the system operates by ionizing the input gas sample with 70eV electrons and injects the ions into the front of a repeller plate. A voltage pulse applied to the repeller repels the ions into an acceleration region followed by a drift region and finally to the detector. The detector is a discrete dynode electron multiplier for sensitivity and ruggedness, and it serves to detect the time of arrival of the ions. This instrument is ideal for the detection and identification of low molecular weight compounds.
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▮ **Molecular Ecology: Slimy Salamander STRs**

The slimy salamanders are a group of woodland salamander species that show unique diversity in the Ouachita Mountains of Arkansas and Oklahoma. I am developing novel molecular genetic tools for these species with specific emphasis on a population of the western slimy salamander that utilizes a mineshaft in Garland Co., AR to brood their eggs. Although my application is quite local and specific, these tools may be applied to many biological questions regarding these species and their relationships with each other and their environment.
Faculty Mentor: Dr. Carole Cramer, ABI/Biology
Other Authors/Collaborators: Dr. Maureen Dolan, Dr. Ronald Johnson, Dr. Stan Trauth

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▮ **Selected Members of the Lupinus Genus Accumulate Elevated Levels of Vitamin C**

Lupins (*Lupinus* sp) are legumes with attractive chemical, medicinal and nutritional properties. There are several reports of the use of lupins to clean up and restore contaminated soils. The Lorence laboratory is interested in understanding the role of vitamin C (ascorbate, AsA) in enhancing the ability of plants to uptake and metabolize toxic compounds from water and soil. The initial goal of this project is to establish the baseline AsA content of selected *Lupinus* species. Our results show that *L. angustifolium* accumulates high foliar AsA content and these levels remain high during the life cycle of the plant.
Faculty Mentor: Dr. Argelia Lorence, ABI/Chemistry & Physics
Other Authors/Collaborators: Dr. Jessica Yactayo-Chang, Dr. Carmen Gurrola and Dr. Pedro Garcia, Universidad de Guadalajara, Mexico, Mexico

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▮ **Characterization of an Arabidopsis Gluconolactonase Involved in Ascorbate Biosynthesis**

Ascorbate (AsA) is a key antioxidant and regulator of cellular events. Gluconolactonase (GNL) is the third enzyme of the myo-inositol pathway, one of the four routes leading to AsA synthesis in plants. We have focused in a putative chloroplastic GNL based on the protective role AsA plays during photosynthesis. ORF was cloned, sequenced and transiently expressed in *Nicotiana benthamiana* with a HIS-tag in the C terminus. GNL was purified by metal-affinity chromatography, lactonase activity was confirmed in vitro and *N. benthamiana* leaves expressing GNL showed increased AsA. We are currently determining temporal/spatial expression and doing physiological studies in GNL over-expressers and knockouts.

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n **Perspectives on Sex Education and Teen Pregnancy**

The US continues to have one of the highest teen pregnancy rates in the world. Since the early 90's Americans have made significant strides in becoming more aware of the need to decrease this number. There is limited research on how pregnant teenagers perceive sex education. The purpose of this study is to determine how pregnant teenagers perceive sex education and determine what interventions may have prevented them from having sex. A questionnaire was given to the females who were pregnant as teenagers. They were asked what type of sex education they received and if it was beneficial. The goal is to determine if there is a consensus among this population on which education best deters teen pregnancy.

Faculty Mentor: Dr. Debbie Shelton, Nursing

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n **The Calcium Channel Challenge: Using AlleleID to Design Primers for qRT-PCR**

Quantitative real-time PCR can be a powerful method for determining differential gene expression. However, obtaining accurate and reproducible results depends significantly on the specificity, efficiency, and quality of primers used to amplify cDNA generated from reverse transcription of total RNA. Here we discuss a practical approach to designing primers for reference and target genes using a primer design software, AlleleID, as well as its advantages and limitations. Primers were successfully designed for genes sharing regions of significant homology (P/Q-, N-, L-, and T-type calcium channel subunits), containing few exon-exon junctions (connexin 36), and having multiple isoforms (Cacna1b).

Other Authors/Collaborators: Blake Jenkins, Paula Williamson; Dr. Roger Buchanan, Dr. Maureen Dolan

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n **Lunar Periodicity in Activity of Caribbean Gnathiid Isopods**

The behavior of many marine organisms is influenced by the lunar cycle. Gnathiid isopods are common ectoparasites of reef fish and are most active during night and twilight. We examined the effects of lunar phase on gnathiid activity on Caribbean reefs using two methods: 1) Emergence traps set on reefs over a 24-hour diel period off Puerto Rico and sites in the Lesser Antilles and 2) Host fish placed in cages on reefs off St. John and Guana Island throughout the lunar cycle. All methods revealed an effect of site. The relationship between gnathiid activity and ambient light varied by method. Our results are consistent with recent studies on the Great Barrier Reef and have important implications for the behavior of host fish on coral reefs.

Faculty Mentor: Dr. Paul Sikkil, Biology

Other Author/Collaborator: Ann Marie Coile

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n **Average Age of First Sexual Encounters Among Pre-Teens and Teens**

Studies have shown that 70% of females already experienced their first sexual encounter before the age of 18 years of age. The purpose of this study was to determine if the age of first sexual encounter was related to the risk of unplanned pregnancies and sexually transmitted diseases. A retrospective chart review was conducted using 100 charts randomly selected of female patients between the ages of 8-18 years old seen within a 5 year period. Results revealed the average age was 14.77 years old for first sexual encounter among females in the studied population. Further data analysis is ongoing to determine correlation between first encounter in relation to rate of pregnancy and sexually transmitted infections.

Faculty Mentor: Dr. Debbie Shelton, Nursing

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n **Effects of Maternal Smoking on Nicotinic Acetylcholine Receptor Subunit mRNA Expression**

In 2009, the US department of Health and Human Services stated that 13.1% of women smoke during pregnancy. In humans, maternal cigarette smoking has been linked with low birth weight, SIDS, and many behavioral disorders. However, the mechanisms by which maternal smoking produces these effects are poorly understood. Nicotine found in cigarette smoke is absorbed in the lungs and crosses the placenta where it interacts with nicotine sensitive nicotinic acetylcholine receptors. We exposed pregnant CD1 mice to cigarette smoke and used q RT- RT-PCR to compare regional nAChR subunit mRNA expression of pups born to exposed and unexposed dams. This allowed us to characterize the effects of maternal smoking on the spatial and temporal expression of nicotinic acetylcholine receptor RNAs.

Faculty Mentor: Dr. Roger Buchanan, Molecular Biosciences

Other Authors/Collaborators: Jamie Adams, Wesley Dunam, Gabby Escovedo, Tj Eskridge, Blake Jenkins, Courtney Middleton, Alshon Rose, Emily Weiss

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n **Novel Defenses in Invasion Resistance: Potential Eavesdropping May Cue Inducible Defenses Against an Invasive Herbivore**

Plants release volatile chemicals when attacked, some of which can induce defense mechanisms in neighboring plants known as defense priming. Here we present data from an experiment of a plant and novel herbivore association that suggests defense priming can be triggered by neighboring plants defending against a coevolved herbivore. When the newly-associated invasive herbivore (*Cactoblastis cactorum*) was reared on native pricklypear hosts (*Opuntia humifusa* and *Opuntia stricta*) in the presence the native herbivore (*Melitara prodenialis*), obvious mucilage and necrotic defenses were observed as well as increased time to pupation. In nature an extended larval period increases mortality due to predators, parasitoids, and environmental factors.

Faculty Mentor: Dr. Travis Marsico, Biology

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n **Hydroxyproline-O-glycosylation Improves Yields of Protein Transiently Expressed in Tobacco Plants**

Plants have emerged as cost-effective, efficient factories to produce foreign proteins of pharmaceutical importance. Agrobacterium-mediated transient expression provides a rapid and simple plant system for production but is often linked with low protein recovery. Plant-specific hydroxyproline(Hyp)-O-glycosylation has been demonstrated to increase protein stability and solubility. To test if Hyp-glycans attached to a target protein can improve overall transiently expressed protein yields, EGFP reporter protein was expressed as fusion with a Ser-Pro 32 repeats motif (SP)32 that directs extensive Hyp-O-glycosylation. Results comparing expression of (SP)32:EGFP fusion and EGFP control using plant and cell culture platforms will be discussed.

Faculty Mentor: Dr. Maureen Dolan, Arkansas Biosciences Institute

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n **Can Vitamin C Enhance the Accumulation of a Model Human Protein in Stable Transgenics?**

Human interleukin-12 (hIL-12) is a heterodimeric cytokine, involved in modulating cell-mediated immunity important for targeting viral disease and cancer. Plants are an attractive platform for producing complex mammalian proteins. There are reports of the positive effect of vitamin C (ascorbate, AsA) in protein recovery when used in the buffer to extract plant-made proteins. Previous results from a collaboration between the Dolan and Lorence groups indicate that AsA can increase accumulation of hIL-12 expressed in a *Nicotiana benthamiana* transient platform. Our main goal is to test if this concept can be expanded to stable transgenics. I will present my progress after crossing *Arabidopsis* lines with elevated AsA and hIL-12 over-expressers.

Faculty Mentor: Dr. Argelia Lorence, ABI/Chemistry & Physics

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n **Expansin Synergy with Cellulases: Development of a Transgenic Maize System for Expansin Production and Evaluation of Synergistic Activity on Lignocellulosic Substrate**

Expansin is a protein that is active in cell wall expansion in growing regions of the plant. Over-expression of expansin in the maize production system3 allows recovery of sufficient protein 1) to study its physiological effects, and 2) to assess its ability to serve as an industrial enzyme for applications, particularly to biomass conversion. Transgenic lines of maize that express the cucumber expansin gene have been recovered (E. Hood, personal communication). The gene is expressed from an embryo-preferred promoter, globulin-1, and protein targeted to three sub-cellular locations: the cell wall, the vacuole and the endoplasmic reticulum.

Faculty Mentor: Dr. Elizabeth Hood, Agriculture

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n **Growing Duckweed as New Feedstock for Bioethanol Production**

Duckweed (*Lemnaceae*) is an aquatic plant that is commonly used to recover nutrients and remove toxic metals from wastewaters (phytoremediation). Duckweed has some desirable characteristics that make it a promising feedstock for bioethanol production, such as less recalcitrant structure and high annual biomass yield. We developed a cost-effective process to convert duckweed to bioethanol. This process involves a two-step enzymatic hydrolysis, followed by ethanol fermentation. Our results show that without any pretreatment up to 94% of the total glucose was released from both starch and cellulose components of the duckweeds biomass; high-yield bioethanol production from released glucose, 0.45g/g (glucose), was achieved in the yeast fermentation without adding additional nutrients.

Faculty Mentor: Dr. Jianfeng Xu, Agriculture



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