

**Sixteenth Annual
Student Research and Scholarly Activity Fair
Wednesday, April 15, 2009**

Welcome,

The students, sponsors, and University Research and Scholarly Activity Committee appreciate your attendance at the Fair. Students and sponsors have committed many hours toward these projects, representing a diverse array of disciplines across SWOSU. The University Research and Scholarly Activity Committee congratulate these participants for their efforts. We trust that you will have an enjoyable day.

I wish to extend my personal thanks to all who played a part in making this event happen, particularly to President John Hays who always seems to find funds to support research and other scholarly activity at all levels throughout the University and to Provost Blake Sonobe for his continuing support for the committee. Special thanks, also, to Ms. Anita Blankenship, Director of Sponsored Programs, and Ms. Berva Pool, Sponsored Programs Specialist, for their continuing support for the Committee. Thank you to Karen Wilson in the Website Management Department for her help in coordinating the online application process. And, to the members of the Committee, thank you for your dedication and support as we all worked together to make this event a reality.

Most of all, thank you to all the faculty, staff and administrative sponsors who find a way to integrate students into various areas of research and other forms of scholarly activity. The extra effort yields dividends for the future as students discover the excitement research and scholarly pursuits can generate.

Sincerely,



Dr. Jason Johnson, Chair
University Research and Scholarly Activity Committee

Committee Members

Dr. Arden Aspedon	Ms. Dayna Coker	Dr. Valerie Reimers
Dr. Rahmat Talukder	Dr. Muatasem Ubeidat	Ms. Anita Blankenship (Ex. Officio)
Ms. Berva Pool (Ex. Officio)		

Title, Student, (Sponsor), Department, Abstract

1. **The Dystopian World of Metropolis.** Corey Don Mingura (Dr. Kelley Logan) Department of Language and Literature

The 1927 Sci-fi film Metropolis is not openly referred to as a work of dystopian fiction. In this project, Corey Mingura compares the plot and action of the film to works of widely known dystopian fiction (such as Brave New World) to illustrate that the film is indeed set in a dystopian world.

2. **The Effectiveness of Music Improvisation on Communication in a 7-year old Female with Autism: A Case Study.** Shanna Horton (Dr. Sophia Lee) Department of Music

This Presentation will discuss the results of music improvisation with a 7-year old female with autism. The results will be based on information from a case study done by the presenter. Also discussed will be techniques used and their outcomes.

3. **Comparison Of Singing Versus Instrumental Performance And Music With Movement On The Agitation Of Dementia Patients.** Rachel McCurdy and Amy Schmidt (Dr. Sophia Lee) Department of Music

Studies have shown that the music therapy treatments incorporating active music making processes effectively reduce the agitation of the dementia, including the Alzheimer type, patients. To address the observed lack in conclusion on the effectiveness of a specific music therapy modality, we will conduct an experimental study to compare the effect of singing or instrumental music making and music with movement on the agitation level of dementia patients. Approximately 30 participants from two memory units of local long-term care facilities will and receive two thirty-minute music therapy sessions per week for 6 weeks in two treatment conditions. Participants chosen for this study will be both male and female ages 65 and older. One group sessions will consist of singing activities and the other will be the instrumental music making and music and movement. Clients' agitation level will be evaluated by the Cohen-Mansfield Agitation Inventory. The study compares the effects of singing versus instrumental music making and music with movement on dementia patients' agitation level.

4. **Comparison of Various Chemical Oxides in Low Fire Glazes.** Megan Malloy (Mr. Joe London) Department of Art

A comparison of chemical oxides in low fire ceramic glazes. Comparison will be made by using various oxides in both a oxygen and a reduced oxygen environment using the low fire Raku process.

5. **An Experimental Procedure for Assessing the Impact of Lighting Changes on Stained Glass using Advanced 3d Modeling and Advanced Ray Tracing Algorithms.** Ryan Lutz and Jesse Johnson (Mr. Joe London and Dr. C. Warren Moseley) Department of Entrepreneurship and Computer Systems

The term stained glass can refer to the material of coloured glass or the craft of working with it. Throughout its thousand-year history, the term "stained glass" was applied almost exclusively to the windows of churches, cathedrals, and other significant buildings. Although traditionally made in flat panels and used as windows, the creations of modern stained glass artists also include three-dimensional structures and sculpture. In this project we explore the use of advanced ray tracing algorithms for simulating the effect of light on 3d object that represent stained glass.

6. **A Cost Effective Experimental Multi-Touch Light Table.** Karl Kirch and Johnathan Larsen (Dr. C. Warren Moseley) Department of Entrepreneurship and Computer Systems

Multi-touch denotes a set of interaction techniques which allow computer users to control graphical applications with several fingers. Multi-touch consists of a touch table as well as software that recognizes multiple simultaneous touch points, as opposed to the standard touchscreen which recognizes only one touch point. This effect is achieved through a variety of means, including but not limited to: heat, finger pressure, high capture rate cameras, infrared light, optic capture, tuned electromagnetic induction, ultrasonic receivers, transducer microphones, laser rangefinders, and shadow capture. These are usually exorbitantly expensive but this project was built on a very slim budget. I rival in functionality some of the very expensive models.

7. **The Gemini Space Program : The Twenty Months That Changed the World of Science Technology Engineering and Mathematics.** Andrew Hill and Brandon Phillips (Dr. C. Warren Moseley) Department of Entrepreneurship and Computer Systems

This project focuses attention on the scientific accomplishments and mathematical breakthroughs of the Gemini Space Program and creates an educational experience for visitors to the Tom P. Stafford Air and Space Museum. Even as the Soviets racked up one space first after another, NASA was getting closer to the first piloted Gemini missions. Launched by a converted Titan 2 missile, Gemini was the most sophisticated spacecraft yet created. Gemini astronauts would utilize an on-board computer. And they would be able to change their orbit -- something no Soviet crew had yet accomplished. For NASA, Gemini would serve as a bridge between the relatively simple Mercury flights and the awesome challenge of the Apollo moon program. In just 20 short months, between March 1965 and November 1966, 10 Gemini crews pioneered the techniques necessary for a lunar mission. They mastered the arcane complexities of orbital mechanics to achieve the first rendezvous between two spacecraft in orbit, and the first space docking. And they made the first controlled reentries into Earth's atmosphere.

8. **How Big is the Universe: An Celestia based Educational Simulation for the Tom P. Stafford Museum.** Brandon Phillips, Jarod Young, and Pankaj Mishra (Dr. C. Warren Moseley) Department of Entrepreneurship and Computer Systems

Using the experience of flying a simulated spaceship student and adult visitors of the Tom P. Stafford Museum will get a chance to experience the age old question of "How Big is the Universe". Ever since people have walked the Earth, we have looked up at the night sky and wondered what it's like out there. What marvels hide within that darkness? Today, we refer to outer space as "the Universe". What exactly is the universe? We know it is filled with stars, planets and moons. Some of us have also heard that it contains galaxies, nebula, black holes, pulsars, supernova, even "red giants". What are these objects? Our Sun is a star. What are stars? How many stars are there in space? How big are they? How far and long would you have to travel to reach one? Do other stars have planets around them? Could life be on those planets, perhaps other intelligent races looking up into their night sky and wondering the same things we are? Perhaps the most intriguing question is: how big is the universe?

9. **The Space Flight Simulator Project.** Jacob Ciesyenski, Travis Jacobi, John Leon, Cory Lumley, Joel Wynn, and Chase Duncan (Mr. Jeff Short) Department of Industrial and Engineering Technology

The Tom Stafford Air and Space Museum recently acquired a 8' X 11' movie theater resembling a space plane. Inside the mock space plane, museum patrons watch a video showing a plane taking off a runway, flying through space, and landing back at the runway. Presently, the mock space plane merely shows the movie without any simulated motion. The museum director feels the display would better serve the museum if the mock space plane also simulated motions of the video. This project seeks to provide a design capable of producing two degrees of motion, pitch and roll, for the entire mock space plane to simulate the motions an actual flyer might experience. The research associated with developing the design of the project explored hydraulic cylinders, pneumatic bellows, and electrical servo motors producing the desired motions. After investigating these alternatives, the project is able to provide this two-degrees of motion with a newly-designed, centrally supported base under the theater and programmable linear motors responding to commands from a programmable controller.

10. **Home Security Systems: The Change Over Time.** Mandy Washa (Dr. Phillip D. Holley) Department of Social Sciences

A home security system is a complete system that secures one's home from various threats, such as burglary, fire, and carbon monoxide poisoning. The system consists of an electric circuit device connected to the windows or doors of a home that would be activated if compromised, as well as other detection devices. If the system is triggered, an audio or visual alert is activated to warn the security system monitoring company of a problem, such as a possible burglar entering a home. The first home security systems date back to the early 1900's. These systems were generally costly, hard to install and even harder to monitor. Home security systems were mostly only used among the wealthy. This project will focus on how technology has advanced over the years allowing home security systems to be an affordable do-it-yourself home project, thus making the systems more accessible to the general public.

11. **Java Based Grid Computing and Security.** Karl Kirch and David Goree (Dr. Anil L. Pereira and Dr. C. Warren Moseley) Department of Entrepreneurship and Computer Systems

Grid Computing is a form of Distributed Computing that involves resource and data sharing among multiple organizations through existing computer networks. Current Grid Security models and mechanisms show severe drawbacks in terms of scalability, interoperability and privacy protection. We have examined a range of Security issues, right from the resource access level to the Grid job submission level. Our research has shown some interesting results and has lead towards the development of a Java based Grid Computing model. Many current Grid models are implemented using C or FORTRAN computer programming languages. While these languages are good for speed and parallelism, they lend themselves to major Security risks by exposing Grid jobs and resources to Security breaches. These risks can be minimized by virtualized computer programming languages such as Java. With Java, each job is sandboxed within its own process and is subject to the Security rules put in place by the Java virtual machine. Furthermore, Java is truly cross platform and allows for quick development time. Current Java based Grid models exist but they do not adequately address Grid Security issues. The incorporation of a lightweight Security model developed at NASA's Advanced Supercomputing (NAS) Division within a Java based Grid model has the potential to solve many Grid Security problems. NASA's lightweight Security model involves a simple lock and key mechanism using Secure Shell (SSH), RSA (initials of the surnames of the developers) keys, and basic user level Unix permissions. We will evaluate the performance of such an extended model with respect to potential Security threats such as denial of service attacks and malware.

12. **Algorithm Acceleration on Single Instruction Stream Multiple Data Stream (SIMD) Architectures.** Pankaj Mishra (Dr. Anil Pereira and Dr. C. Warren Moseley) Department of Entrepreneurship and Computer Systems

Algorithm Acceleration on Single Instruction Stream Multiple Data Stream (SIMD) Architectures examines an integrated High Performance Computing (HPC) architecture and programming model that can be used to improve the performance of existing parallel algorithms. SIMD is used to achieve data level parallelism. SIMD is inherent in most Graphics Processors (GPUs) today. Multiple cores (a core is a single processing unit) in the GPU can each execute the same instruction on different data elements simultaneously. NVIDIA CUDA technology exploits this architecture and uses a C like computer programming language. NVIDIA is a multinational corporation that manufactures Graphics Processors for a wide variety of devices. CUDA was originally an Acronym for Compute Unified Device Architecture. The full form is no longer used. A high-end GPU can typically execute more than a thousand threads simultaneously. Each thread is a separate instance of the same computer program. Memory access in GPUs is extremely fast. Scientific computation involving complex calculations can be accelerated with GPUs. For example, a large number of different output values of a mathematical expression can be calculated simultaneously. Each core in the GPU can compute a different output value in parallel by simultaneously accessing a different set of parametric values from the GPU memory. Our work will involve the acceleration of parallel algorithms for tasks like searching, sorting, graph traversals, image processing and Computer Vision. These tasks are widely employed in scientific and commercial applications. The algorithms will be optimized to execute on SIMD architectures. We will evaluate the performance of our algorithms in terms of Speed up over existing parallel algorithms.

13. **Economic Benefits of Private Prisons.** Melissa Nichols (Dr. Phillip D. Holley) Department of Social Sciences

A private prison is a secure institution where individuals are incarcerated and supervised by a third party via contract with a local, state, or federal government. The governmental agency that has jurisdiction pays the prison a certain fee per inmate per day to house these prisoners. These privately owned facilities not only seek to benefit our economy by operating at lower costs, but also to help create more job opportunities for citizens in local areas.

14. **Private Investigation: Who's Watching for Infidelity?** Diana Leon (Dr. Phillip D. Holley) Department of Social Sciences

Private investigators are people who are hired by individuals or businesses to undertake investigations. In 2006, 52,000 jobs were held as private detectives and investigators with a 19% expected increase throughout the upcoming years. Private investigators are known to professionally assist a wide variety of individuals by finding and analyzing requested information. Private investigators are expected to connect small clues toward mysteries or crimes. Their activities vary by the requests of their clients. This research will focus on the uncovering information relating to infidelity between partners.

15. **The Effectiveness of Faith-based Programs in Private Prisons.** Robin Edgar (Dr. Phillip D. Holley) Department of Social Sciences

Faith-based programs are religious services and programs that focus on the principles and knowledge needed to practice positive life-changing values, attitudes and behaviors. This involves outside religious organizations offering counseling, bible classes, or other activities. The programs strive to facilitate positive behavioral changes by helping offenders to adopt socially acceptable values and beliefs, and to reduce recidivism. A private prison is a place in

which individuals are physically confined by a third party that is contracted by a local, state or federal government. Private prison companies typically enter into contracts with local, state, or federal governments where they pay a rate for each prisoner confined in the facility. Private prisons ask for volunteers from the religious community, but research has yet to prove that these programs in private prisons reduce recidivism. The Corrections Corporation of America, which operates private prisons, claims participants have far less disciplinary issues and have a better attitude and outlook on life. The hope is that participants are re-socialized and better prepared for life outside prison with faith in God.

16. **Bounty Hunters: Are They Under Enough Regulation?** Brandon Norris (Dr. Phillip D. Holley) Department of Social Sciences

This study will address how bounty hunters operate in the United States. A bounty hunter, or bail enforcement agent, is an individual who seeks out escaped fugitives in return for a monetary reward. This study will address the lack of bounty hunter laws in the state of Oklahoma, which states require licensing for bounty hunters, states banning bounty hunting, the Uniform Criminal Extradition Act (UCEA), and the Taylor v. Taintor case. Licensing will be suggested to reform the way bounty hunters operate in the U.S.

17. **Self-Defense: Use of Pepper Spray.** Laci Jo Vianco (Dr. Phillip D. Holley) Department of Social Sciences

Pepper spray is a chemical compound that irritates the eyes producing tears, pain, and even temporary blindness. It can burn the skin slightly but is more effective if sprayed in the eyes, nose, or mouth so it can enter mucous membranes and cause swelling and pain. It is used as a self-defense weapon against an assailant/attacker that could be lurking in potentially dangerous areas such as dark alleys or parking lots. It is the most effective and humane deterrent when utilized as a temporary weapon. When used as a self-defense mechanism, the spray allows the potential victim time to flee the scene or escape the assailant/attacker and get to safety. Pepper spray is an excellent way to protect oneself from an attacker, but it must be used only after thorough research and clear understanding of the operation of the product.

18. **Hired Allies for the United States.** Aaron Bark (Dr. Phillip D. Holley) Department of Social Sciences

A mercenary company is a privately operated company that is hired to take part in an armed conflict between two parties. The company and its employees are not interested in the conflict issues but rather their own personal gain and compensation. The United States has contracted private security jobs in Iraq to several different mercenary companies throughout the world. These companies include: Blackhawk, a company in the US; Meteoric Tactical Solutions, a company in South Africa; and Erinys, which is a South African/ British based company. They are paid by the United States to carry out duties such as airport and high profile security along with helping train Iraqi law enforcement officers.

19. **Are Safe Zones Really Safe?** Brandii Abernathy (Dr. Phillip D. Holley) Department of Social Sciences

This project will analyze different types of information to determine if gun free zones are a benefit to our society. A safe zone is described as an area not permitting any type of firearms, such as university campuses or Federal Buildings. A handgun is identified as any firearm that can be held and fired with one hand; such as a revolver or a pistol. The right- to- carry laws have the potential to prevent situations from turning into massacres. If an individual knew that there were guns on campuses or in businesses, that person would not carry out any deadly crimes.

20. **Protect Yourself: No One Else Will.** Brandon M. Dudgeon (Dr. Phillip D. Holley) Department of Social Sciences

We, as Americans are no longer "one." Our ideals and morals have changed so much that programs like Neighborhood Watch, where neighbors watch out for each other and alert authorities when things don't seem right, have been replaced with the philosophy that we have to find a way to protect ourselves. Neighbors will no longer watch another person's house with the intent of keeping families from harm. In today's society, it is expected that one protect oneself. This poster explains the three main choices for self-protection within the home, firearms, pepper spray, and home security systems.

21. **Working Conditions of Private Investigators.** Tiffany Tyler (Dr. Phillip D. Holley) Department of Social Sciences

Private investigators are individuals that are hired to undertake investigations, but are not associated with government or state-funded organization. A lot of private investigators are hired by prosecutors in civil cases and may be required to be licensed and are able to carry firearms. Many private investigators have prior experience in law enforcement; however certain training is required to become a licensed or private investigator. Private

investigation has grown in the past century and has become an efficient use to civil court cases and prosecution of criminals. This poster will focus on the working conditions of private investigators such as hours of work, the working environment and the pay scale.

22. **Are Private Prison Rehabilitation Programs Effective?** Marisela Hernandez (Dr. Philip D. Holley) Department of Social Sciences

Private prisons are facilities owned by private companies which have a contract agreement with a government agency, such as a state. They offer rehabilitation programs for the inmates to help overcome addictions and cope with the time being served. By attending these programs inmates are educated about substance abuse, behavioral issues, life skills, faith, and job training. By using therapy and education with the inmates they hope to help inmates defeat addictions and live a better life. This provides an opportunity to improve their behavior inside prison and prepare them to return to society.

23. **Bounty Hunters vs. Police.** Robert Baker (Dr. Philip D. Holley) Department of Social Sciences

Bounty hunters are paid by the bail bondsmen to locate and capture the criminals that have jumped bail and failed to appear on their court date. When the person does not make their court date, then the bail bondsmen gives the information to the bounty hunters. The bounty hunters work usually without any support from the law enforcement. Since the criminals are jumping bail the argument is made that law enforcement should apprehend the criminals, not the bounty hunters. Law enforcement officers go through months of training, during which they learn appropriate techniques for apprehending criminals. Bounty hunters do not have to go through any training to teach them how to retrieve the criminals.

24. **The Differences Between Public and Private Policing.** Guadalupe Rivera (Dr. Philip D. Holley) Department of Social Sciences

Private policing is carried out by private companies who provide services for businesses. Public policing is carried out by governments, empowered to enforce the law and to effect public and social order. Private police usually are found in banks, manufacturing plants, and other places that need special protection. Private police take care of the locations they were hired to protect. Private police are expected to do acceptable jobs for which they were hired. If they fail to do the jobs acceptably they will no longer be employed. The private police are more interested in serving their paying clients and focus more on loss prevention while public police focus more on crime prevention.

25. **Prevention of Gangs.** Gregory Franklin (Dr. Philip D. Holley) Department of Social Sciences

The prevalence of gang activity throughout the United States has lead community leaders, school systems, families, criminologists, and sociologists to consider how it might be possible to prevent gangs. Gangs consist of groups of young and older members, with common motives, marked by specific symbols, colors, or locations with which each individual gang identifies. The concern of gang deterrence for those identified is based in motivation for positive community development, and the removal of destructive deviance and crime. The issue to be resolved is: how can gang formation be prevented? The poster will consider the following: o Establish constructive outlets for current at risk youth, and youth groups that are or may be gang members. o For gang members that have not "aged out" create full time job opportunities or establish outreach programs in which these individuals can recruit existing gang members and emphasize positive values of their society. o Strengthen family and community ties and give youth a direction to become productive members of the public.

26. **Effect of BMI Feedback on Perception of Enjoyment and Usefulness for Encouraging Exercise for the Wii Fit.** Kari Watkins (Dr. Stephen Burgess) Department of Psychology

Video games are played by over 70% of teens and young adults. The sedentary nature of video games is claimed to contribute to the rising incidence of obesity in the US. The Wii Fit has been marketed as a video game system designed to increase exercise and movement among players. The Wii Fit system provides feedback about the frequency of player exercise (use) and changes in player's BMI. The player feedback also includes information about the health consequences of different BMI levels. This study examined the effect of BMI feedback on the player's perception of whether the Wii Fit system would encourage other players to exercise and the expected enjoyment of other players. We hypothesized that players who received BMI feedback prior to playing would rate the Wii Fit system as less likely to encourage exercise and as less enjoyable to others. Player BMI was expected to interact with timing of BMI feedback. Approximately 50 female college students participated. Results will be discussed in terms of the main effects of BMI feedback, player BMI, and previous experience with the game. Interaction between player BMI and timing of BMI feedback will also be reported.

27. **Player Identification and the Desensitizing Effect of Violent Video Games.** Zach Patterson (Dr. Stephen Burgess) Department of Psychology

Over 70% of families own video game equipment and the average male teen plays for almost an hour per day. The prevalence of violent video games has also increased. Approximately 85% of games contain violent content. Violent video games have been to increase aggressive thoughts and actions in players as well as to decrease reactions to violence in the player's environment (e.g., Anderson et al., 2005). Video games are thought to have a greater effect than TV because they require a greater degree of interaction the more passive experience of TV viewing. The more realistic the motions involved in the video game may also increase their effects. In the present study, we examined the effect of playing violent video games that differed in the degree of realism of the player motions. For example, the PS2 requires the player to manipulate a hand controller using motions that are not similar to the motion of a sword or gun. In contrast, the Wii typically has motions that are more realistic. The effect violent video games may also be increased if the player identifies more closely with the character in the video game. After playing the game, the players rated how closely they identified with the character. After a 10 minute delay, each participant viewed a video compilation of violent clips from news programs. Then each participant rated the video compilation on a variety of characteristics (e.g., violence level, excitement). Approximately 60 participants completed the experiment. Results will be discussed in terms of the effect of realism of game motion and identification of the player with the character on the desensitization of the player to the violence presented in the video.

28. **Music Videos and Attitudes Towards Women.** Sandra Burpo (Dr. Melinda Burgess) Department of Psychology

Music videos contain many degrading and stereotypical depictions of women and other minorities. The effect of viewing degrading images has been demonstrated with magazines and other static images. For example, females report a lower body image and self esteem after viewing pictures of female models. In the present study, we extended this body of research to include the moving images contained in commercially available videos. Participants viewed videos differing in the extent which women were displayed as sex objects or not. Approximately 100 participants viewed a video and then read a scenario depicting a date rape situation. Participants then rated the degree of guilt of the individual and how much, if any, punishment was warranted. Participants were less likely to rate the individual as guilty after viewing the sexualized video.

29. **The Angel in the Inferno: Dante's Perfect Woman Transmuted.** Tara Havins (Dr. Kelley Logan) Department of Language and Literature

Dante's perfect woman, Beatrice, has been reworked and adapted to fit each subsequent literary period. She crosses genre lines, influencing the female characters and voices in the film METROPOLIS, Hawthorne's "Rappacini's Daughter," FAREWELL TO ARMS, Lord Byron's poetry, Clare Booth Luce's THE WOMEN, and Susan Glaspell's TRIFLES. She becomes the Victorian "angel in the house" and emerges as the subversive woman of Glaspell's play, defying convention, the law, and the wishes of husbands. By the 20th century, Pygmalion's Galatea has awakened, become fully aware, and asserted herself.

30. **Contemporary Newspaper Design Using Punk Design Influences.** William Crane (Ms. Xiaomiao Wang) Department of Art

The punk movement arose out of the United Kingdom in the mid-to-late 1970's. The youth of the area had grown tired of the establishment of societal norms and etiquette. The music they made threw away the old elements of harmony and tone to make a screaming, noisy anthem of angst. The clothes they wore were torn, mismatched, and defaced with paint and markers, as a rebellion against the egotistical fashions that people used to identify their status. Most importantly to graphic design, they also rebelled against previous notions of proper design and advertising. My research is in designing a contemporary newspaper that has a punk influence. In doing so, I shunned the proper newspaper layout of columns and uniformity by overlapping the different elements and making some run off the page. The colors I have chosen reflect the punk influence with a lot of red and black, as well as, dramatic color shifts. I utilized the dirty, torn edges and a pasted on look that the punk artists favored for things like concert flyers and album covers. The punk artists put their pieces together with cut and paste methods. I have chosen to use some of their techniques (like tearing the edges), and incorporating them into new technologies like Photoshop and Illustrator on the computer, thus merging the old and the new.

31. **Contemporary Newspaper Design with a 1960's Influence.** Nikki Janzen (Ms. Xiaomiao Wang) Department of Art

Psychedelic 60's The 1960s was a time of change. It was a time of irresponsible excess and flamboyance. I have done research on this decade for a 60s inspired newspaper I am designing. The newspaper I am designing is heavily inspired by the swirling patterns and kaleidoscope-like colors derived from psychedelic states of consciousness. A great portion of this psychedelic art is seen in the posters of the 1960s. Wes Wilson was a famous poster artist, creating designs for bands such as the Grateful Dead, Jefferson Airplane and The Byrds. All of Wilson's imagery appears quite flat and his color combinations are more neutral. Wilson also uses very cramped spaces, and his imagery and text flow together continuously in a tight space. Throughout my research, I have tried to emulate Wilson's design by using the idea of cramped space and flowing text and imagery. I was also inspired by Wilson's flattened imagery. To create the look of a flattened image I used the cutout tool in Photoshop on all my images. The generation of the 1960s quickly fled from the highly conservative ideas of the 1950s. This concept is mimicked in the posters of the 1960s. Like the culture of the 1960s, I am trying to create my own unique design by pushing the limits. Unlike Wes Wilson's fairly washed out work; I have put a contemporary twist on the old 60s look and pumped up the volume on the color.

32. **Graphic Design Arts and Crafts Art Movement Newspaper Project.** Cameron Creed (Ms. Xiaomiao Wang) Department of Art

Graphic Design arts and crafts art movement from the 1880-1910 the leaders where William Morris, with his Kelmscott press, Eric Gill and the Golden Cockerel press, Owen Jones and his book The Grammar of Ornament In this research project I am making a newspaper to represent this art movement by incorporating the elements in there imagery and there ideas of design, through art work typography and color. Using patterns of leaves and foliage in a boxy way surrounding and enter twining, the Font is print like, like gill sans and such, the colors are Earth tones to mach the principles of the movement.

33. **The International Style of Design in Modern Publication.** Kyle Easter (Ms. Xiaomiao Wang) Department of Art

Since the International Style of design focuses on simplicity of text and readability, how better to emphasize this than through a newspaper design. Since the style is all about getting information across, it is a perfect candidate. All too often in modern society, people have the need to be constantly entertained instead of really understanding things. The International Style is about function over form, based on its roots in Futurism and the Bauhaus school of design. I chose to use the very common Helvetica font because of its ability to be straightforward with no stylistic concern. It was created in 1957 by The Haas Type Foundry. By showing no meaning in it's form it does one thing. It gets the facts across simply. This style is usually used to create posters or advertisements with large heavy text. By using the headlines of the newspaper, I was able to do that while also incorporating imagery into the blocks of text to give a visual interest to the publication without changing the style of text or presentation. With the option of writing part of the publication, I tried to subtly express my views of how I would like things to be and how they actually are in this town. I also took a stab at modern society by iterating the point that everyone has to be constantly entertained. A newspaper these days usually has opinion and entertainment as its focus rather than information and facts. I chose to put both.

34. **"Revised" Study of Russian Poster Art and Constructivism.** Ryan Lutz (Ms. Xiaomiao Wang) Department of Art

I'm doing a study of Russian Poster art and Constructivism to create a newspaper based on 1920's Russian poster art. Russian Poster art is inherently bold, gritty, and gets the message across. As was the movement and art form it is based on; Constructivism. Russian posters were mostly propaganda, promoting the Soviet Empire and communism. I've tried to reflect all these aspects through my use of colors and shape and also provide history of Russian Poster Art and Constructivism as the body text in the design. Russian Poster Art is a unique style inspire by art nouveau in it's earlier development and moving toward constructivism during the NEP. It started out as strictly controlled propaganda by the government and ended up as a tool for protests. It's evolution and how all Russian art was directly influence by the state of the government is an interesting subject. I started with a giant number, bold and frightening, "1" as the background and centerpiece of the first page of my newspaper. It splits the page to create geometric forms similar to those used by Constructivists. It is an off blue chosen specifically not to overpower other elements as red would have done, but to enhance them. This "1" divides and flows out of the space to create similarity's to the bold and dramatic geometry we observe in their art. I did the same with the second page but with a bold "2" instead, this was more tricky as the space around the subject only left me with one area to put a pictorial element. In the surrounding space, I placed pictures of a train yard reminiscent of an industrial Russia. They fit into the design to negate the unused space and add content / substance to the ideas I'm trying to develop.

35. **Newspaper Design With De Stijl Characteristics.** Jeannie Adair (Ms. Xiaomiao Wang) Department of Art

De Stijl or The Style is an art movement that began in the Netherlands it lasted from 1917 to 1931 this style was founded by Theo van Doesburg. The Style uses geometric shapes and thick and thin lines horizontally, vertically, and diagonally. De Stijl also uses geometric shapes and also sometimes arranging the layout geometrically. The colors used in this style are red, blue, yellow, black, gray, and white. The font of this style is plain or bulky cube like font, most likely because De Stijl has Cubistic qualities. This style influenced painters and architects like painters Piet Mondrian, Bart van der Leek, and Vilmos Huszar and also the architect Jacobus Johannes. This style was used in advertisements, advertisement posters, paintings, and architecture. The style main purpose to accomplish was social order and harmony. I used this style as a reference for my layout. The design I did is used to bring attention to a less known and simple style. I used the limited color of red, blue, and yellow, primary colors, and then used neutral colors, black and gray throughout the layout of my newspaper. I use long rectangles and triangles like an extension of the picture attached behind the pictures, which helped bring the picture and the title of the article together. The fonts I use for this style is Arial, Morohashi, and De Stijl Regular. I organized my newspaper layout by forming geometric shape of triangles and rectangles.

36. **Bringing Street Art Indoors: A look at Modern Graffiti.** Larissa Copeland (Ms. Xiaomiao Wang) Department of Art

I put together the campus newspaper each week and am very comfortable with the typical six-column newspaper format. It is very difficult for me to break any of the “paper rules” such as allowing free space or having mismatched columns. I feel that attempting to create a newspaper using a graffiti art style will allow me more freedom and the opportunity to “think outside the box” and not worry about abiding by the rules as closely as I have to while putting together The Southwestern. Graffiti is an art form that dates back to ancient times and as such has become invaluable to anthropologists, as it allows them insight into the literacy rates and political views of the time. Examples of graffiti were even found preserved in the ruins of Pompeii, which helped scientists learn more about that particular culture. Without graffiti, many facts about the culture would not have been discovered. I chose to work with graffiti because it is a misunderstood art style that is typically associated with vandalism. The bright, vivid colors and outlandish writing styles appeal to me in several ways: they are eye-catching, they are unexpected, and they often convey direct meaning. I did not want to have a rigid layout for this project; things are placed where they are convenient, much like taggers trying to find a few spare inches of space to make their mark. My background incorporated the beautification aspect of graffiti; the bright, spray-painted colors will improve the image of the grungy wall underneath it. For fonts, I tried to use several different “street” graffiti styles. I used everything ranging from a style that resembles handwriting to writing that is almost illegible to extravagant, bubble-like letters.

37. **The use of Art Nouveau Style in Graphic Design.** Stephanie Ast (Ms. Xiaomiao Wang) Department of Art

In researching and doing this project to create a newspaper, I choose to use Art Nouveau as an inspiration for the newspaper design. Art Nouveau is often nature inspired and free flowing. The Art Nouveau colors are often different shades of greens and oranges. The layout of the Art Nouveau style usually consists of curves and very rarely straight lines even for the text. The layout also consists of either a lot of foliage designs or pictures of ladies with the foliage incorporated into them. The imagery is usually drawn or painted. I made the text body copy appear in organic shapes similar to the plant forms used in Art Nouveau. The type colors that I used are greens, reds, and yellows similar to that of Art Nouveau. The layout that I made is similar to how Art Nouveau used plants to interweave with one another. The pictures are mostly plants with muted colors or objects that might of appeared in that time period. Art Nouveau often has repeating patterns in the background consisting of floral or organic compositions.

38. **The Idea of Art Nouveau Used in a Newspaper.** Estrella M. Lopez (Ms. Xiaomiao Wang) Department of Art

I choose the Art Nouveau theme, to create a newspaper, because of the mystic, nature like style. Many of the posters and paintings created involved women and nature along with different creative texts and fonts. The colors used are bright, natural and some times muted. The colors, like the fonts used are bold, thin, elongated and creative and resemble nature. The females in the posters are often depicted in a Greek, simplified, passionate or awaiting position. The artist responsible for this poster designed is Jules Cheret. He produced a variety of commercial work, from menus to posters and specialized in color lithography. Art Nouveau was first introduced as a unique style of decoration characterized by repeated elongated motif of elongated movement connected to curved lines. This type of art was based of Asian art and Japanese woodcuts. By the end of the decade the Art Nouveau posters were not only popular in France but throughout the West. I intrepid some of the similarities by using long stylistic lines that curve at the end giving the paper a complete and rich background. Also, figures of females were used to resemble the Art Nouveau style. No faces are showed in the females, they were left blanked to give the reader curiosity in knowing what they would look like if they were a true model. The fonts used are a bit close to what Art nouveau artist would select for a font. The fonts and display of text that was chosen are more modernized to give the newspaper a touch of

the new era. The colors selected are pastels and shades of gray. The colors were kept muted, not to loose the viewer from the idea of a newspaper.

39. **Pop Art Newspaper.** Alex Smith (Ms. Xiaomiao Wang) Department of Art

POP ART, Pop art was something new in the early 50's, challenging traditional art in every context to say the least. Pop art made things like a picture of a can of soup interesting because it took the object out of its context and isolates it. Characterized by themes and techniques drawn from popular mass culture, such as advertising, comic books pop art is interpreted as a reaction to the dominant ideas of Abstract Expressionism. Pop artist often would use very bright colors on a flat two-dimensional background. Some images would be screen-printed and repeated in different colors. The concept of pop art refers not as much to the art itself as to the attitudes that led to it. My newspaper research paper was influenced directly from pop art. I isolated images by taking them out of the surroundings and contrasting them with the background. The background color played a big roll in making the composition a whole by adding a similar balance through out the work. In the background I made 4 squares each a different color and the text in the square contrasted against it. The color choice comes from Andy Warhol's painting of Marilyn Monroe. Where the columns would be in a normal newspaper I added text bubbles to make it like a comic book. The font I used was very expressive and dramatic, just like pop art its self. The font is very distorted and has a lot of very harsh and contrasting lines reflect the informal style of pop art.

40. **Building Lightning Detecting Electric Field and Magnetic Loop Antennas.** Justin Silkwood and Wessley Lamoreaux (Dr. Tony Stein) Department of Chemistry and Physics

Lightning produces pulses of electric and magnetic fields that can be detected hundreds of kilometers away. We designed, built, and tested a magnetic field loop antenna and a capacitive electric field antenna with accompanying signal amplifying circuits to measure these fields. Here we will discuss lessons learned from building these devices including preliminary measurements. Funding was provided for this project through a NASA/EPSCoR grant. Additional help was provided by Dr. Bill Beasley from Oklahoma State University.

41. **Differential Pulse Anodic Stripping Voltammetry (DPASV) For The Detection Of Barium And Lead From Oil Well Water.** Desiray J. Cannon, Crystal M. Mars, and Gwendolyn L. Ramon (Dr. Curt A. Woolever) Department of Chemistry and Physics

Differential pulse anodic stripping voltammetry (DPASV) has been applied for characterization and quantitative detection of barium and lead from oil well water samples. These water samples are from oil wells that have been under waterflood. The development of a differential pulse anodic stripping voltammetric technique for barium and lead detection will be discussed. Included in this discussion are such factors as electrolytic solutions and other DPASV conditions such as pulse amplitude and scan rate.

42. **Differential Pulse Anodic Stripping Voltammetry (DPASV) For The Detection Of Barium And Lead From Gunshot Residue (GSR).** Katherine Helms, Crystal Mars, Shawn Plymnesser, Tamara Powell, Kaden Stratton, and Justin Cullen (Dr. Curt A. Woolever) Department of Chemistry and Physics

Differential pulse anodic stripping voltammetry (DPASV) has been applied for characterization and quantitative detection of barium and lead from gunshot residue (GSR). Previous electrochemical techniques have detected antimony and lead from gunshot residue, however, barium had never been detected. This technique allows for simultaneous detection of barium and lead that is simple, fast, and nondestructive. Current work is investigating the use of various concentrations of LiClO_4 electrolyte to improve determination of barium in the gunshot residue.

43. **Preparation and Characterization of $\text{Re}(\text{NCH}_3)\text{Cl}_3(\text{PPh}_3)\text{P}(\text{CH}_3)_3$.** Terri Kardokus (Dr. David Esjornson) Department of Chemistry and Physics

The proton nmr resonances of the alkyl alpha-hydrogens of the alkylimido rhenium(V) compounds of the type $\text{ReCl}_3(\text{NCH}_2\text{R})(\text{L})_2$ (where $(\text{L})_2$ represents two monodentate or one bidentate phosphine ligands) have long been recognized as somewhat unusual. These proton resonances appear significantly upfield of other similar compounds, and are out of the range usually encountered for "normal" alkyl resonances. Anisotropic effects from aryl substitution on the phosphine ligands leads to upfield resonances in the proton nmr. Substitution of one of the aryl phosphine ligands leads to the less sterically crowded $\text{Re}(\text{NCH}_3)\text{Cl}_3\text{PPh}_3\text{P}(\text{CH}_3)_3$. The nmr properties (proton, C-13, P-31), UV-vis, IR, and Cyclic Voltametric data are all consistent with a trans-meridional structure for $\text{Re}(\text{NCH}_3)\text{Cl}_3\text{PPh}_3\text{P}(\text{CH}_3)_3$. Unlike the bis-triphenylphosphine derivative, this complex is highly soluble in a variety of solvents.

44. **Preparation and Characterization of Rhenium(V) Bromide Complexes of the type $\text{Re}(\text{NCH}_3)\text{Br}_3(\text{PR}_3)_2$.** Sarah Webb (Dr. David Esjornson) Department of Chemistry and Physics

Several Rhenium(V) complexes with sterically demanding ligands were prepared. The alkylimido-bromo compounds are stabilized by steric crowding around the Re(V) center, which prevents beta-elimination in the alkylimido group. The crowding of this low spin d2 complexes can lead to anisotropic upfield proton nmr resonances for the "beta" position (relative to the metal) of the alkylimido ligand. Both *trans,mer*- $\text{Re}(\text{NCH}_3)\text{Br}_3(\text{PPh}_3)_2$ and *cis, fac*- $\text{Re}(\text{NCH}_3)\text{Br}_3(\text{PPh}_3)_2$ (where Ph = C_6H_5), show significant anisotropic effects from the positions of the phenyl rings of the phosphine ligands. The steric crowding was relieved somewhat by the substitution of $\text{P}(\text{CH}_3)_3$ for PPh_3 .

45. **Energy Dependencies of Matrix Metalloproteinases (MMPs) on Geometry of Zinc Binding Site.** Steven Stone (Dr. Doug Linder) Department of Chemistry and Physics

Matrix Metalloproteinases (MMPs) have been implicated in a host of disease states, including cardiovascular disease, arthritis, and cancer. Through studies we hope to learn more of how to inhibit these particular enzymes so as to limit the damages they cause. In particular, using computational quantum chemical techniques the influence of the active site zinc geometry on the catalytic mechanism of action will be studied. Small models of the zinc active site will be constructed, energies will be calculated, and the results will be analyzed to determine how to what extent changes in the zinc active site geometry (bond angles and lengths) influence the catalytic properties of enzyme. With these results we hope to establish a new paradigm to develop effective enzyme inhibitors.

46. **Synthesis of New Enol Phosphates.** Tonnie Burnett (Dr. Cody Timmons) Department of Chemistry and Physics

Enol phosphate compounds are of potential biochemical importance as compounds that can bind proteins and be used to study allosteric interactions. In addition, organophosphates are highly sought compounds in the pharmaceutical and pesticide industries due to their diverse biological properties. As a result, a research program has been established for the synthesis of phosphorylated enol pyruvates and phosphorylated enol acrylates. Initial success in the phosphoryl enol acrylate was achieved via a modified malonic ester synthetic strategy. The preparation of various structural analogs of phosphoryl enol pyruvates are currently underway. The synthesis features a Perkow reaction between trimethylphosphite and an appropriately substituted α -halo ketone. Methyl deprotection of the resulting phosphate diester using TMS-X (X = Br or I) affords the bis-trimethylsilyl ester, which is converted to the free acid via simple methanolysis. In situ formation of the cyclohexylammonium salt proceeds smoothly to afford the desired products. This mild and efficient protocol has been found to proceed in high yield. Importantly, the entire sequence proceeds without the need for a single chromatographic purification.

47. **Development of an Asymmetric Kabachnik-Fields Reaction.** Sunny Patel (Dr. Cody Timmons) Department of Chemistry and Physics

Organophosphorus compounds play an integral role in the chemical and pharmaceutical industries due to their diverse physiological/pharmacological properties. In particular, α -amino phosphonic acids, esters, and amides are highly sought compounds due to their antibiotic, herbicidal, and insecticidal activities. These compounds are considered good transition state analogs for ester and amide hydrolysis reactions and have thus been widely used in the design and synthesis of catalytic antibodies. Amino phosphonic acids bear structural similarities to proteinogenic amino acids and a naturally occurring organophosphorus analog of tyrosine has been isolated. As a result, the synthesis of amino phosphonates that are isostructural with the naturally occurring amino acids has blossomed into an important field for both the synthetic and medicinal chemists. Among the methods for the preparation of amino phosphonates, perhaps the most attractive from an ease-of-operation standpoint are the one-pot Kabachnik-Fields and Pudovic reactions. These involve the treatment of an imine (or an aldehyde and amine) with trimethylphosphite in the presence of a Lewis acid catalyst. Unfortunately, very few asymmetric versions of these reactions have been developed. As a result, synthetic studies are currently underway aimed at the development of an asymmetric Kabachnik-Fields / Pudovic reaction. Factors under scrutiny include: solvents, catalysts, and nitrogen-protecting groups.

48. **Nickel(II) and Cobalt(II) Complexes of m-CB-Cyclams: Potential CXCR4 Antagonists.** Courtney Garcia (Dr. Tim Hubin) Department of Chemistry and Physics

CXCR4 chemokine receptors are found on the surface of immune cells, and together with the specific natural ligand, stromal cell-derived factor-1 α (SDF-1 α), have been revealed to play a role in a number of disease states. For example, the CXCR4-SDF-1 α system has involvement in cancer progression and metastasis, the development of rheumatoid arthritis, and as the entry route for HIV into cells. Our aim is to develop new antagonists for the CXCR4 receptor which may one day be used as therapeutic drugs to combat these diseases. Our target molecules are

conformationally fixed macrocyclic compounds and their transition metal complexes based on a known CXCR4 antagonist. Nickel(II) and Cobalt(II) complexes of a meta-xylyl linked ethylene cross-bridged bis-tetraazamacrocyclic (m-CB-Cyclams) have been prepared and chemically characterized to examine the effect a conformationally fixed ligand has on the properties of these metal ions. Metals such as cobalt and nickel are known to increase the binding efficiency of bis-tetraazamacrocyclics for the CXCR4 receptor.

49. **Use of the Allyl Protecting Group in the Synthesis of Unsubstituted Cross-Bridged Bis-Tetraazamacrocyclics.** Kiet B. Nguyen (Dr. Tim Hubin) Department of Chemistry and Physics

Bis-tetraazamacrocyclics are organic molecules consisting of two linked rings, each containing four nitrogen atoms. These molecules, and their transition metal complexes, have been intensely studied as potential therapeutic drugs due to their strong binding to the CXCR4 chemokine receptor. The newly approved stem cell transplant drug Plerixafor (aka Mozobil), is a simple example of this structural class. Recent studies have shown that designing analogs with enhanced rigidity may result in metal complexes with improved CXCR4 binding ability. However, the most rigid examples published sacrifice potential hydrogen-bonding interactions with CXCR4 by making all nitrogen atoms tertiary. We present a route to rigid bis-tetraazamacrocyclics that leaves two secondary nitrogen hydrogen-bond donors intact by utilizing the allyl group as a protecting group. The allyl group makes possible the key rigidification step of the synthesis, yet is removable after this step to give the desired secondary nitrogens.

50. **Chemical Characterization of CXCR4 Antagonizing Transition Metal Complexes.** Amy Cain (Dr. Tim Hubin) Department of Chemistry and Physics

The Hubin group has produced nearly 50 metal complexes of bis-tetraazamacrocyclics and their analogues for screening as CXCR4 antagonists. Although some biological properties of these complexes have been determined, full characterization of the compounds as interesting coordination complexes has not been completed. Our objectives were to complete the characterization of the Cu and Zn complexes made previously and to synthesize and characterize their Ni and Co analogues. EI mass spectra, UV-Visible spectra, cyclic voltammograms, magnetic moments, X-Ray crystal structures, and ¹H and ¹³C NMR spectra were collected on the existing complexes. Ni and Co analogues were prepared according to known procedures and similarly characterized. The Cu complexes exhibited typical magnetic moments, UV-Visible spectra, and redox properties (irreversible reduction to Cu⁺ and oxidation to Cu³⁺). The Zn complexes gave well defined NMR spectra that confirm the ligand structure upon binding. The Ni and Co complex UV-Visible spectra were interpreted to calculate the ligand field strengths, which were typical of tetraazamacrocyclics. The X-ray crystal structures show that Cu²⁺ prefers coordination of acetate in an anisobidentate fashion, whereas Zn²⁺ exhibits monodentate acetate coordination with hydrogen bonding of acetate to a bound water. Although the CXCR4 antagonism demonstrated by some of these complexes is extremely interesting, their chemical characterization has given results typical of tetraazamacrocyclics. This finding leads us to conclude that the demonstrated biological activity is primarily a result of the size, shape, and Lewis Acid properties of the complexes, rather than of any unique chemical properties.

51. **The Anticancer Drug 4-Hydroxyphenylretinamide is a Potent Inhibitor of Mitochondrial Electron Transport Complex I.** Gabriel Pray and Melissa Pray (Dr. William Kelly) Department of Chemistry and Physics

The retinoid anticancer drug 4-hydroxyphenylretinamide (4-HPR) is currently in Phase I clinical trials for the treatment of head and neck squamous cell carcinoma. Previous research has suggested that 4-HPR inhibits mitochondrial respiration and mitochondrial electron transport chain (mETC) by affecting a target between complex I and complex III, presumably ubiquinone (UQ). Our research now shows that 4-HPR is a potent inhibitor of mETC complex I with an IC₅₀ (concentration of inhibitor leading to 50% inhibition of enzyme activity) of ~2μM. Complex I activity was measured by monitoring the disappearance of added NADH (340nm) over time. Initial velocities (V₀) were measured over six doublings of added UQ. Kinetic parameters for the maximum rate of enzyme reaction (V_{max}) and the Michaelis constant (K_m) were obtained by curve fitting the data to the Michaelis-Menten equation using non-linear regression analysis. V_{max} and K_m were determined in the absence of 4-HPR and with four doublings of added drug (5-40 μM). Lineweaver-Burke double reciprocal plots based on the curve fit to the Michaelis-Menten equation reveal that added inhibitor both lowers V_{max} and increases K_m, indicative of a mixed inhibitor mechanism. This fits with the observation that other hydrophobic compounds such as rotenone, capsaicin and the Flex-Het drug SHetA2, inhibit UQ reduction by binding to the large hydrophobic pocket within the trans-membrane domain of Complex I.

52. **Do Ligand-Induced Changes in Loop Dynamics Encompassing the "Oxyanion Hole" Coordinate Activities within Carbamoyl Phosphate Synthetase?** Garrett Scott (Dr. Jason Johnson) Department of Chemistry and Physics

The reaction between ATP and HCO₃⁻ at one active site within carbamoyl phosphate synthetase (CPS) represents the stimulus for an allosteric signal promoting glutamine hydrolysis at a separate active site. Although the mechanism for this conformational response is unknown, it has been shown that C248 becomes exposed to labeling reactions upon addition of ATP and HCO₃⁻, and that the mutation C248D enhances glutaminase activity. Crystallographic differences between C248D and native CPS are therefore proposed to mimic conformational changes associated with the synchronization of active sites. The mutation produces a large change in the position of residues G243 through A251 toward greater solvent exposure. This sequence spans the "oxyanion hole", residues speculated to interact with and stabilize tetrahedral intermediates accompanying glutaminase activity. We have constructed Y250W, thereby introducing a fluorescence probe potentially sensitive to coordinating allosteric signals. Separately, the C248D mutation has also been introduced with Y250W. The kinetic properties, absolute fluorescence properties, and the ligand-induced fluorescence changes of Y250W vs. Y250W/C248D are being examined. If ATP and HCO₃⁻ association induces a change in fluorescence properties of Y250W analogous to that caused by the introduction of C248D, credence will be given to the notion that synchronizing conformational changes are indeed mimicked in C248D. Supported by NIH P20RR016478-04 from the INBRE Program of the National Center for Research Resources.

53. **Assessing the Allosteric Influence of GTP on Cytidine-5'-Triphosphate Synthetase.** Jaci Nuttle and Hans Igou (Dr. Jason Johnson) Department of Chemistry and Physics

CTP synthetase (CTPS) catalyzes the synthesis of cytidine-5'-monophosphate (CTP) from uridine-5'-monophosphate (UTP), adenosine-5'-monophosphate (ATP), and glutamine. Since the enzyme sets the limits of intracellular CTP concentration supporting DNA, RNA, and phospholipid synthesis, it is a target of anti-cancer, anti-parasitic, and anti-viral therapies. Among the entire amidotransferase family of proteins, CTPS is also the only one whose activity is directly regulated by an allosteric effector, guanosine-5'-triphosphate (GTP). It is both activated in its glutaminase activity and inhibited in its ligase activity by GTP. With only one binding site for GTP per monomer of the homotetramer, the mechanism for this action is unclear. We seek to unravel these complex allosteric signals, in part, via an evaluation of the enzyme's fluorescence response to GTP binding, potentially revealing a unique pharmaceutical target. CTPS exhibits three native tryptophans, too many to independently resolve. Our approach is to use the QuickChange Method to genetically engineer a variant of the enzyme devoid of tryptophan residues, which can then serve as a template for inserting probes into areas proposed to be involved in the GTP-mediated synchronization of CTPS. The gene for CTPS has been redesigned to optimize codons for bacterial expression, synthesized by the company GenScript, and inserted into the pET-15b vector. Expression and purification via IMAC yields more than 20mg/L culture of His-tagged CTPS, 10-fold greater than levels reported in literature. Supported by NIH P20RR016478-04 from the INBRE Program of the National Center for Research Resources.

54. **Asymmetric Press-Coated Matrix System for Near Zero-Order Sustained Drug Release.** Lance A. Miller¹ (Dr. Rahmat Talukder¹ and Thomas Durig²) College of Pharmacy¹ in collaboration with Aqualon², a Business Unit of Hercules Incorporated, Wilmington, DE

Purpose: Design and evaluation of an asymmetric press-coated diffusional matrix system for achieving near zero-order sustained drug release. Methods: The device consists of a hydrophobic non-swellable drug layer, which has been press-coated with hydrophobic and/or hydrophilic non-swellable barrier layer(s). The active (Propranolol hydrochloride) was blended with ethylcellulose (Ethoxyl contents 51%, viscosity 9.2 cps) and stearic acid, which constituted the drug layer contents. The hydrophobic barrier layer consisted of ethylcellulose (EC) and stearic acid, while the hydrophilic barrier layer consisted of hydroxypropyl cellulose (HPC) and stearic acid. The press-coated tablets were prepared by compressing the barrier layer first at 300 psi, thereafter compressing the drug layer on the bottom barrier layer at 300 psi, and finally compressing the top barrier layer on top of the drug layer at 1500 psi. In-vitro evaluations were conducted in 900 ml deionized water in a VanKel USP apparatus II at 50 rpm using on-line UV spectrophotometric detection. Results: Because of its high aqueous solubility, over 90% of the active drug was released by diffusion in less than 4 hours from the non-swellable hydrophobic matrix system. An application of a hydrophobic press-coat on one side of the hydrophobic drug layer retarded the drug release moderately and in 9 hours about 90% drug release took place. A two sided press-coated tablet released over 90% of its contents in 24 hours in a liner manner with about an 8% of burst release. Conclusions: Well defined press-coat(s) of hydrophobic and/or hydrophilic layer(s) on a diffusional matrix retards the drug release significantly by reducing effective diffusional area. Optimization of the diffusional surface by employing press-coating layers offers near zero-order sustained drug release for highly soluble drugs. Thus, the system can overcome the major disadvantage of fast and non-linear drug release associated with diffusion-controlled matrix system by impeding drug release from specified surfaces of the matrix.

55. **Chemical Structure and Rate of Degradation of Anti-Cancer Drug Temozolomide.** Kelly Fine¹ (Dr. Muatasem Ubeidat¹ and Dr. Quentin Smith²) Department of Biological Sciences¹; Summer Program within the Department of Pharmaceutical Sciences at Texas Tech University²

Temozolomide (anti-cancer drug Temodar) has recently been approved by the FDA for the treatment of brain tumors and is labeled as showing “good brain uptake” □. Many drugs are unable to be easily absorbed into the brain. The blood brain barrier (BBB) protects the brain from what it sees as harmful toxins; which is in the case for so many drugs. Passage through the BBB is based on molecular qualities such as lipophilicity, size, and overall charge. Temozolomide also is a pro-drug, meaning it must break down into its active anti-cancer metabolite, MTIC. Temozolomide degradation is affected by fluctuations in temperature and is extremely pH dependent.

56. **Whole-mount *in situ* Hybridization of Genes Involved in Synthesis and Degradation of cAMP in *Dictyostelium discoideum*.** Amanda Prasayasith and Kelly Fine (Dr. Muatasem Ubeidat) Department of Biological Sciences

Cyclic AMP is an extracellular chemoattractant and a regulator of gene expression in *Dictyostelium*. Before culmination, cAMP is required for the induction of cell-type specific gene expression in prespore and prestalk cells. However, during culmination, prestalk cell differentiation is inhibited by cAMP, while prespore differentiation is stimulated. Synthesis and maintenance of a specific level of cAMP may be the result of a coordinated interaction of adenylate cyclase (the synthetic enzyme), cAMP phosphodiesterase (the enzyme that degrades cAMP to 5'AMP), 5'-nucleotidase (5NT, the enzyme that degrades 5'AMP to adenosine) and adenosine deaminase (the enzyme responsible for degrading adenosine into inosine). The use of *in situ* hybridization technique will help us to determine the location of gene expression of genes that are involved in cAMP metabolism during different stages of *Dictyostelium* development and will help us to understand how these genes function together in regulating cAMP concentration throughout the life cycle of *Dictyostelium*. Any new information gained about the synthesis and degradation of cAMP will help us understand how chemoattractants and chemotaxis play a role in causing many diseases in human at different stages of the human life.

57. **Molecular Cloning and Overexpression of *Dictyostelium*'s Alkaline Phosphatase in *E. coli*.** Kelly Fine, Amanda Prasayasith, Dawod Dawod, Nelvin Daniel, Steven Bozell, Kassandra Guthmueller, Tyler Shadid, and Christopher Omari (Dr. Muatasem Ubeidat) Department of Biological Sciences

In *Dictyostelium*, alkaline phosphatase (ALP) is a membrane bound enzyme and regulated during the life cycle of the organism. Several studies showed that the preferred substrate for the enzyme is 5AMP which is the same substrate for another enzyme called 5'-nucleotidase. To study alkaline phosphatase, a large amount of the protein will be needed. Therefore, the gene will be overexpressed in *E. coli*, then purified and studied and analyzed. A cDNA clone was obtained from the *Dictyostelium* cDNA project in Japan. The ALP gene is about 1800 bp in length and the estimated molecular weight of the protein is approximately 60kDa. We were able to release a fragment of 1680bp of the gene (94% of the gene) from pSPORT vector by restriction digestion with BamHI. The fragment was purified from agarose gel then ligated to a BamHI linearized pUC19 vector. Colonies were screened by PCR and restriction digestion for the presence of the gene insert. Colonies with the recombinant plasmid were selected. For further analysis, maxi-prep was performed to produce a large amount of DNA. The next step is subcloning alkaline phosphatase gene in an expression vector called pET32a. The recombinant vector will be digested with BamHI, and then the gene will be ligated to pET32a. Colonies with recombinant plasmid will be selected. Then the plasmid will be transformed into an expression host. The gene will be induced by IPTG and protein synthesis will be monitored by SDS-PAGE. The enzyme will be purified using conventional methods.

58. **The Effects Of Salt And Quinine On The Feeding Behavior Of Fruit Flies (*Drosophila melanogaster*).** Casey Cochran (Dr. Jimena Aracena) Department of Biological Sciences

We used the fruit fly (*Drosophila melanogaster*) as a model to study how animals make decisions when foraging for food. Many plants defend themselves from herbivores by producing toxic compounds such as quinine, and flies readily feed on sucrose solutions, but are deterred by quinine. The salt receptor has been suggested as the chemoreceptor used by flies to detect quinine and other alkaloids. Our purpose was to test the effect of quinine and salt on acceptance of sucrose solutions by the flies. We mixed quinine or salt into the sucrose solution and colored the food solutions with food coloring. In one test, the flies were presented with a choice between pure sucrose (red) and sucrose with quinine (blue). In the second test, the flies chose between pure sucrose (red) and sucrose with salt (blue). The color of the food consumed was visible through the abdomen of the flies after the test. All flies rejected sucrose containing quinine concentrations as low as 3.26mM. However, 20% of the flies still fed on sucrose containing 2M NaCl. This shows that very small concentrations of quinine are very effective deterrents and large salt

concentrations are still acceptable to the flies. The results suggest that quinine may not be detected by the salt receptors and may require a separate chemoreceptor.

59. **Molecular Analysis Of The Machinery Regulating Membrane Fusion.** Ariana Eakle (Dr. Andrea M Holgado) Department of Biological Sciences

Membrane fusion is an essential mechanism utilized by all cells containing membrane-delineated compartments whereby two separate lipid bilayers merge to become one. The best-studied process involving membrane fusion entails calcium-regulated exocytosis of synaptic vesicles at presynaptic terminals. In the last decade, a number of key proteins involved in exocytosis have been identified. VSM-1, the subject of our research, is a highly conserved protein that was identified as a synaptobrevin binding partner capable of inhibiting vesicle fusion. Analyses of the phenotypes found in yeast lacking VSM-1 and overexpressing VSM-1 suggest that this protein negatively regulates exocytosis by limiting priming of vesicles. To better understand VSM-1 function in vivo and test its role in synaptic vesicle exocytosis we began characterizing the *C. elegans* VSM-1 homolog (CO1G5.6). First, we established that *C. elegans* has a VSM-1 homologue by performing a BLAST search of the *C. elegans* protein sequences database (Wormpep) using the yeast VSM-1 protein (accession # AAC18522). The search results revealed a predicted VSM-1 protein with strong homology to yeast VSM-1 (40% identity). Second, we tested the hypothesis that VSM-1 is a negative regulator of neurotransmitter release and examined the aldicarb-sensitivity of *vsm-1(ok1468)* mutant animals and nematodes overexpressing neuronal VSM-1. This pharmacological assay showed that *vsm-1(ok1468)* mutants are aldicarb-hypersensitive, consistent with enhanced acetylcholine release; while integrated transgenic lines overexpressing neuronal VSM-1 fused to GFP have the opposite phenotype. Taken together these data suggest that *C. elegans* VSM-1 has a regulatory role in synaptic transmission, inhibiting vesicle exocytosis and ACh release.

60. **Preliminary Evaluation Of Nutrient Limitation In Crowder Lake.** Erica Benda, Johnny Boschman, Ryan Brewer, Mikkinzi Davis, Lucas Keyes (Dr. Steven W. O'Neal) Department of Biological Sciences

Nutrient limitation and zooplankton grazing effects on phytoplankton populations in Crowder Lake were investigated using microcosms incubated in situ from July 15 to July 21, 2008. Four replicate microcosms were established for each of the following treatments: controls, nitrogen added, phosphorus added, and minus zooplankton. Zooplankton was removed by pouring the lake water through a 250 plankton net. The experimental design was repeated for water collected from both the riverine and lacustrine regions of the lake to look for region differences within the reservoir. After the incubations period, the microcosms were recovered and sampled for dissolved oxygen, turbidity and chlorophyll-a. Dissolved oxygen, turbidity, and chlorophyll-a all increased significantly in response to phosphorus additions to water samples collected from the riverine region. Nitrogen addition to the riverine water produced a significant increase only in dissolved oxygen. Zooplankton removal did not increase any measured parameter. Lacustrine turbidity and chlorophyll-a did not show significant responses to any of the treatments. Dissolved oxygen was significantly elevated in lacustrine microcosms treated with either nitrogen or phosphorus with nitrogen producing the greatest increase. These results suggest that riverine and lacustrine phytoplankton populations may be experiencing different nutrient conditions. An understanding of such ecological relationships is necessary for the management and protection of Oklahoma's hundreds of impounded lakes and their ecosystems.

61. **One Year After Flooding: Limnological Conditions In Crowder Lake.** Erica Benda, Johnny Boschman, Ryan Brewer, Mikkinzi Davis, Lucas Keyes, Tyler Ozment, and Morgan Scott (Dr. Steven W. O'Neal) Department of Biological Sciences

Oklahoma experienced its wettest June on record in 2007. Crowder Lake, a 158-acre reservoir on Cobb Creek in Washita County experienced significant flood conditions at this time. Lake conditions and phytoplankton populations immediately following the floods were monitored during the summer of 2007 and compared with records of pre-flood conditions in 2001. The goal of this study was to determine whether detectable recovery was occurring one year after the floods. Four sites, representing riverine and lacustrine regions, were sampled on July 16 & July 23, 2008. Water samples collected from a depth of 0.5 m were processed for chlorophyll-a, pH, conductivity, turbidity, ammonia, nitrate, soluble iron, total phosphorus. Water temperature, dissolved oxygen, and Secchi depth were also measured at the sites. Depth profiles of water temperature and dissolved O₂ were run at the deepest site located near the dam. Parameters measured were compared with similar measurements made in the summers of 2001 and 2007. Chlorophyll-a, nitrate, and turbidity remained high in 2008 and showed no signs of dropping to pre-flooding levels. Dissolved oxygen concentrations at depths > 1 meter started recovering from hypoxic levels measured in 2007.

62. **Campus Tree Maps.** Kelsey Zybach (Dr. R. W. Seibert and Dr. Rick Baugher) Department of Biological Sciences and Department of Industrial and Engineering Technology

Updates have been made to existing tree maps on the Weatherford campus. Trees have been tagged for identification purposes.

63. **The Vegetation of the Washita and Optima National Wildlife Refuges in Oklahoma USA.** Tyler Shadid (Dr. R. W. Seibert) Department of Biological Sciences

A continuation of the collection and identification of plants from two national wildlife refuges in western Oklahoma was conducted during the last two years. The two sites are the Washita National Wildlife Refuge, Butler, Oklahoma, USA, and the Optima National Wildlife Refuge, Guymon, Oklahoma, USA. New species were added to the existing collection. A comparison of the species present in the two refuges was done.

64. **Neurofibromatosis Type I.** Kristine Johnson and Lacey Rogers (Dr. Muatasem Ubeidat) Department of Biological Sciences

Neurofibromatosis type I (NF1) is an autosomal dominant disorder that affects 1 in 3500 people. The main symptoms of the disease are café au lait spots, cutaneous neurofibromas, and hamartomas of the iris. Secondary problems associated with the disease are nervous system tumors, scoliosis, plexiform neurofibromas, learning difficulties, and epilepsy. Nearly all patients suffering from neurofibromatosis type I begin to display symptoms by the age of 5 years, and most of the people with the disorder are male. The risk of young children with neurofibromatosis type I developing malignant myeloid disorders is 200-500 times that of a normal child. The gene responsible for neurofibromatosis type I is the NF1 gene located on chromosome 17. In cases of neurofibromatosis type I, there is a mutation or deletion of the NF1 gene. The NF1 gene that encodes neurofibromin is thought to be involved in tumor suppression. It is thought that neurofibromin negatively regulates Ras-GTP which contributes to an increased risk of cancer in patients with the disease. The NF1 gene has one of the highest mutation rates in the human genome with approximately 50% of cases caused by new mutations. Detection of mutations on the NF1 gene are hard to spot because it is about 350 kb in length and includes 59 exons and encodes 13kb mRNA. There is a high percentage of new cases of neurofibromatosis type I because of the large size of the gene, an unequal exchange of genetic material between homologous chromosomes during meiosis, and sequences in the gene that are highly susceptible to mutation. About 80% of the NF1 mutations are nonsense mutations or small insertions or deletions that cause early termination of translation.

65. **Hyperkalemic Periodic Paralysis in Impressive Bloodlines of Horses and Their Descendants.** Tember Hursh (Dr. Muatasem Ubeidat) Department of Biological Sciences

Hyperkalemic periodic paralysis (HYPP or HPP) is a genetic mutation in equine bloodlines displaying symptoms of muscle spasms. This disorder is associated with the bloodlines of American Quarter Horse sire Impressive and affects muscle cells, specifically in the interference of the opening and closing of the sodium ion channels. In horses that express the HYPP gene, these openings become leaky allowing sodium to flow in and potassium to flow out of the muscle cell. This disrupts the overall net charge of ions within the cell. Horses must have the genetic status of HYPP homozygous dominant to express the worst symptoms of the disease; heterozygous individuals experience some symptoms. Indications of horses that may carry the HYPP gene(s) are muscle spasms, sweating, leaning against walls/fences, and trembling. Horses carrying both genes can present with raspy breathing due to the paralysis of the throat muscles after an attack, total loss of muscle control leading to collapse, respiratory failure, and cardiac arrest, in which all of these severe symptoms may lead to death. The American Quarter Horse Association monitors horses and can test for the disorder by either a blood or hair sample. Equine owners may still manage horses expressing the HYPP genetic disorder with medication and by carefully monitoring exercise, stress, and diet of the individual. The horse may be permitted, with careful observation, in leading a productive life.

66. **PCR Based Testing for *Mycobacterium tuberculosis*.** Whitney Wichert and Holley Ladymon (Dr. Muatasem Ubeidat) Department of Biological Sciences

The “gold standard” for the diagnosis of tuberculosis infections is the bacterial isolation of *Mycobacterium tuberculosis*; however, these diagnostic methods are labor intensive and require large amounts of cell material, which extends the time required to obtain results. Recently, Polymerase Chain Reactions (PCR) have been implemented to achieve more rapid results because they could be applied to isolates for which only a small amount of culture material is available. PCR shows high sensitivity and specificity making it a reliable test for the diagnosis of tuberculosis. Genotypic analysis of *Mycobacterium tuberculosis* isolates has also recently been implemented with the help of PCR-based strain typing methods. This analysis allows the use of a small number of *M. tuberculosis* cells to detect a unique pattern at mycobacterial interspersed repeating unit (MIRU) loci 10 and 23. Patterns are then compared to patterns in a local MIRU locus database. Targeted genotyping at these loci are performed with cultures

from epidemiologically associated tuberculosis cases, and are further analyzed by use of a 12 locus MIRU panel and by repetitive-subunit-sequence-based PCR (rep-PCR). Presumptive genotypic data from this assay are available rapidly, and the data can be used to prioritize disease control activities. An internally controlled novel wide-range quantitative nested real-time PCR (WR-QNRT-PCR) assay for *M. tuberculosis* DNA has recently been developed to rapidly diagnose TBM. This assay reveals sufficiently high sensitivity and specificity in clinically suspected TBM patients. The WR-QNRT-PCR is considered to be a quite useful advanced technique for assessing the clinical treatment course of TBM.

Podium Presentations

67. **Developing Biomarker-Based Tests for Rheumatoid Arthritis.** Abigail Ntrel (Dr. Brian Campbell¹ and Dr. Mike Centola²) Department of Chemistry and Physics¹; Research conducted via Summer Program within the Department of Arthritis and Immunology at the Oklahoma Medical Research Foundation² (12:30 PM)

Objective: Rheumatoid arthritis (RA) is a chronic inflammatory disease that can result in severe joint damage and disability. If RA patients are treated rapidly and with appropriate therapy the disease is easier to control. Unfortunately, current disease assessment tools used in practice are subjective and poorly correlated to disease activity; therefore therapy may not be optimized for a given patient. We are identifying serum proteins that are highly correlated to disease activity. These “biomarkers” will then be made into a laboratory test to aid in treatment. Methods and Results: My work focused on patient recruitment and sample processing. During recruitment patient clinical data are collected. This includes assessing tender and swollen joint counts, obtaining patient reported symptoms using validated questionnaires, and blood is collected for biomarker and laboratory testing. Bar coded single use aliquots of serum from each patient is bio-banked for future analysis. Conclusion: I have been working on the clinical research portion of a biomarker study in rheumatoid arthritis. During my time in lab we collected samples and clinical data from over 100 study subjects. Bio-banked samples will be screened for serum markers associated with disease activity. Measures of disease activity will be determined from the clinical assessments performed on the patients at the time of collection. It is hoped that these studies result in identification of quantitative and objective markers of disease activity and that these can be translated into a clinically useful test.

68. **The Allegorical Values in Lu Xun’s “Medicine”□ and “A Madman’s Diary”□.** Hung Nguyen (Mr. Kevin Collins) Department of Language and Literature (12:50 PM)

Lu Xun is the most prominent modern Chinese writer. He introduced realism into Chinese literature. Sarcastic humor and sharp criticism distinguish Lu Xun’s writing from other authors. The combination of traditional Chinese literature and European realistic writing characterizes his works. While the traditional elements of China’s literature in Lu Xun’s works creates the feeling of familiarity to the majority of the Chinese readers; the European realistic writing style reflects the progressive movement of modernizing in China at his time. Understanding the allegorical values of his translated works proves to be difficult. However, the most challenging obstacle to reading Lu Xun’s story originated from his writing style that mirrors the Chinese culture. Reading Lu Xun’s works requires readers to understand both the influence of the Chinese tradition on national literature and specific use of allegory in his stories.

69. **Allegories: A Deadly World for Metaphors.** Misty Crosby (Mr. Kevin Collins) Department of Language and Literature (1:10 PM)

Through time and history, the use of figures of speech in everyday language has changed and adapted. With these adaptations in language, different relationships among figures of speech emerged and became co-dependent of each other. The two figures of speech that I concentrate on are allegories and metaphors. With a breakdown of the meanings of each of these terms, as well as their internal (and not-so-well-known) structures, I indulge the listener in a new idea of what it actually means to be “metaphoric”□ and “allegoric”. There is also an in depth look at what exactly metaphors contribute to language and language in society paired with the involvement of society in the overuse and misuse of the metaphoric and allegorical forms. Through the analyzing of metaphors by the everyday person, it is commonly seen that language is given new and skewed meanings. I also look at the fascination with allegories that has become prevalent in pop culture. The format and intention of allegories is also discussed and debated. The way in which children may view allegory is paired against the way in which adults may view that same allegory. The world is understood through associations and the use of figurative language makes these associations prevalent in our reasoning processes. Furthermore, I also explain what causes figurative language to become less effective and even inactive.

70. **Mari Sandoz: Story Catcher of Chief Crazy Horse and the Sioux.** Katrina Detherow (Dr. Viki Craig) Department of Language and Literature (1:30 PM)

Mari Sandoz, author of *CRAZY HORSE: THE STRANGE MAN OF THE OGLALAS*, applies fictional techniques to a basically historical treatment of the life of famous chief Crazy Horse. She supplies, for example, imagined dialogues to events in his life, since there are no records of the real conversations. However, everything she writes is predicated on meticulous historical research and an intense focus on arriving at the truth. She actually walked the trails the Sioux walked; she learned to communicate with Sioux tribal members. Although she was not Native American herself, she was raised in daily contact with Native Americans, whom she greatly respected, and thus desired to achieve the greatest authenticity possible in her account. Even though the frontier was officially closed by the American government, Sandoz was blazing a new trail, being a pioneer in the expression of the Native American perspective, only rivaled, perhaps, by Oklahoma's Angie Debo.

71. **Robotics Design.** Dylan Frizzell (Mr. Frank White) Department of Industrial and Engineering Technology (1:50 PM)

The purpose of the project is to help with the design and building of a robot to compete in the FIRST Robotics competition. Also to try and encourage other college level mentors of high school teams.

72. **Radio Frequency Identification (RFID) As it Obtains to Retail DVD Sales.** Chris Parton (Mr. Brad Fitzgerald) Department of Industrial and Engineering Technology (2:10 PM)

This project will be evaluating the present RFID technology as a potential solution to improve the frequency and accuracy of the inventory process in the retail environment. We will have state of the art RFID readers and tags to study and define the test accuracy, reliability, and repeatability of this technology.

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