

A close-up photograph of a person's lower leg and foot. The person is wearing dark blue denim jeans and a red shoe. They are stepping on a white-painted crosswalk on a dark asphalt surface. The background shows more of the crosswalk and a manhole cover.

**3RD ANNUAL
3 UNDERGRADUATE
RESEARCH AND
SCHOLARSHIP
CONFERENCE**



Boise State University
THIRD ANNUAL
UNDERGRADUATE RESEARCH AND
SCHOLARSHIP CONFERENCE

Student Union Building
April 17, 2006
1:00 – 4:00pm

Schedule of Events

Poster Session	1:00 – 4:00 pm	Jordan Ballroom
Art Display	1:00 – 4:00 pm	SUB Gallery, 2nd Floor
Podium Presentations	1:30– 3:00 pm	Barnwell & Farnsworth
Performing Arts Session	1:30 – 3:00 pm	Jordan Ballroom
Media in Action	2:00 – 3:00 pm	Lookout
Speakers & Awards	3:30 pm	Jordan Ballroom
Bob Kustra, President		
Sona K. Andrews, Provost		
Wyatt Parke, ASBSU President		
Jack Pelton, Interim Vice President for Research		



Welcome to the Boise State University Undergraduate Research and Scholarship Conference. This conference provides undergraduate students at Boise State an opportunity to display their research projects and be recognized for their exceptional work.

Allow me to be the first to congratulate those students who have been selected as a part of this important event. The faculty sponsors who assist and support these students with their research have good reason to feel proud. These faculty members should also be commended for their commitment to learning and their dedication to the personal success of Boise State students. The projects on display span an extensive range of subjects. No two are alike; each project reflects the effort of our students and faculty toward the betterment of our university, community, and state through academic research and exploration.

The previous two years of this conference have left an impressionable legacy at Boise State. We look forward to this program expanding in future years. As President, I am committed to supporting the process of discovery and research at all levels of the University, and I will continue to encourage growth in research opportunities and activities as part of the undergraduate educational experience at Boise State.

I hope you enjoy the conference and thank you for your support of this annual event.

Warm regards,

A handwritten signature in cursive script that reads "Bob Kustra".

Bob Kustra



Welcome to the Third Annual Boise State University Undergraduate Research and Scholarship Conference. It is through this event, among many others, that Boise State University is advancing as a Metropolitan Research University of Distinction.

The students participating in today's conference represent the diverse range of academic disciplines that Boise State University has to offer. They have each demonstrated a drive and determination that exceeds that of the average student. Through their hard work, they have gained research and presentation skills that will prepare them for the world beyond academia. It is with great pride and enthusiasm that I congratulate these exceptional students and honor them for their outstanding work.

I would also like to extend my appreciation to our faculty sponsors. Their dedication to enriching the learning environment at Boise State University is another testament to our vibrancy and growth. We thank them for their commitment to our students and for creating opportunities for scholarly achievement.

For those of you joining us today, I hope that you take time to meet with our students and learn about the research they have conducted. You will not be disappointed. On behalf of Boise State University, I thank you for your support and hope that you enjoy this year's conference.

Sona K. Andrews

– Podium Presentations –

COLLEGE OF ARTS AND SCIENCES
1:30-3:00PM, BISHOP BARNWELL ROOM

Dr. Helen Lojek, Department of English, Discussant

EPISTEMIC DILEMMAS OF RAPHAEL'S SCHOOL OF ATHENS

Shane Girard (Department of Art) Lee Ann Turner

Raphael's fresco in the Stanza della Segnatura has continued to be subject to a multitude of discursive debates among art historians to this day. The enigmatic nature of this painting provides exemplary insight of the idealistic paradigm of which art historians scrupulously endeavor to assess when analyzing works that succumb to uncertainty. Such quandaries are disclosed in my paper on the essentiality of epistemic problems which are presented to art historians. My paper evaluates historical and contemporary accounts of explanations regarding specific aspects of Raphael's School of Athens. Such explanations provide examples of epistemic perplexities that exist in accounting for works of art with a dearth of textual evidence as is the case with the School of Athens. My argument is whether such analyses are formed from justified true belief or absolute knowledge. I conducted my research for an art history class on methods and theory in art history.

STILL LIFE: OBJECT AND THEME IN 17TH CENTURY FRANCE

Jenaleigh Kiebert (Department of Art) Janice Neri

While the genre of still life paintings is often admired for proximity to reality, attention to detail, and demonstration of artistic skill, further examination reveals that there is much to be learned from these paintings as they often reflect themes and values of the culture from which they come. This body of research examines still life paintings from 17th century France, with emphasis on the objects represented in the works. The value of these objects, such as goblets, globes, books, hunting implements, etc. in French society of this era will be discussed as a means of interpreting the importance of their depiction in works of art. Lastly, it will determine whether a particularly French style of still life exists for this era or whether the works from France are simply following the themes and style of their predecessors from other regions.

19TH CENTURY CLASS IDENTITY DEMONSTRATED IN THE WORKS OF BAUDELAIRE AND MANET

Jenaleigh Kiebert (Department of Art) Janice Neri

This research compares the works of writer Charles Baudelaire and Edouard Manet and examines similar themes represented in their works. These themes relate to events and culture of France in the mid to late 19th century such as class division, changes in the economy, and the reconstruction of Paris. Changes such as this greatly affected the way people were to interact with one another and how public spaces would come to be viewed. Conflicting treatments of modernity and representations of modern life in the works of Manet and Baudelaire reflect the anxiety of personal identity and class definition experienced by many 19th century Parisians as well as the artists' own struggles with modern issues and investigating their own identities in a modern society.

JAMES CASTLE: TOTEM

Mardie Stone (Department of Art) Janice Neri

James Castle (1899-1977), a deaf, mute, self-taught artist quietly working in isolation mastered the art of perspective without the benefit of an education or artistic training. The majority of his subject matter is straightforward, but some of his drawings have an unusual aspect to them which numerous curators and other professionals have labeled "totems." Scholars have not been able to explain why Castle placed these seemingly disassociated objects in his landscape, interior architectural and architectural drawings. By using a theoretical approach of semiotics, I have presented the argument that James Castle used the totems as a measuring device towards the development of perspective. Upon the mastery of perspective the totems, no longer useful, disappear from his drawings.

– Podium Presentations –

College of Social Sciences and Public Affairs/College of Education
1:30-3:00pm, Farnsworth Room

Dr. Leslie Martin, Department of Sociology, Discussant

LETTING GO OF THE HARNESS FOR THE LAST TIME: A DESCRIPTIVE REALISM APPROACH TO EXPLORING THE ENDING OF WORKING RELATIONSHIPS WITH GUIDE DOGS

Deborah Allen (McNair Scholar) (Department of Sociology) Virginia Husting and Robin Allen

In this research, I use a combination of feminist methodology and descriptive realism to explore my experiences and the experiences of other totally blind individuals who have ended working relationships with guide dogs. Little research has been done on the approximately eight thousand blind people who are partnered with guide dogs in the United States. A primary goal of this qualitative study is to give voice to the unique narratives of people whose experiences are rarely explored in academic literature. I blend information I gathered during interviews with five guide dog instructors, five blind authors, and ten blind participants with my autoethnography to illustrate how concepts can be applied to broader social issues, such as policies at agencies that provide guide dogs to blind individuals.

EXPEDITIONARY LEARNING: A QUALITATIVE STUDY

Brandi Bailey (McNair Scholar) (Department of Education & Social Science) Leslie Martin

Expeditionary Learning Outward Bound (ELOB) is a model of learning that encourages students to be active participants in their quest for knowledge. Many charter schools have adopted ELOB as the model through which students learn content. The existing literature demonstrates that more research is needed to conclude if this model is helping previous struggling learners succeed. The intent of this research is to study specifically if the ELOB model is changing students' attitudes towards learning. For this qualitative study, two students new to an ELOB environment, their parents and teachers were interviewed. Students were also observed in their classroom three times. The conclusions from this research demonstrate how ELOB can be an effective model for previously unsuccessful learners and what within the model can still be improved.

FINDING FEEDOM: A DISCOURSE ANALYSIS OF BUSH'S WEEKLY ADDRESSES

Macy Boggs (Department of Sociology) Michael Blain

This paper employs Mann's (2003) perspective on social power to examine the use of Bush Administrations' ideological discourse of freedom and democracy to justify its imperial policies. While ordinary Americans prefer not to think of themselves or their nation as imperialist, many social scientists believe that the US is an imperial nation. President Bush's weekly radio speeches are examples of strategic discourse in which actors are subjectified through their relationship to freedom in a victimage and democracy promotion rhetoric. Using Blain's (1994) politics of victimage ritual perspective, heroes, villains, and victims are identified. These actors' identities, motives and actions in democracy promotion are described. Mann's four forms of social power – political, economic, ideological and military, are associated with victimage and democracy rhetoric.

– Podium Presentations –

ZERO TOLERANCE POLICING IN A RURAL SETTING

Jon Cooper (Department of Criminal Justice Administration) Andrew Giacomazzi

While most studies of zero tolerance policing take place in large urban areas, the setting for the current study is rural, adding to an emerging body of literature detailing interaction between rural officers and citizens. It is hypothesized that because greater informal social control tends to exist in rural areas as compared to urban areas, rural zero tolerance policing will not result in decreases in serious crime. Further, it is hypothesized that with the implementation of zero tolerance policing, a rural agency will experience an increase in complaints against the department. To explore both hypotheses, a before-and-after design was employed using agency data. City council minutes and letters-to-the-editor were used in a content analysis to further explore the second hypothesis. Results from this study show support for the first hypothesis. The second hypothesis does not appear to be supported by the quantitative data. Discussion of this phenomenon is presented.

STUDENT DEVELOPMENT THEORY AND LISTENING THEORY: CONNECTIONS, IMPLICATIONS AND PRACTICE

Clay Cox (Department of Communication) Laurel Traynowicz

General listening theories and established student development theory both place the responsibility for creating meaning upon the listener. This primary role in creating meaning in both frameworks was established first by revealing how listening theory places the responsibility for creating meaning upon the listener. The same responsibility exists in student development theories; the student is ultimately accountable for her or his own understanding and education. The connections between these two theories have implications for students and their academic advisors. Understanding the primary role of the listener/student could benefit both the student and the advisor. This research connects these two theoretical perspectives and explores the potential benefits of informing both student and advisor of the implications.

KING KONG: MONSTER FOR ALL ERAS

Olivia Umphrey (Department of History) Todd Shallat

With the release of King Kong in December 2005, we were once again transported to the world of Kong, Ann Darrow and Carl Denham. For 70 years, the Kong movies have attracted audiences. As films can be viewed as cultural artifacts, which speak about the eras they were made in and the audience they were made for, one wonders how one story can span across decades. This project seeks to answer what it is about the Kong films that have allowed them to reach such vast audiences and have success over the years.

– Performing Arts –

1:30-3:00pm, Jordan Ballroom

Dawn Craner Department of Communication, Respondent

Marla Hansen, Department of Theatre Arts – Dance Program, Respondent

THE MEATRIX HAS YOU: COMMUNICATION ANALYSIS

Wayne Rysavy (Department of Communication) Dawn Craner

This genre of scholarship involves an examination of the ideas, devices, and themes employed in a specific form of communication artifact, e.g., a speech, a movie, a commercial, or possibly a work of visual art. The artifact is investigated using a theory that enables a clarifying perspective for a focused analysis. In "The Meatrix Has You," a flash clip (presented at www.themeatrix.com) is examined through use of Walter Fisher's Narrative Rationality Theory. As a result, issues and implications of our nation's mass production and consumption of meats and animal products as presented in The Meatrix begin to stand out boldly. Finally, the listening audience must confront their own personal consumption of such products as they face humorous, but serious, accusations from The Meatrix.

MACARONI AND CHEESE

Molly Beardmore (Department of Theatre Arts) Marla Hansen

"There is a vitality, an energetic life force, that is translated through you into action, and because there is only one of you in all of time, this expression is unique. And if you block it, it will never exist through any other medium and be lost."

– Martha Graham

It is only recently that I have truly begun to explore and appreciate my uniqueness. We often forget how wonderful it is to be inimitable in our own right. Every day we are given the opportunity to embody creativity in our lives, but the threatening unknown often hinders our ambitions. I have learned to embrace the chance I have in life to be a masterful artist, one who creates ideas and visions through movement. The piece I am presenting represents a new chapter in my exploration of creativity. It is full of vigor and excitement, a liveliness that only I possess.

RUN FREE

Jennifer Waters (Department of Theatre Arts) Marla Hansen

You don't have to agree with those around you. Express yourself in your own way by following your heart. "Run Free" is a visual expression of feelings through the medium of a human being, dancing freely and showing physical strength as well as emotional. Expression is not easy, especially when others may not agree with what you say. In this piece the words are taken from music and transferred in the mind to become one energy exerted through motion. Dare to be free.

SELLING VOTERS SHORT: A RHETORICAL ANALYSIS OF WAL-MART'S USE OF NAZI IMAGERY TO INFLUENCE CITIZENS

Kristin L. Davidson (Department of Criminal Justice Administration) Dawn Craner

On May 8, 2005, Flagstaff Arizona residents opened up their Arizona Daily Sun newspapers and were exposed to a full-page advertisement sponsored by the Wal-Mart Corporation, opposing Proposition 100, a local zoning ordinance. The advertisement utilized a significant historical image as a marketing tool to convince residents that their rights were being threatened. I posed the research question: With historical images becoming increasingly thrust upon us as tools for advertising, will the lessons learned from the original contextual message of the image be forced to take a back seat to a product or idea presently being marketed? To attempt to answer this question, I first explored the Wal-Mart-sponsored ad against Proposition 100. I then examined Judith Williamson's "Historical Images in Advertising" Theory, and finally, I used Williamsons' theory to analyze the advertisement, focusing on serious implications that can result from this type of mass media communication.

– Performing Arts –

CREATIVITY WITHIN CONFINEMENTS

Katie Ponozzo (Department of Theatre Arts) Marla Hansen

For an up coming dance audition I must perform a two minute solo that shows all the strengths I have as a dancer. I must come up with unique and creative movements that will capture the judges' attentions while at the same time showing my technique and versatility. I found this to be a fairly difficult endeavor. For within the confines of two minutes I must create movements that define me as a dancer, I must show my strength, flexibility, turning ability, range of motion and range of emotion. So it is with this piece that I will be creative within the confinements that I am given.

MY PLACE IN THE UNIVERSE

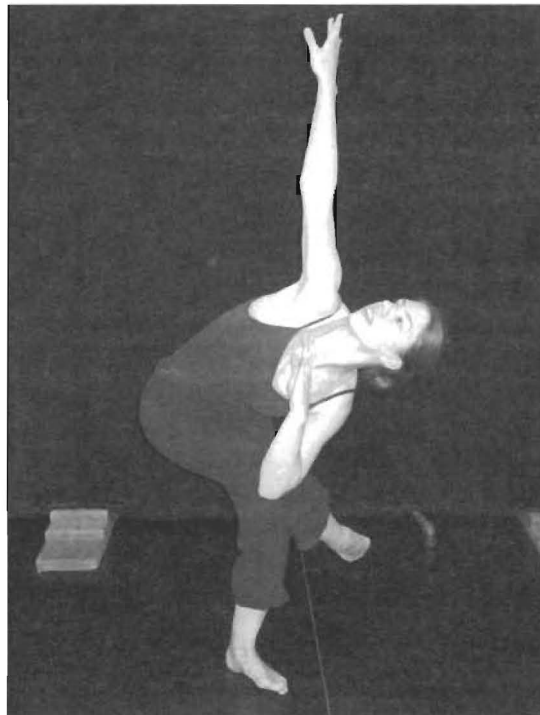
Camille Levi (Department of Communication) Dawn Craner

An oral interpretation program constructed around a central theme, this artistic presentation was designed to share with an audience a variety of poetic texts woven together to speak to the notion of the program title above, "My Place in the Universe." Twisting and turning through variations on that theme, this performance attempts to name such a place by asking a question that lies at the foundation of the human psyche: "Why am I here?" Carefully composed to address such a critical question, this program relies on and artistically displays poetry by Billy Collins, Allison Hawthorne Deming, Rita Dove, & Tim Siebles.

UNIVERSAL INFLUENCE

Hailey Hays, Katie Ponozzo, Amie Wingert, Jennifer Waters, Gonzalo Valdez, Molly Beardmore, Sarah Nielson, Lesley Uehling, and Brittany Gardner (Department of Theatre Arts) Marla Hansen

After studying an array of movement from various technical and global areas, the choreography study Universal Influence, is a melting pot of genres wrapped into one. Mediums that have spurred this piece include influences from cultures such as Chinese, African, Indian, and American, as well as dance genres including modern, jazz, and ballet. The Turkish Belly Dance music is performed by drumming only, and though it is a single instrument, it goes through a variety of rhythm, beats, and movements to bring about a full sound that you can't help but move your body to.



– Art Gallery –

College of Arts and Sciences 1:00-4:00 pm, Second Floor Art Gallery

UNDERGRADUATE RESEARCH AND SCHOLARSHIP CONFERENCE PROGRAM COVER DESIGN

Kim Barker, Robert Barney, Shannon Barz, Amaya Bengoechea, Jodie Bernt, Beth Bricker, David Casey, Dustin Cavin, Tyler Cenarrusa, Nicole Coleman, Tahirih Commers, Dmitry Danilovitch, Emily Duckett, Leona Ellsworth, Jackie Elo, Heather English, Brian Evancic, Matthew Evans, Cameron Frey, Nicole Fulfer, Seth Hanson, Amy Howa, Heather Imlach, Maria Kauffman, Kailyn Lamb, Justin Logan, Hans Lohse, Brandon Michael, Kim Nelund, Chistopher Petersen, Brandon Salladay, Erin Smith, Kim Stockton, Thomas Volk, Lindsey Wagner, Cory Zubizareta (Department of Art) Tom Elder

Students in Art 204, *Graphic Design Studio II* were presented with a unique opportunity to design the program cover for the 2006 Undergraduate Research and Scholarship Conference. This is an example of a research project for a graphic designer. The student designers prepare themselves by researching the university colleges and many programs that are represented in the conference. Class instruction includes subjects in representation, semiotics and denotation of images as a way to present the concept for communication. Through use of peer and instructor review, each student developed their own design as a way to visually represent the conference. Some designers used metaphoric principles, others by use of a visual pun while some tried to capture the essence of the undergraduate research experience. This year's cover design was selected by a jury of graphic design faculty and conference personnel. Each cover design submission is displayed in the Student Union Building Gallery for the duration of the conference.

THE DISASTERS OF WAR

Kate Bowen, Colleen DeBolin, Erica Dешner, April Hoff, Lorin Humphreys, Angela Katona-Batchelor, Penny Key, Tiffany Kimball, Denise Lauerman, Amy Nack, Stephanie Oster, Tom Volk (Department of Art) Jill Fitterer

Spanning four centuries, the prints and drawings of Jacques Callot, Francisco de Goya, Otto Dix, Käthe Kollwitz, and Nancy Spero have confronted the brutal realities of war. While their imagery is often difficult to consume, the engagement with it puts the viewer face to face with what are referred to as the "collateral damages" of war. Responding to the current war in Iraq, Afghanistan and civil unrest in Africa, participating printmakers sought inspiration from the masters listed above. Commenting on the complex issues surrounding war, some areas of research include; torture, death, sacrifice, patterns of killing, orphans, children armed with weapons, wounds, censorship, transformation and hope. Connected through process and content across centuries, the work from *Goya's Disasters of War* continues to be timely. A critical cog in the social wheel, the artist's diverse perspectives address topics to consider, draw attention toward, rebel against, reflect upon, promote discussion and motivate change.

INFORMATION GRAPHIC: FREEDOM OF INFORMATION ACT

Anthony Bachman, Brett Baltzer, Anna Burks, Sean Cross, Jane Dater, Derek Edgar, Naomi Ferree, Sarah Gridley, Erica Haney, Jennie Jorgensen, Tamar King, Jennifer Lara, Katie Luke, Greg Marshall, Jason Martinez, Steve Norell, Will Oberleitner, Laura Sanders, Megan Smith, Clint Stonich, Kyle Struchen, Sarah Talbert, Kimberly Taylor, Lindsay Ward, Aubrey Watkins, Theresa Worl (Department of Art) Stephanie Bacon

An information graphic orchestrates text, statistical information and visual elements in such a way that the result is more than the sum of its parts. In an effective information graphic, text and image work in tandem to convey information more clearly and more vividly, in a more immediate, detailed and more memorable way, than if the information were conveyed in exclusively verbal or exclusively visual terms. No visual element in information graphic is extraneous or decorative; each element should be in some way informative to the viewer. In this project, students in *ART 118 Digital Tools for Graphic Design and Illustration* researched statistics and factual data relating to the Freedom of Information Act (FOIA.) Their presentations, which are designed to inform the general audience about the FOIA, were created using vector-based software.

– Special Features –

Classical Guitar Presenters

JACOB INECK

Jacob Ineck began studying acoustic guitar from his sister in fourth grade before transitioning to the classical guitar with the Childbloom Guitar Program under the guidance of Kelli Larson. He won several Childbloom national competitions within that time. He received four consecutive superior ratings at the annual National Federation of Music festival. Five years later, he began taking lessons from Dr. Joseph Baldassarre, with whom he has been studying for four years. He is currently a sophomore at Boise State, majoring in Music Performance and Music Education. He was featured as the fretted strings representative for the Chair's Honor Recital 2005 and 2006. He will be playing a guitar concerto with the BSU Symphony Orchestra on May 7 of this year. Apart from classical guitar, Jacob is a music minister and leader of the Life Teen Music Group at St. Mark's Catholic Church. He also fronts a four-piece jazz/rock band called The Middle Income Household Band. He played string bass with the BSU orchestra and now sings in the BSU Meistersingers ensemble.

DEREK WARREN

Derek Warren began playing the piano at age of eight and the guitar at age of twelve. He played the guitar in his high school's jazz band and performed in festivals in Denver and Portland. Derek received a Bachelor's degree from Boise State University in August of 2005 and is currently completing a Master's degree in Music at Boise State. He has been featured twice in the BSU chair's honor recital. Derek was a featured performer with the BSU University Singers and is in the upcoming performance with the BSU orchestra in the musical Kiss Me Kate. He has performed in the master classes of Jason Vieaux, David Burgess, Michael Partington, Paul Grove, James Reid, and Matt Greif. Upon completion of graduate school, Derek plans on continuing his education in a P.H.D. program in Music History with an emphasis on Historical Performance Practices.



– Media in Action –

COLLEGE OF SOCIAL SCIENCES AND PUBLIC AFFAIRS

2:00-3:00 P.M., LOOKOUT ROOM

Dr. Mark Shevy, Department of Communication, Discussant

"Media in Action" showcases exemplary video production work created by students in the Department of Communication, College of Social Sciences and Public Affairs. Each student producer provided an artist's statement and personal reflections of her or his work.

LINES

Colin Clark (Department of Communication) Robert Rudd

"Lines" illustrates an attempt to reveal the infinite definitions any particular statement may contain through visual representation. A line is arbitrarily defined as "a geometric figure formed by a point moving along a fixed direction and the reverse direction." The beginning point of the line, tool of creation and end of the line (if any) remain limitless. By using over seventy layers of cropped color mattes, a permanent line continues to create complex geometric shapes throughout multiple frames of an inestimable vacant dimension paralleled only with corresponding text.

WHO'S NEXT?

Shannon Dee (Department of Communication) Robert Rudd

"Who's Next" is an invitation to look with greater depth, ultimately playing with and being played by the stimulus before us. The idea was to create an art gallery setting and have an art viewer literally get inside a piece of work. I used an 8"x10" batik as the art work, filming it in front of back-lit glass, giving it a luminous quality as well as showing the texture of every thread in the fabric. That image was then used as the background to the keyed moving image. It appeared to be some kind of massive internally-lit screen. Effects were applied to achieve the surface manipulations and an extreme zoom-in to get the grid of threads when "inside" the art work. The music and movement as she moves her arms describes a playful experimentation and self-creation of experience, available to anyone who cares to really let oneself go and get "into" anything.

MEDIA IN ACTION

Matt Dewey (Department of Communication) Robert Rudd

Today we all understand, of course, the important role that the media, in all forms, have in implicitly and explicitly designing the type of culture and political atmosphere in which we associate. Not only does the power of the media promote and determine the acceptance and fruition of ideas and methods of interaction, they constitute a tool for distributing and reinforcing the basic emotional and logical connections in our conscience; connections we continuously use to assign individual and social value and ideal to those ideas and interactions. Given media's innate hegemonic authority, it is the responsibility of those in the position, or those willing to assume such positions, to create the types of media we consume in a manner that is specifically of a socially conscious nature in message, and of content that not only serves to educate its viewer socially, but enlists the necessary dialogue for the interaction and association of all types of ideals and values unbound by degrees of social, economic, and political power. The exercises that encompass Media In Action are efforts to reinvigorate the all-too-often tired and passive process of media consumption, and by the careful initiation of content and structure, form a more explicitly active type of media.

Thanks to Matt Dewey, whose "Media in Action" title captures the essence of this program.

COLLEGE OF ARTS AND SCIENCES

SEQUENCING HUMAN MITOCHONDRIAL DNA FROM IDAHO'S BASQUE POPULATION

Ericka Anderson (Department of Health Sciences) Greg Hampikian

The origin of the Basque people remains an enigma. In order to study this question, we are examining two hypervariable regions of mitochondrial (mt) DNA from people of Basque heritage. Ninety eight samples have been taken by buccal swabs (inner cheek) from the local Basque population, and the HVI and HVII regions will be PCR-amplified and sequenced to look at sequences unique to the Basque population, and to determine the haplotype frequencies within the group. Studying the sequences of these regions of mtDNA can help us to determine biogeographic migration of the Basque population.



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APPLICATIONS OF GAME THEORY IN CALCULUS AND INFORMATION SECURITY

Wenyi Dai (Department of Mathematics) Marion Scheepers

People use game theory in many different areas, especially in business and mathematics. In game theory, people are most interested in strategies: How to use a strategy to win a game? (Is the strategy a winning strategy?). When there are different winning strategies are some more efficient than others? “Continuity” is one of the most important concepts in calculus. There is a game, the continuity game, played by two players. We will investigate which of the two players, if any has a winning strategy. In e-commerce encryption is used to protect information. Companies want their online services to be user friendly. The desires for protection and for user friendliness are sometimes conflicting. There is a game, played between two players, which exploit this conflict. We will look at how successful this game is in defeating the encryption protection.

ANTI-MICROBIAL AND ANTI-BIOFILM EFFECTS OF NUCLEOSIDE ANALOGS

Cassie Dayan (Department of Biology) Kenneth Cornell

Drug resistance has increased over the past years, reducing the effectiveness of many antibiotics. The Methionine Salvage Pathway contains several steps unique to many disease-causing bacteria. This makes it an ideal pathway to target with new antimicrobial compounds. The enzyme methythioadenosine/S-adenosylhomocystine (MTA/SAH) nucleosidase plays a central role in the recycling of methionine, adenine, and the production of autoinducer 2 (AI-2). AI-2 partially controls the bacterial production of virulence factors and biofilm formation. Bacterial biofilms are formed to protect the microbes from the surrounding environment. Reducing biofilm formation can increase the sensitivity of bacteria to antibiotics and reduce chronic infections. In an effort to show the potential of this pathway as a target for novel antibiotic design, three substrate analog inhibitors of MTA/SAH nucleosidase were designed. The analogs were examined for their effects on bacterial growth and AI-2 mediated biofilm formation. Inhibition of microbial growth was observed with all three analogs.

SEPARATION AND CHARACTERIZATION OF LIPHILIC PROTEINS BY ELECTRICAL FIELD FLOW FRACTIONATION (EFFF) IN NON-POLAR FLUID

Markus Degirmenci (Department of Biology) Dale Russell

Isolating and characterizing membrane bound proteins is a frontier area of biomedical research. With the era of proteomics, the characterization of integral membrane proteins, such

as channels, transporters, and receptors, is critical in understanding fundamental functions of many biological processes. This has important biomedical applications, since many drug targets are integral membrane proteins. We report protein separation with non-polar Electrical Field Flow Fractionation (EFFF). Retention of the proteins in the channel can be obtained through coupling with the imposed field; differences in retention time correlate to diffusivity and electrophoretic mobility of the proteins. Fundamental characteristics of an individual protein can be calculated from the retention data. Molecular mass and size of proteins are determined using MALLS detection. Collected fractions will be run on an SDS-PAGE gel to show protein separation and enzyme kinetics will be used to show that proteins remained in their native conformation during the separation process.

CRYPTO SYSTEMS IN CILIATES

Nikki DeWane (Department of Biology) Marion Scheepers

Ciliates are single cell eukaryotes found in the Kingdom Protista and Phylum Ciliophora. Ciliates have two types of nuclei: the germ line nucleus (or micronucleus), which is transcriptionally silent and the somatic nucleus (or macronucleus), which is transcriptionally active. The number of each type of nuclei present varies among ciliate species. During development of the macronucleus from a micronucleus, several DNA editing events take place. The development of the macronucleus from the micronucleus is a decryption process. The objective of this study is to investigate the unique properties of the nuclei arrangement by analyzing transformation of a micronucleus to a macronucleus.

Experiments have been designed to determine the encryption/decryption algorithm for a given species by constructing a model for the gene-by-gene encryption and decryption algorithms from the experimental data. We will use micronuclear transplant techniques to investigate if different ciliate species to determine if they share the same or similar decryption technology.

DEVELOPMENT OF NOVEL AFM FOR BIOLOGICAL STUDIES

J.J. Durant (Department of Physics) Byung-Il Kim

In the life sciences, it has long been a dream to view the nanometer-scale dynamic behavior of individual bio-molecules, such as proteins, in solution. Bio-molecules perform very specific and sophisticated physiological functions. These physiological actions are determined by a very specific 3-dimensional structure of bio-molecules in action. Knowledge of the bio-molecular fine structure with atomic resolution is essential for understanding the physiological function. Atomic force microscopy (AFM) has made it possible to view living bio-molecules with atomic resolution in physiological environment. We have developed a novel AFM specifically for this purpose. This AFM can be adapted for studies of biological systems, atomic and molecular structure, and both atomic and molecular forces. Specifically, we can use this instrument for the study of interfacial forces between molecules in their natural physiological environments.



NEAR INFRARED OBSERVATIONS OF THE GAMMA-RAY BURST 050820A AFTERGLOW

Jessica Elias (Department of Physics) Daryl Macomb

A gamma-ray burst (grb) is a brief, bright explosion releasing roughly the same amount of energy as a supernova. The grb spectral intensity after the initial burst evolves into a steady but somewhat complex decline; moving from the initial gamma-ray energies down through the X-ray, ultraviolet, visible, infrared and so on. This fading multi-wavelength light is what is known as the afterglow. As part of our research program to study the optical afterglows of gamma-ray

bursts at BSU's Challis Observatory, we have participated in infrared observations using the Wyoming Infrared Observatory (WIRO). This poster describes the physics of grb afterglows with an emphasis on detailed lightcurve of the infrared afterglow decay of GRB 050820a.

EPISTEMIC DILEMMAS OF RAPHAEL'S SCHOOL OF ATHENS

Shane Girard (Department of Art) Lee Ann Turner

Podium Presentation

Raphael's fresco in the Stanza della Segnatura has continued to be subject to a multitude of discursive debates among art historians to this day. The enigmatic nature of this painting provides exemplary insight of the idealistic paradigm of which art historians scrupulously endeavor to assess when analyzing works that succumb to uncertainty. Such quandaries are disclosed in my paper on the essentiality of epistemic problems which are presented to art historians. My paper evaluates historical and contemporary accounts of explanations regarding specific aspects of Raphael's School of Athens. Such explanations provide examples of epistemic perplexities that exist in accounting for works of art with a dearth of textual evidence as is the case with the School of Athens. My argument is whether such analyses are formed from justified true belief or absolute knowledge. I conducted my research for an art history class on methods and theory in art history.

UNIVERSAL INFLUENCE

Hailey Hays, Katie Ponzozzo, Amie Wingert, Jennifer Waters, Gonzalo Valdez, Molly Beardmore, Sarah Nielson, Lesley Uehling, and Brittany Gardner (Department of Theatre Arts) Marla Hansen

Performing Arts Session

After studying an array of movement from various technical and global areas, the choreography study *Universal Influence*, is a melting pot of genres wrapped into one. Mediums that have spurred this piece include influences from cultures such as Chinese, African, Indian, and American, as well as dance genres including modern, jazz, and ballet. The Turkish Belly Dance music is performed by drumming only, and though it is a single instrument, it goes through a variety of rhythm, beats, and movements to bring about a full sound that you can't help but move your body to.

SINGLE MOLECULAR ANTIBODY-ANTIGEN INTERACTIONS STUDIED BY ATOMIC FORCE MICROSCOPY

Joe Holmes (Department of Physics) Byung-Il Kim

Atomic force microscope (AFM) was used to study the antibody-antigen recognition at a single molecular level, an important issue in the immune defense system. Using AFM force-spectroscopy, the interaction between IgG2A antibody and MTAN, an E. coli derived protein, were investigated at the single molecular level in the biological environment. A flexible PEG cross-linker was used to reduce the steric hindrance in the single molecular interactions. More than one hundred measurements showed single ruptures and sequential ruptures during retracting the antibody from the antigens, suggesting monovalency and polyvalency. Histogram analysis showed that the most probable unbinding forces are 88 pN and 692 pN, indicating two dominant binding sites in the IgG2A-MTAN system. It also showed that the unbinding forces 440pN, 880pN, 1320pN, 1760pN, ... and so on, representing the simultaneous multiple unbinding events. The single molecular force spectroscopy provides a new insight on the single molecular antibody-antigen recognition.

STOPPING BACTERIAL "GOSSIP"

Chelsea Isom (Department of Chemistry) Kenneth Cornell

Enzymes in the methionine salvage pathway are a target for antimicrobial drugs because the mammalian cells and the bacterial pathway are different. The mammalian cells use a single enzyme to phosphorylate 5'-methylthoadenosine (MTA) while the bacterial pathway uses two

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enzymes to accomplish the same phosphorylation 5'-methylthioadenosine nucleosidase (MTAN) and 5'-methylthioribose Kinase (MTRK). In bacteria the methionine salvage pathway allows the recycling of methionine from polyamine and methylation products MTA and S-adenosylhomocysteine (AdoHcy) and also leads to the production of the quorum sensing molecule Autoinducer-2 (AI-2). Quorum sensing molecules allow bacteria to "gossip" with each other and coordinate processes like virulence and biofilm formation. The transition state analog inhibitors (BCX, BCY) were examined for their effects on enzyme activity, biofilm formation and bacterial growth. These initial studies showed that these compounds were potent inhibitors of enzyme activity, and caused a decrease in biofilm formation and a delay in bacterial growth.

CLONING CARBONYL REDUCTASE GENES FROM HUMAN, RABBIT, RAT, AND MOUSE HEART

Tamara Kelly (Department of Chemistry) Henry Charlier

Anthracycline compounds are used to treat a variety of cancers. Despite their benefit, anthracycline treatment is linked to the development of a potentially lethal cardiotoxicity. Though the mechanisms accounting for the cardiotoxicity are not well known, alcohol metabolites of the anthracyclines are believed to be the causative agents. The parent anthracyclines are converted to the cardiotoxic metabolites by NADPH-dependent carbonyl reductase (CR). Studies in mice have shown that the risk of developing anthracycline-induced cardiotoxicity is increased when CR levels are high. Currently anthracycline cardiotoxicity models have been developed in mice, rats, and rabbits, however, very little is known about the mechanisms of anthracycline reduction by CR isoenzymes from these species. It is the goal of this work to clone, express, and kinetically characterize CR from rabbit, mouse, and rat heart. Strategies for cloning CR genes from these species will be presented. (Supported by NIH/NCRR P20-RR16454 and NIH R15-CA102119-01.)

MECHANISTIC AND KINETIC INVESTIGATION OF MANGANESE SALEN COMPLEXES BY UV/VIS SPECTROSCOPY, THE MEASUREMENT OF OXYGEN EVOLUTION, AND DENSITY FUNCTIONAL CALCULATIONS

Brett Keys (Department of Chemistry) Jeffrey Peloquin

The role of manganese complexes in the detoxification of reactive oxygen species (ROS) has been investigated. Manganese salen complexes were synthesized and analyzed by UV/Vis spectroscopy. The reactivity of the complexes was quantified via the measurement of the amount of oxygen produced by the complexes following reaction with hydrogen peroxide. Results indicate that bicarbonate does not have a significant effect on the oxidative properties of manganese salen complexes but the pH does have a measurable effect. Finally density functional calculations give insight into the spin state and geometry of manganese salen complexes while interacting with ROS.

19TH CENTURY CLASS IDENTITY DEMONSTRATED IN THE WORKS OF BAUDELAIRE AND MANET

Jenaleigh Kiebert (Department of Art) Janice Neri

Podium Presentation



This research compares the works of writer Charles Baudelaire and Edouard Manet and examines similar themes represented in their works. These themes relate to events and culture of France in the mid to late 19th century such as class division, changes in the economy, and the reconstruction of Paris. Changes such as this greatly affected the way people were to interact with one another and how public spaces would come to be viewed. Conflicting treatments of modernity and representations of modern life in the works of Manet and Baudelaire reflect the anxiety of personal identity and class

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definition experienced by many 19th century Parisians as well as the artists' own struggles with modern issues and investigating their own identities in a modern society.

STILL LIFE: OBJECT AND THEME IN 17TH CENTURY FRANCE

Jenaleigh Kiebert (Department of Art) Janice Neri

Podium Presentation

While the genre of still life paintings is often admired for proximity to reality, attention to detail, and demonstration of artistic skill, further examination reveals that there is much to be learned from these paintings as they often reflect themes and values of the culture from which they come. This body of research examines still life paintings from 17th century France, with emphasis on the objects represented in the works. The value of these objects, such as goblets, globes, books, hunting implements, etc. in French society of this era will be discussed as a means of interpreting the importance of their depiction in works of art. Lastly, it will determine whether a particularly French style of still life exists for this era or whether the works from France are simply following the themes and style of their predecessors from other regions.

PUBLIC ART IN ART EDUCATION

Odessa Kirk & Katie Jo Rupert (Department of Art) Kathleen Keys

Developed within parallel independent studies in Fall 2005, Kirk & Rupert explored the potential for creating educational support offerings to compliment the ongoing school tours of public art in Boise City sponsored by the Boise City Arts Commission (BCAC). Initial curriculum ideas for bringing these artworks into the classroom were also explored. Following research efforts within the existing BCAC public art programs and field testing tour ideas with high school students, research produced by Kirk & Rupert included a self-guide tour packet of Boise City public art for use by K-12 educators in planning class tours and a power point presentation study guide/resource including historical and cultural information about the public art works for use in developing public art units of study. Both the tour packet and the power point study guide/resource will be available for viewer perusal, and the researchers will be available for comments and questions.

ENSO AND SNOWMELT TIMING IN IDAHO

Melvin Kunkel (Department of Geosciences) Jen Pierce

The Idaho mountain snowpack acts as a long-term water reservoir for Idaho. Snowpacks build up in the winter and slowly release water into rivers and lakes throughout the spring and summer. Climatic changes such as El-Niño-Southern Oscillation (ENSO) influence long-term snow storage. Initial results from an examination of the effects of ENSO on Idaho snowpacks indicates ENSO affects all Idaho's snowpacks, but most greatly affects sites that typically maintain snow the longest. Preliminary examination of SNOWTEL snowmelt data indicates that during El Niño years, generally warmer and drier conditions in the Pacific Northwest result in earlier snowmelt dates in Idaho, while the inverse may be true during wetter and cooler La Nina years. Since depth of snowpack and timing of snowmelt influences the timing and magnitude of peak flow events, variations in snowmelt are linked to streamflow conditions and have implications for Idaho's water supply, native fish populations and economy.

SCENE DESIGN FOR WILLIAM SHAKESPEARE'S MEASURE FOR MEASURE

Joseph Lavigne (Department of Theatre Arts) Gordon Reinhart

This poster will present the process of creating the set design for the theatrical production of the play Measure for Measure by William Shakespeare. Beginning with initial play responses and leading toward a scenic model and a realized set, the author will address the various stages that a scenic designer goes through in creating a finished scenic design.

COMPARATIVE ANALYSIS OF GENETIC LOCI INVOLVED IN FIBROMYALGIA

Kristen Leenhouts (Department of Biology) Greg Hampikian

No single chromosomal location has been associated with the disease fibromyalgia. However, several studies suggest a role of the X-Chromosome due to the observed inheritance pattern (What is Fibromyalgia Syndrome (FMS)?). Other sites have also been implicated, and several seem to have overlapping functions. METHODS: Using various resources; i.e. Internet, published journals, etc., a register of possible genetic loci involved with the disease fibromyalgia was compiled to examine the link between various genes and fibromyalgia. Identified

sequences were analyzed based on chromosome location, genetic content, protein function, and various other criteria. Loci were ranked on similarity and their possible role in the disease fibromyalgia. RESULTS: Study is on-going and formal results are being compiled.

CONCLUSION: The levels of statistical significance linking candidate genes and fibromyalgia are discussed, and a comparison of candidate sequences is presented.



SYNTHESIS OF THIOPHENE DERIVATIVES AND PRELIMINARY INVESTIGATIONS OF POLYTHIOPHENES AS CHEMICAL SENSORS

Christopher Liby (Department of Chemistry) Don Warner

Thiophene-based monomers are being investigated for their potential application as chemical sensors. We hypothesize that these sensors have important applications for the detection and monitoring of environmentally hazardous chemicals. It is essential that the monomer can be readily synthesized, amiable to derivatization, and easily polymerized. Furthermore, upon polymerization, the resulting polymer must have conductive properties. Additionally, the polymer must resemble and approximate the target analyte. During detection studies, binding of an analyte will induce a change in the electrical properties of the polymerized sensor and generate a quantifiable signal. A number of target analytes will be studied; however our initial investigations have examined the organic compound benzene as the target of interest. To accomplish this, a molecular imprint that resembles the structural characteristics of benzene has been created. Significant progress has been made toward the synthesis of six thiophene monomer analogues. These and related results will be discussed.

BACTERIAL INHIBITION INDUCED BY SPICE EXTRACT AROMAS

Emily Madsen (Department of Biology) Greg Hampikian

The purpose of these experiments is to determine bacterial inhibition caused by the aromas of various spice extracts. The experiments will be conducted with a 96-well assay using various spice serial dilutions to determine the concentrations required for full, partial and no inhibition. Some spice extracts used thus far, including peppermint, oregano, and cinnamon bark, have shown strong inhibition at the single concentrations originally used in our lab. Other extracts have yielded variable results, for example rose absolute and wintergreen. Finally, several extracts have not shown any inhibition whatsoever: lemon, grapefruit and tangerine. Those extracts which yield variable results might be at a dilution that is close to the level of "no inhibition." Further dilution studies will determine the effective concentrations of the antibacterial agents.

IDENTIFICATION OF THE LNS-COLLAGEN FAMILY MEMBERS IN DANIO RERIO

Jeremiah Maschmann (Department of Chemistry) Julia Oxford

Zebrafish (*Danio rerio*) have become an increasingly popular organism for biological research. While the genome has been mapped out for this fish, specific gene locations coding for proteins have yet to be discovered. My research is limited to elucidating the locus of the genes

encoding LNS-collagens, such as Collagen (XI) alpha 1 chain. Determining the loci will help to better understand human deficiencies expressed by the alteration of these proteins. It is believed that the amino acid sequence which forms these proteins is highly conserved from species to species. This property enables comparison of a known sequence from a different organism, such as *Rattus norvegicus*, to a chromosome location on *Danio rerio*. The use of protein and DNA databanks on the World Wide Web, such as ExPaSy and Ensembl, accelerates finding, manipulating, and comparing genomic and protein sequences.

THE DEVELOPMENT OF TRANSURANIC AQUEOUS METAL ION SENSOR SYSTEMS

Noah Minskoff, Jon Scaggs, and Brian Cawrse (Department of Chemistry) Dale Russell

A new approach in developing environmental sensors for the detection of uranium in groundwater requires a series of organic reactions to achieve a covalent attachment between a binding site and the target molecule. Using electrochemical deposition the polymer is plated onto platinum micro-electrodes. An in situ set of organic reactions were carried out on the polymer surface to allow covalent attachment of 4-sulfonic calix [6] arene hydrate (C[6]A), a uranium binding ring with structure complementary to the uranyl ion (UO_2^{2+}). The polymer is a semi-conductor and the binding of C[6]A to the uranyl ion alters the conductivity of the polymer. The change in conductivity is correlated to the concentration of the uranyl ion present in the ground water being sampled. The polymerized micro-electrode is inexpensive, robust and small with sub parts per billion sensitivity. This has advantages over larger and more expensive methods currently employed to measure heavy metals in ground water.

CREATIVITY WITHIN CONFINEMENTS

Katie Ponozzo (Department of Theatre Arts) Marla Hansen

Performing Arts Session

For an up coming dance audition I must perform a two minute solo that shows all the strengths I have as a dancer. I must come up with unique and creative movements that will capture the judges' attentions while at the same time showing my technique and versatility. I found this to be a fairly difficult endeavor. For within the confines of two minutes I must create movements that define me as a dancer, I must show my strength, flexibility, turning ability, range of motion and range of emotion. So it is with this piece that I will be creative within the confinements that I am given.



INVESTIGATION OF Ca^{2+} INDUCED AGGREGATION OF CALSEQUESTRIN BY ASYMMETRICAL FLOW FIELD-FLOW FRACTIONATION (AFFF)

Randy Rostock (Department of Chemistry) Susan Shadle

Calsequestrin is a calcium-binding protein found in the lumen of the sarcoplasmic reticulum of skeletal and cardiac muscle. Functionally, it is involved in the uptake and release of calcium ions associated with muscular function. Calsequestrin binds calcium with a high capacity and low affinity ($20-80 Ca^{2+}/CSQ$ with an average K_d of 0.5 mM). This high capacity calcium binding is thought to require protein aggregation. The goal of our study was to investigate and characterize the Ca^{2+} induced aggregation of calsequestrin. Asymmetrical Flow Field-Flow Fractionation (AFFF) has been used, in conjunction with Multi Angle Laser Light Scattering (MALLS) AND Refractive Index (RI), to study calcium induced CSQ aggregation. A variety of conditions have been explored to elucidate the effect of ionic strength on protein aggregation.

GLYCOSAMINOGLYCAN BINDING TO THE HEPARIN BINDING SITE OF TYPE XI COLLAGEN

Stacie Sanderson (Department of Chemistry) Julia Oxford

In recent studies, researchers have elicited a binding site for the glycosaminoglycan (GAG) heparan sulfate on type XI collagen in the noncollagenous domain called Npp. This affinity is believed to be an important link between collagen XI and the extracellular matrix (ECM) which are components of cartilage. This particular study uses enzyme-linked immunosorbent assay (ELISA) to seek other possible GAG's found in the ECM that may interact with collagen XI. Sugar moieties being studied include dermatan sulfate, keratan sulfate, and chondroitin sulfate. The anticipated results of the experimentation will reaffirm the binding of heparan sulfate to the noncollagenous (Npp) domain and will show either affinity or no activity of the Npp domain with dermatan sulfate, keratan sulfate, and chondroitin sulfate. These results will be quantified with absorbance readings from the ELISA plates to obtain the dissociation constant (KD) of each of the sugars.

EVALUATING THE ROLE OF METHIONINE 234 IN SUBSTRATE RECOGNITION

Alina Schimpf (Department of Chemistry) Henry Charlier

Anthracyclines are effective anti-cancer drugs whose use is limited by their cardiotoxic effects. The cardiotoxicity has been linked to carbonyl reductase (CR) dependent reduction of the anthracyclines to their corresponding alcohol metabolites. Knowledge of how CR recognizes its substrates could be used to design novel anthracyclines that are not recognized by CR. Modeling studies done with CR revealed a close contact between methionine 234 and the anthracyclines. As such, methionine 234 could restrict the size of the substrate that CR can bind. Site-directed mutagenesis was used to replace the methionine 234 with the smaller amino acids alanine, cysteine and serine. These mutant CR enzymes are being expressed in and purified from *E. coli*. The catalytic efficiencies of each of the mutant enzymes will be measured using a variety of anthracycline substrates to evaluate the role of the methionine at position 234. (Supported by NIH/NCRR P20-RR16454)

COLON CANCER: A ROLE FOR ONCOSTATIN M IN TUMOR CELL PROGRESSION?

Tyrell Simkins (Department of Biology) Cheryl Jorcyk

Oncostatin M (OSM) is a pleiotropic cytokine in the interleukin-6 family and is produced by several cell types, including human macrophages, monocytes, and neutrophils. OSM exhibits both stimulatory and inhibitory effects on cell proliferation. However, recent research in our lab suggests that OSM may actually contribute to tumor progression and enhance metastatic potential. The research presented here is aimed at addressing the effects of OSM in colon cancer. We obtained three human colon cancer cell lines: LoVo, HCT-116, and T84, and these cell lines differ in the amount of OSM receptor (OSMR) they produce. Adequate amounts of cellular receptors are essential to elicit a response of any sort, and many important cellular responses are generated via cytokines such as OSM binding to these cell surface receptors. LoVo cells are reported to have essentially no OSM receptors, while HCT 116 cells show an abundance of OSM receptors. We are currently determining the amount of OSMR expressed by T84 cells. Our preliminary results suggest that OSM does not affect the proliferation and detachment of HCT116 and T84 human colon cancer cells. Experiments are underway to measure changes in the invasive capacity of these colon cancer cells in response to OSM.

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PYRAZOLOQUINONE SUBSTRATES AND INHIBITORS OF CARBONYL REDUCTASE

Andrew Slupe, Choice Luster, Oladapo Bakare, and Solomon Berhe (Department of Chemistry) Henry Charlier

Carbonyl reductase (CR) catalyzes the NADPH-dependent reduction of many carbonyl containing compounds, including anthracyclines. CR reduction of anthracyclines has been linked to both efficacy and cardiotoxicity associated with anthracycline anticancer therapy.

Inhibition of CR during anthracycline therapy offers the potential to both increase the effectiveness of the drugs and to decrease the risk of cardiotoxicity. Understanding the substrate and inhibitor specificities of CR is paramount to developing inhibitors that could be used clinically to improve anthracycline therapy. Several pyrazoloquinone compounds were synthesized and screened for biological activity with CR. Several of the compounds tested were found to be substrates with a wide range of catalytic efficiencies. Four compounds were found to be inhibitors with IC₅₀ values ranging from 3-5 micromolar. The pyrazoloquinones in this study represent a new class of substrates and inhibitors for CR and offer insights into the design of potential inhibitors. Supported by NIH/P20RR016454 and NIH/R15CA102119-01.

JAMES CASTLE: TOTEM

Mardie Stone (Department of Art) Janice Neri

Podium Presentation

James Castle (1899-1977), a deaf, mute, self-taught artist quietly working in isolation mastered the art of perspective without the benefit of an education or artistic training. The majority of his subject matter is straightforward, but some of his drawings have an unusual aspect to them which numerous curators and other professionals have labeled "totems." Scholars have not been able to explain why Castle placed these seemingly disassociated objects in his landscape, interior architectural and architectural drawings. By using a theoretical approach of semiotics, I have presented the argument that James Castle used the totems as a measuring device towards the development of perspective. Upon the mastery of perspective the totems, no longer useful, disappear from his drawings.

CONSTRUCTION OF VECTORS TO PRODUCE CHOLERA TOXIN CHIMERAS AS POTENTIAL VACCINES

Tabitha Sturges (Department of Biology) Juliette Tinker

Vibrio cholerae is the bacterial agent of the disease cholera. This study involves the engineering of a plasmid using a native *ctxB* leader to express cholera toxin chimeras in *Vibrio cholerae*. Studies indicate that the *Vibrio cholerae* toxin (CT) is an adjuvant producing strong immune responses. The *ctxB* leader of *V. cholerae* will direct the chimeras to the type II secretion system allowing purification from the supernatant. In this experiment, we will clone in *tcpA* into our plasmid containing the *ctxB* leader. The goal of this experiment is to produce and purify the chimera (TcpA-CTA2/CTB) in large enough quantities to test in mice to see if it confers immunity to cholera. Ultimately we are trying to find out whether or not this chimera can be used as a vaccine against *Vibrio cholerae*.

FERROMAGNETISM IN CHEMICALLY SYNTHESIZED CeO₂ NANOPARTICLES BY Ni DOPING

Aaron Thurber (Department of Physics) Alex Punnoose

Metal oxide materials have recently been the subject of intense research since the discovery of room-temperature ferromagnetism in dilute semiconducting metal oxide systems for applications in spintronics. CeO₂ is a widely used rare earth oxide in fields of catalysis, optical

coatings and electrolysis, but more recently has been a candidate for use in field-effect transistor devices, a dielectric in capacitors and as a buffer layer in silicon-on-insulator technologies. The wide array of possible applications available for this system makes it very attractive for study and use in spintronics. This work reports the discovery of ferromagnetism in the cubic metal oxide insulator system $\text{Ce}_{1-x}\text{Ni}_x\text{O}_2$ for $0.0022 \leq x \leq 0.0440$ with particles in the 8 – 14 nm range. Particle induced X-ray emission (PIXE), magnetometry, x-ray diffraction (XRD), transmission electron microscopy (TEM), electron diffraction (EDP), and diffuse reflectance were used to characterize and study the magnetic, structural, and optical properties of samples.

COMPARISON OF ROBOTIC AND STEP-WISE SPIN COLUMN DNA EXTRACTION TECHNIQUES UTILIZING THE QIAGEN EZ-1 BIOROBOT

Alex Urquhart and Michael Davis (Department of Biology) Greg Hampikian

The Qiagen EZ-1 Biorobot uses a magnetic silica bead solution to perform DNA purification. In theory this method should be as effective as traditional spin column elution technique of DNA extraction, and since 6 samples can be run at a time, may improve throughput of samples. Other benefits may include limited sample loss and increased purity of the extracted DNA. This project focuses on comparing the traditional technique of spin column filtration elution with the robotic magnetic bead purification for throughput, ease, quality and quantity of obtained DNA from samples collected via buccal swab.

PURIFICATION OF A FIMBRIAL-CHOLERA TOXIN CHIMERA FOR USE AS A POTENTIAL VACCINE

Elizabeth Villanueva (Department of Biology) Juliette Tinker

TcpF is a secreted protein from *Vibrio cholerae*. Antibodies directed against this have been found to be protective in the mouse model. By joining TcpF with the cholera toxin CTB subunit to form a chimera, we hope to increase immunity. The goal of this experiment is to produce high amounts of TcpF chimera to generate antibody production in adult mice and to see if it will protect infant mice against cholera infection. In this experiment, we will use protein expression to try and optimize TcpF chimera expression. We will be working with two plasmids that utilize different secretion pathways; pJKT85 and pJKY86. pJKT85 utilizes that Tat pathway and a TorA leader sequence. pJKT86 contains a leader sequence, LTIIb, which directs proteins through the general secretory system in *E. coli*.

RUN FREE

Jennifer Waters (Department of Theatre Arts) Marla Hansen

Performing Arts Session

You don't have to agree with those around you. Express yourself in your own way by following your heart. "Run Free" is a visual expression of feelings through the medium of a human being, dancing freely and showing physical strength as well as emotional. Expression is not easy, especially when others may not agree with what you say. In this piece the words are taken from music and transferred in the mind to become one energy exerted through motion. Dare to be free.

ENHANCING THE FERROMAGNETISM IN DILUTE MAGNETIC SEMICONDUCTOR $\text{Sn}_{1-x}\text{Fe}_x\text{O}_2$

Jill West (Department of Physics) Alex Punnoose

Recent studies have shown room-temperature ferromagnetism in SnO_2 by doping with various transition metal ions. The use of sol-gel chemical synthesis has been used to introduce high levels ($x \leq 0.25$) of Fe into the SnO_2 system. Nanoparticles of $\text{Sn}_{1-x}\text{Fe}_x\text{O}_2$ have shown good reproducibility and a high Curie temperature making it attractive for spintronics applications. It has been theorized that magnetism in diluted semiconductor oxide systems is directly related

to carrier concentration. This work reports on the solubility limit of Fe in SnO₂ and shows the optimal level of doping for stronger magnetism. Additionally, SnO₂ has also been doped with Sb as a means of altering both the electrical and optical properties of the system, and to study the effect of simultaneously introducing Sb and Fe into the metal oxide semiconductor.

EFFECTS OF THE 1994 RABBIT CREEK FIRE ON STREAM FISH DIETS: ELEVEN YEARS LATER

Joshua White and Cindy Valdivia (Department of Biology) Peter Koetsier

We examined fish gut contents collected from 9 headwater streams, some whose watersheds were burned by wildfire. We placed streams into 3 categories: unburned, burned, burned/blowout (episodic, post-fire scouring). We assessed riparian cover by measuring photosynthetically active radiation (PAR). We removed 9-15 fish digestive tracts per stream. We partitioned contents into 4 groups: terrestrial, aquatic invertebrates; unidentified organic matter; inorganic material. Invertebrates were identified, and all material types were dried and weighed. Our blowout streams had higher PAR than the others. Fish from these sites ingested higher percentages of aquatic, but not terrestrial invertebrates. Gut contents from unburned and burned sites had similar percentages of aquatic and terrestrial invertebrates, but less organic matter. Riparian canopy in blowout sites were less than control or burned streams, 11 years after the wildfire. Lacking a close canopy, terrestrial invertebrates were not a major item for the fish, possibly affecting their production or growth.

IMMUNOHISTOCHEMICAL EVALUATION OF COLLAGEN TYPE XI IN SKELETAL DEVELOPMENT

Luke Woodbury (Department of Biology) Julia Oxford

Type XI collagen is a minor constituent of the extracellular matrix of cartilage and is essential in the regulation of collagen fibril assembly and diameter. The $\alpha 1$ chain of Collagen XI ($\alpha 1$ CollXI) contains a variable region that is modulated by alternative splicing in a tissue-specific and developmental manner. In the absence of CollXI, collagen fibrils of developing cartilage are very large in diameter, resulting in a loss of structural integrity. This loss of organization leads to Chondrodysplasia, which is evident in the short broad long bones and abnormal cartilage of the chondrodysplastic mouse. Recently, the Col11 $\alpha 1$ 6a-8 mouse, lacking the variable region of $\alpha 1$ CollXI has been developed. Investigation of these mice, through immunohistochemistry, may further elucidate the role of $\alpha 1$ CollXI and the variable region in the establishment of the collagen fibril network and healthy tissue. In addition, this may contribute to the understanding of skeletal disease such as osteoarthritis and osteoporosis.