



**Undergraduate**



**Research**

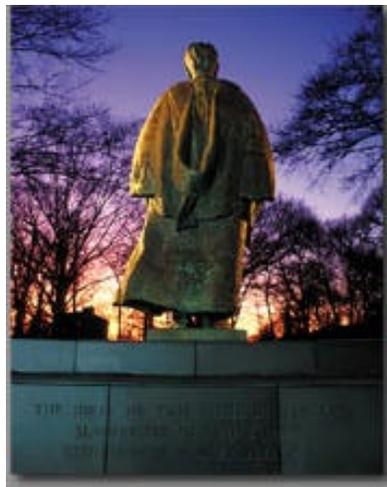
**&**

**Creative Activity  
Symposium**

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**Rhodes College**

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April 29<sup>th</sup>, 2003 – Memphis, Tennessee

## **Table of Contents**

Abbreviated Schedule	Page 2
Fine Arts Division	Page 3
Humanities Division	Page 4
Social Sciences Division	Page 11
Natural Sciences Division	Page 16
Combined Natural and Social Sciences Poster Session	Page 23
Special Sessions: Environmental Research Urban Studies Charette Biology II Laboratory Research	Page 30
Acknowledgements and Thanks	Page 38

### **Symposium Planning Committee 2003**

Eric Gottlieb (Natural Sciences)  
Eric Henager (Humanities)  
David Jilg (Fine Arts)  
Thomas McGowan (Social Sciences)  
Richard Redfearn (Natural Sciences)  
Jack Stewart (Student Representative)  
Alison Stohr (Student Representative)

## **Undergraduate Research and Creative Activity Symposium 2003**

### **Abbreviated Schedule:**

#### **Plenary Lecture:**

**Dr. Michael Long, B.S. Biology, B.A. Psychology, Rhodes College, 1997;  
Ph.D., Brown University, 2003**

*10:30-11:30 am, Frazier Jelke Lecture Hall B*

**“Six years after Rhodes: My life in science so far”**

This presentation will give an overview of Michael's journey through science beginning at Rhodes College, continuing through a brief stint as a technician, and ultimately arriving at the completion of his graduate work in Neuroscience at Brown University. He will introduce a number of the techniques used in the laboratory and discuss some of the results from his thesis work.

#### **The Student Presentation Sessions:**

*1:00-4:00 pm, various locations on the Rhodes campus*

#### **Closing Reception and Announcement of Outstanding Presentation Awards:**

*4:30-5:30 pm, Frazier Jelke Amphitheatre  
(Rain location: Hardie Auditorium, Palmer Hall)*

## **Fine Arts Oral Presentations – Session 1**

***112 Hassell, beginning at 1:00 pm until 1:40 pm***

**1:00-1:20 *Gianni Schicchi: The Development of Art Historical Research into Theatrical Space***

Angela Springer

Faculty Mentor: David Jilg

Departments of Art and Theatre

The set design for Puccini's one act comedic opera, *Gianni Schicchi* was conceived as the culminating project for an interdisciplinary major combining art history and theatre. Art historical research was conducted on the domestic architecture and furnishings of the Italian Renaissance and was then transformed into the design of a theatrical space. That space was then constructed for the McCoy Theatre's 2002 production of *Gianni Schicchi*.

**1:20-1:40 *Norman Rockwell: The Problem We All Live With (1964)***

Jenna Sadar

Faculty Mentor: David McCarthy

Department of Art

Norman Rockwell is known for his non-controversial images; for decades, that was all he produced. However, Rockwell's famous knack for capturing the daily life of middle class America served him equally well when he began to express his political views. In 1964, *The Problem We All Live With*, a Rockwell illustration depicting racial strife in the United States, was published for the first time, and it presented the problem in a non-threatening way that forced his audience to pay attention.

## **Fine Arts Oral Presentations – Session 2**

***Payne Recital Hall, beginning at 2:30 pm until 3:30 pm***

**2:30-2:50 *Die Schöne Müllerin, by Franz Schubert***

Adrian Killebrew

Faculty Mentor: Diane M. Clark

Department of Music

A song cycle is a group of songs related through textual ideas or musical elements that are designed to form a musical entity. *Die Schöne Müllerin (The Beautiful Miller Maid)* is a song cycle of poems by Wilhelm Müller set to music by the early Romantic composer Franz Schubert, and tells the tale of a young man who experiences and deals with unrequited love. Schubert uses many musical elements in the cycle which help to portray the different emotions of the young man; a brook is introduced in the opening song and plays its important role throughout the cycle.

**2:50-3:30 *An Evening's Affair, a new musical***

Erin Gabbert

Adrian Killebrew

Jeff McCrary

Nicole Vazquez

Travis Williams

Faculty Mentor: Anthony C. Horne

Department of Theatre

A collaborative effort that has taken the span of a semester to create, this original one-act musical tells the tale of five friends who have come together over dinner and are finding out things about each other that they never would have imagined.

## **Humanities Juried Oral Presentations**

***108 Buckman, beginning at 1:00 pm until 3:40 pm***

**1:00-1:20 Justice Through the Ballot Box: The Civil Rights Movement in Fayette County, Tennessee, 1959-1964**

Grace Williams

Faculty Mentor: Russell Wigginton

Department of History

In 1959, an African-American man named Burton Dodson was tried for murder in Fayette County, Tennessee. It was clear to all blacks in Fayette County that neither this man, nor any other African American could ever receive a fair trial in a place where no one of his race was eligible to serve on a jury. The jury selection for Burton Dodson's trial reinforced to other African Americans in Fayette County that they would have to fight for equal representation on juries and in political offices. As a result, blacks in Fayette County, realizing that the right to vote was central to their social, political, and economic status, organized a movement with the primary goal of obtaining the right to vote. Fayette County African Americans were able to sustain their movement through harsh resistance from local whites and without the presence of national civil rights organizations. This study examines ways in which the struggles, and the successes, of their movement to gain the right to vote compared with other places during the Civil Rights Movement.

**1:20-1:40 Don't Know Thyself: The Comedy of Self-Ignorance**

Benjamin Groover

Faculty Mentor: David H. Sick

Department of Greek and Roman Studies

Many studies exist on the subject of tragedy and the tragic hero; few define the comic hero, however. Starting from Plato's claim that comedy results from self-ignorance, this paper examines self-ignorant characters from several major works, starting from the classical period. Characters from prominent Greek, Roman, and English playwrights, such as Plautus and Shakespeare, reflect self-ignorance on biological, psychological, and sociological levels. The culmination of the study is an original dramatic scene incorporating the theories discussed.

**1:40-2:00 Of Reverence and Rivalry: An Analysis of Reputation in Dryden's Aureng-Zebe**

Ann Young

Faculty Mentor: Jennifer Brady

Department of English

In the prologue of his final rhymed play *Aureng-Zebe*, John Dryden declares he is "betwixt two ages cast," revealing a disturbing sense of displacement that is echoed throughout the accompanying text and transmitted into the play proper (14: 21). Indications within this work and its accompanying texts suggest that Dryden is undergoing an acute sense of alienation from his literary precursors and successors, which was particularly troubling for Dryden, who felt an intense filial attachment to his Renaissance fathers Shakespeare, Jonson, and Fletcher. His sense of estrangement resulted in a directional crisis that coincides with the point of departure for a dramatic stylistic shift, away from heroic rhymed verse, as found in *Aureng-Zebe*, to blank verse, the style of his predecessors. Previously, Dryden had suggested rhymed verse was a genre that would allow him to establish a distinct yet equal reputation among his Renaissance predecessors. His announced intention within the accompanying text of *Aureng-Zebe* to abandon rhymed verse brings Dryden out of the realm of unchallenged reverence for his Renaissance precursors, and into the uneasy position of revering rival. In the accompanying text of *Aureng-Zebe*, Dryden's intense thematic focus on longing for a legitimate position within the continuum of literary tradition is infused with repeated declarations of self-doubt and despair. This shift matches Sigmund Freud's characterization of melancholia, and the resulting

crisis reverberates throughout the dedication, prologue, and epilogue in numerous references and examples. Both Dryden's melancholia and unease towards his perceived position between two strong generations are transmitted into the play proper.

2:00-2:20 **Irony in American Culture**

Erin Kitchell

Faculty Mentor: Joseph A. Favazza

Department of Religious Studies

Jebediah Purdy's *For Common Things* is an examination of the American culture's stance on civic duty. Turning our backs on a world that fails to meet the expectations society teaches us to build is a growing trend. Our generation is immersed in a culture that believes value comes from outside of ourselves, viewing it as a material thing that should rightfully fall into our lap. We increasingly neglect our own responsibility to shape the world as we wish it to be. Instead, we expect it to automatically conform to our expectations, withdrawing from it when it fails to do so. Irony, in Purdy's sense of the word, can be held accountable for most if not all of the civic disengagement typical of Americans. It takes its place at the center of our current, and largely unacknowledged, cultural crisis. Purdy's book offers an explicit challenge to this way of life. His words illuminate the burden of our culture and call for a rededication to the values central to our self-image. Purdy simultaneously traces the roots of our disillusionment and passionately exhorts a return to civic engagement that is particularly pertinent in light of contemporary American politics.

2:20-2:40 **Ground of Christian Belief**

Carson Weitnauer

Faculty Mentor: Pat Shade

Department of Philosophy

My paper is a philosophical consideration of proper ways to ground faith in the Christian God. After analyzing the failure of the evidentialist debate to prove the existence of God (due to incorrect epistemological assumptions), I present Alvin Plantinga's epistemology to show how we can have faith in the Christian God. If Christianity is true, then a cognitive faculty known as the "sense of divinity" is designed to produce in us properly basic, warranted true beliefs about God. I conclude that we are justified and internally rational to believe that with the Holy Spirit's aid our sense of divinity is restored to proper function and leads us to accept Christian belief as properly basic. With renewed cognitive faculties we may also understand that sound arguments provide non-basic grounding belief. As for our hearts, I argue that we enter into a love for God through proper affective function.

2:40-3:00 **The Wicked, Aborted Narratives of Chinua Achebe's Things Fall Apart**

Mia Hood

Faculty Mentor: Brian Shaffer

Department of English

My talk will focus on the various narratives Achebe employs throughout *Things Fall Apart* and how they work as arbiters of power within Ibo culture. Specifically, the essential difference between masculine and feminine narratives lends to the former's supplanting of the latter. By extension, the feminized Ibo narrative—that is, its many sub-narratives, its culture and practices—comes to be dominated by the western, Christian narrative by the end of the novel.

Most telling of these narratives are those that revolve around Ezinma, the precocious young girl whose character is abruptly dropped from the novel half-way through, and whose disappearance signals a premature abortion of the feminine narrative. Her disappearance relates to the subordination of the feminine more generally.

Okonkwo's constant efforts to build his identity as masculine are dependent upon his power of narrative. This consumption with story-telling eventually leads to his culminating but futile act of literally and figuratively killing the messenger, again reaffirming this insistent idea that narrative is the currency by which power is negotiated.

3:20-3:40 **‘Wretched Women’ and ‘Docile Bodies’: Female Deviancy and Social Discourse in Memphis, Tennessee, 1850-1870**

Elizabeth P. Smith

Faculty Mentor: Gail Murray

Department of History

This study focuses on black and white women who transgressed the social norms of nineteenth-century Memphis society. Presenting deviance as a cultural construction, I adapt the ideas of Michel Foucault to this historical analysis of deviance as a conflict within the networks of social power. In particular, I argue that the actions of these deviant women can be classified into three categories: ideological, legal, and physical deviance. Although these classifications can overlap in certain instances, such distinctions prove useful in understanding the variety of behaviors labeled “deviant” by mainstream white society.

Furthermore, I also argue that this mainstream social discourse often encoded women’s deviance according to racialized terms and assumptions. Chief among these racialized constructions of gender stood the perception that white women’s deviance was somehow unnatural and therefore reformable while the transgressions of women of color were inherent to their racial character. As a result, social discourse treated black women’s deviance as unreformable—a perception that upheld the racist attitudes of white society. To support these arguments, I have analyzed various documents preserving the local social discourse of the day, particularly the *Commercial Appeal* and Freedmen’s Bureau records.

**Humanities Nonjuried Oral Presentations**

***110 Buckman, beginning at 1:00 pm until 3:40 pm***

1:00-1:20 **The Long Road to Athens: Theseus Transformed and Reformed**

Caroline Bishop

Faculty Mentor: Susanne Hofstra

Department of Greek and Roman Studies

Most prominent figures of Hellenic myth developed before the concept of writing had traveled to Greece. The character of Theseus, however, has a myth cycle that developed relatively late. Theseus was adopted as Athens’ patron hero, and made a transition from a backwater woman-stealing tyrant to a benevolent (sometimes democratic) king. In my paper, I examine the reasons, both political and cultural, for Theseus’ transformation. I trace the development of Theseus’ myth cycle through the period of the Peisistratids in the mid sixth century through Cleisthenic Athens, using both Henry Walker and W.R. Connor’s hypotheses on the ascendancy of the myth. I also outline Theseus’ importance in the Persian invasions, and the more radical democracy of the fifth century. My final section looks at the character of Theseus in several Attic tragedies, in which his final culmination as the stereotypical Attic hero is complete.

1:20-1:40 **Cancer in Ancient Greece and Rome**

Veena Rajanna

Faculty Mentor: Kenneth Scott Morrell

Department of Greek and Roman Studies

As the culmination of my four years at Rhodes, I thought it would be interesting to intertwine my two majors, Greek and Roman Studies and Biology. Thus, for my senior project in Greek and Roman Studies, I have researched the disease, cancer, in ancient Greece and Rome. Both archaeological and literary evidence have revealed that cancer did exist during ancient times. However, in comparing the prevalence of cancer between ancient times and the present, it is seen that cancer was not as widespread then as it is today, due to differences in such factors as average life expectancy and diet. Yet, several ancient medical authors, including Hippocrates, Celsus, Pliny, Galen, and Aetius of

Amida, have still provided a variety of descriptions and coined terms to describe cancer and other “cancer-like” symptoms. In addition, these authors have also given detailed accounts for treatments of cancer, the most common of which was surgery. Nevertheless, the Greeks’ and Romans’ incomplete knowledge of cancer is demonstrated in their depictions of cancer in both sculpture and literature. Through a historical analysis of the disease, possible explanations for the increased frequency of cancer today could be elucidated.

1:40-2:00 **Hope of the Kingdom at Hand: The Eschatological Vision of the Azusa Street Mission**

Bob Davis

Faculty Mentor: Tom Bremer

Department of Religious Studies

The worldwide Pentecostal movement was born in an old stable on Azusa Street, Los Angeles in 1906, to a religious community that was marginalized by class, race, ethnicity, and gender. The rapid spread of the movement may be attributed to its eschatological vision of an imminent, premillennial return of Christ to earth. This eschatological vision helped form a countercultural spirituality and ethic in the earliest Pentecostals that was at once continuous and distinct from its Wesleyan Holiness roots. The eschatological fervor of the Azusa street revival inspired radical personal and ecclesial transformation, the dissolution of social and cultural barriers, and empowerment of society’s most marginalized to take part in realizing their ultimate hope and joy—the Kingdom of God. Its vision of the Kingdom is far from irrelevant to contemporary theological reflection on Christian eschatology, and may be able to promote a more complete and useful understanding of the role of apocalyptic hope in the life of Christian faith.

2:00-2:20 **Calderón y su Gran teatro del mundo**

Allison Prickett

Faculty Mentor: P. Eric Henager

Department of Modern Languages

Durante el Siglo de Oro, Pedro Calderón de la Barca escribió *El gran teatro del mundo*, un auto sacramental que señala una manera de vivir moralmente. Como escribe Robert L. Fiore, “*El gran teatro del mundo*, through the allegory of life as a drama, emphasizes moral rather than theological problems in an effort to explain man’s anguish as he is confronted with his involuntary presence in the world” (40). En el presente estudio, examino estos aspectos morales y su incorporación tanto en la obra de Calderón como en ciertas otras obras en las que la figura de Dios y la del autor se aproximan. Estas obras ponen en escena una conversación literal entre Dios y creación (autor y personaje) como estrategia para representar ciertos dilemas filosóficos. Dios, como autor, se representa como el que da todo lo que el ser humano tiene y, por eso, el que puede quitarlo si el ser humano no hace bien su papel.

2:20-2:40 **Los de abajo: La representación de la mujer**

Cynthia Hallums

Faculty Mentor: P. Eric Henager

Department of Modern Languages

La Revolución Mexicana fue una lucha para los que no tenían una voz política durante la presidencia de Porfirio Díaz. Después de la Revolución, las vidas de todos los grupos que antes luchaban cambian, pero la vida que cambia más es la de la mujer. *Los de abajo* (1915) de Mariano Azuela cuenta una historia de la Revolución y el papel que las mujeres desempeñaron en la lucha. En *Los de abajo* Azuela usa a Camila y a La Pintada como una representación de la mujer en la Revolución. Camila representa la conciencia revolucionaria al mismo tiempo que representa la víctima, mientras que La Pintada representa el papel del hombre tradicional y la asesina de la conciencia revolucionaria. En *Los de abajo* La Pintada y Camila existen en contraste y representan aspectos diferentes de la cultura mexicana. En la sociedad tradicional de México, Camila representa la mujer

ideal y obediente, mientras que La Pintada representa la contradicción de este ideal y tiene ciertas acciones machistas. Las mujeres en *Los de abajo* existen en yuxtaposición y representan imágenes contrastivas de la mujer en la Revolución Mexicana.

2:40-3:00 **La religión en Latinoamérica: El sincretismo en La aurora en Copacabana por Pedro Calderón de la Barca y So Far From God por Ana Castillo**

Tamara L. Martin

Faculty Mentor: P. Eric Henager

Department of Modern Languages

Aunque Latinoamérica es muy heterogénea y abarca muchos climas y tierras, desde la época colonial, la religión católica ha sido un constante en la región. A pesar de su constancia ha sufrido continuas alteraciones. En el catolicismo moderno se percibe todavía un sincretismo entre varios conceptos prehispánicos y la religión que los conquistadores llevaron a las Américas hace cuatro siglos. La palabra “sincretismo” significa la unión entre varias corrientes ideológicas a pesar de la aparente dominación de una sobre las otras. El presente estudio es una comparación entre la representación del sincretismo religioso en *La aurora en Copacabana* (1672) por Pedro Calderón de la Barca y *So far from God* (1993) por Ana Castillo.

3:00-3:20 **The Family: A Concept in Transition in La casa de Bernarda Alba and So Far From God**

Kimberly Kirkpatrick

Faculty Mentor: P. Eric Henager

Department of Modern Languages

The traditional definition of a family generally includes a couple that society considers to be in a durable relationship. Throughout literary history, a variety of cultures have challenged this concept. Frequently, a family may lack a father, a mother, or both. The families may consist of two or twenty members with different styles of life. In two important works, *So Far From God* (1993) by Ana Castillo and *La Casa de Bernarda Alba* (1936) by Federico García Lorca, the idea of a traditional family is challenged by two families made up exclusively of women.

3:20-3:40 **El poder del amor: Una lectura budista de Demasiado amor por Sara Sefchovich**

Anne Kathryn Rice

Faculty Mentor: P. Eric Henager

Department of Modern Languages

Se puede decir que es igual de posible vivir sin suficiente amor que vivir con demasiado. Es verdad que recibe mucha atención el hecho de que a la humanidad le falta un sentido de amor y hermandad, pero en su novela *Demasiado amor* (1990), Sara Sefchovich llama la atención al otro extremo. Amar demasiado es el gran error de la protagonista, y por eso sufre mucho. Sin embargo, la palabra “amor” en el título y por toda la novela es un poco ambigua por lo que quiere decir. Este tipo de amor al que se refiere la autora tiene cara de obsesión y sentimientos que dominan el espíritu. No es el amor que hace tanta falta a la humanidad sino el amor que debemos evitar. Encontrar la línea entre amar suficiente y amar demasiado requiere mucho empeño, pero acercarse a la línea sin cruzarla es más difícil aún.

La disciplina del budismo se enfoca mucho en evitar los dos extremos. Uno sólo tiene que vivir la vida muy consciente de sí mismo para acercarse a la línea sin cruzarla. Hay que estar siempre consciente del cuerpo, de los sentimientos, de los deseos, de los pensamientos y del momento presente. Lamentablemente esta conciencia es muy difícil de mantener mientras que se vive una vida muy rápida con muchas metas para el futuro. Examino en este estudio cómo la perspectiva budista puede iluminar ciertos aspectos de la novela de Sefchovich.

## **Humanities Nonjuried Poster Presentations**

***Buckman Foyer, beginning at 1:00 pm until 4:00 pm***

### **Single Parent Families: Does TennCare Really Care?**

Cindy Hallums

Julie Hallums

Jenna Groner

Natalie Pennington

Mark Wilson

Faculty Mentor: Gail Murray

Department of History

When examining the complex issue of poverty in the United States today, adequate healthcare is a pressing concern for impoverished individuals, policy administrators, and professionals in the field. With the recent budget cuts facing the state of Tennessee, TennCare has taken a significant role in providing relief to low income families. For our project, our group examined the structure, rules, and regulations of TennCare as an organization as well as the problems in accessing the benefits that TennCare provides. Additionally, we used a hypothetical family to demonstrate how actual individuals are affected by the healthcare system and state policies like TennCare. Through the use of our “family,” we are also able to portray the pressures and strain that single parent family’s face when attempting to overcome the obstacles intertwined in the Tennessee healthcare system.

### **To Eat or Not to Eat: The Trade-Offs of Low-Income Food Budgeting**

Leah Walter

Charlie Patrick

Lori Steger

Phaedra Fisher

Faculty Mentor: Gail Murray

Department of History

Our project is a study of what it takes for a single mother to feed three children, two of which are school-age, with only one income source and whatever public assistance is available. First, we calculated an approximate take home salary based on part-time work taking into account social security and taxes to be withheld. We determined how much she would receive each month in food stamps and vouchers, and we confirmed that the children would receive up to two free meals at school. After taking these steps to determine how much she would have to spend each month, we then went to several grocery stores to compare prices and discover what one in this situation would have to sacrifice in order to give her family healthy, balanced meals. We also account for such factors as distances to grocery stores, generic vs. name brands, and fast food meals that may be necessary for convenience sake. The project is intended to demonstrate that even with public assistance, a single mother with three small children will have a difficult time feeding her family on a limited income.

### **Full-time, Part-time, or Double-time for a Lifetime: An Analysis of Wages, Benefits, and Entry-Level Work in Memphis**

Grace Williams

Katharine Etchen

Marci Hendrix

Tyler Sanders

Faculty Mentor: Gail Murray

Department of History

This project explores the wages for a variety of entry-level jobs in Memphis. The project seeks to determine any discrepancies between gross pay and net pay including expenses toward uniforms and equipment, or amounts withheld for health benefits. In addition to discrepancies between gross and net pay, the project also

evaluates the possible benefits associated with low-wage jobs. Examples of possible benefits include contributing toward one's retirement, which may seem positive, but is not necessarily helpful to someone who is barely able to sustain his or her family. Other examples include the number of paid sick days or vacation days provided and whether the employee has to work for a certain amount of time before accruing these benefits. To conduct our investigation, the research group interviewed managers in eight different service sector jobs. We were able to conclude that it is unlikely that people working in the service sector will be able to support themselves, let alone their families, solely on the income of one of these jobs. To sustain a family in Memphis without some outside source of assistance, it would be necessary either to have the income of two workers in each home, or in single parent families, to work multiple jobs.

### **No Place to Call Home: Low Income Housing in Memphis**

Lindsey Seifert

Greg Matthews

Laura Dallas

Ashley Crosland

Rebecca Kynes

Faculty Mentor: Gail Murray

Department of History

This research project will investigate affordable housing opportunities for the working poor in Memphis, Tennessee, based on a fictional family headed by a single mother, who earns minimum wage, working twenty five hours a week, supporting three children. Housing options, such as transition housing for the homeless provided by Memphis Interfaith Association (MIFA), public housing, section eight vouchers, and low priced apartment units will be investigated. Interviews with authorities and low-income renters, Internet sources, and fieldwork will be utilized as resources. This project will demonstrate the dire need for more and better affordable housing opportunities to be made available in Memphis for low-income families that are not homeowners. Thus, the research will evaluate both current options and offer suggestions for improving the horrible housing situation in Memphis, based on the success of progressive initiatives in other American cities.

### **Navigating the System and the Hidden Costs of Poverty**

Christine Coy

Bob Davis

Mary Grace Fields

Sarah Tuttle

Faculty Mentor: Gail Murray

Department of History

This research explores available relief and services for those who live in poverty in the city of Memphis. The project examines what different agencies offer and the hidden costs of these services. Government and non-profit services such as those provided by MIFA, the Department of Human Services, and the MATA system, will be considered, as well as businesses that offer goods and financial services targeted to the poor, such as cash advances, title loans, second-hand goods, and cut-rate auto insurance. The goal is to better understand the institutional support system that is available to those who live in poverty or with the threat of poverty in Memphis. This will include analyzing the feasibility, costs, obstacles to utilizing these services, and suggestions for strengthening and streamlining the relief and support system for those who are poor in the city.

## **Social Sciences Oral Presentations – Session 1**

***Frazier Jelke Lecture Hall A, beginning at 1:00 pm until 2:40 pm***

**1:00-1:20 Tracking COACT: A Study of Community Policing Practices in Madison Heights**

Shayla Nicole White

Faculty mentor: Michael Kirby

Urban Studies Program

Very little is known about community policing practices in Memphis and even the literature about community policing in other cities is limited. Community policing services and activities are hidden from view to the community and are very difficult for researchers to study. This study was able to obtain unique access to viewing the activities of community policing officers in the Madison Heights neighborhood of Memphis. The student “shadowed” the officers for four days and quantified the extent of time the officers spent on specific community policing activities. This research was supplemented with interviews of residents in the area. The hypothesis of this study was that the officers were not performing community-policing activities in the Madison Heights area. The research did not confirm the hypothesis and found some evidence of effective community policing practices. The study also suggests some ideas for improving community policing of this unit.

**1:20-1:40 A Redevelopment Strategy for the Sears Crosstown Building**

Curtis Thomas

Faculty Mentor: Michael Kirby

Urban Studies Program

This project is a study of the redevelopment potential of the Crosstown Sears building in Memphis. The Memphis building is one of many identical buildings that were abandoned when the Sears Corporation left the catalog business in the early 1990s. The goals of this project were twofold: First, to make an informed prediction about the likelihood of a rehab of the building based on an examination of what has been done with similar Sears buildings across the country. Secondly, to present a redevelopment proposal for the site that is sensitive to the needs of the surrounding community, as well as economic trends in Memphis. The redevelopment proposal is based on interviews with community association leaders and experts in the community, as well as an examination of market research and similar development projects. This proposal suggests a community-city partnership to initiate a redevelopment project, which entails a partial demolition of the building coupled with a mixed-use development including retail/service industry and mixed-income housing.

**1:40-2:00 Drug Treatment Courts: A New Approach to Substance Abuse and the Judicial System**

Laura Bishop

Faculty Mentor: Michael Kirby

Department of Political Science

Drug treatment courts combine judicial power with substance abuse treatment. A drug court team, including the judge, attorneys and treatment providers, administers the program. The program consists of 12 months of treatment, in lieu of a prison sentence, that includes counseling, random drug screens, job assistance and sanctions for non-compliance.

The objective of this project is to identify the various elements of the drug treatment court in Shelby County and to compare and contrast the perceptions the team and the clients have of the components of the drug court. Surveys were distributed to both the drug court team and the clients asking them to assess the importance and effectiveness of the components of the program. The survey included questions about motivations for entering the program and the importance of the various team members to the success of the clients. The survey also asked both team members and clients to rate the

likelihood of the clients using drugs, drinking alcohol, maintaining full-time employment, and continuing to attend therapy sessions after completing the program.

**2:00-2:20 Is Quality Day Care Accessible for Low-income Families?**

Sarah Tuttle

Faculty Mentor: Michael Kirby

Urban Studies Program

Quality day care is important to any child's development, but especially for children of low-income families. This research project studies where quality day care centers are present in the city of Memphis, their accessibility to low-income families, and what characteristics of the program determine its level of quality. Quality is determined by the rating system of the State Department of Human Services. This research looks at facilities that care for over thirteen children within four zip codes surrounding the Rhodes campus. Through interviews and observations of individual centers, factors that create high quality centers in low-income neighborhoods will be determined.

**2:20-2:40 Identifying precursors to White privilege awareness and White guilt**

Nicole Lindner

Faculty Mentor: Chris Wetzel

Department of Psychology

Research into White privilege awareness and White guilt has contributed to psychology's understanding of racial discrimination and Whites' racial attitudes. This study employed scales measuring White guilt, White privilege awareness, and a variety of other race-related constructs to identify both the simple correlations between the constructs and the causal paths, using path analysis, related to White privilege awareness, White guilt, and the other constructs. The path analysis, and the preliminary factor analysis that isolated the major constructs represented by the 158 questionnaire items, allowed us to better understand how race-related attitudes related to the other constructs. These constructs measured attitudes concerning and experiences in the dimensions of discrimination experience, racial contact, racial interests, racial prejudice, racial identity, belief in a just world, discrimination awareness, White guilt, prejudice suppression, White privilege awareness, and support for affirmative action. It was found that White guilt, discrimination awareness, and belief in a just world were the central variables in the path model, while White privilege was predicted positively only by discrimination awareness and, paradoxically, by racial prejudice. White guilt and suppression of prejudice had a strong reciprocal relationship with each other and were both strongly predicted by discrimination awareness.

**Social Sciences Oral Presentations – Session 2**

***302 Clough, beginning at 1:00 pm until 4:00 pm***

**1:00-1:20 Forty Weeks: An Ethnographic Study of the Home Birthing Midwifery Service**

Erin Hoekstra

Faculty Mentor: Prof. Susan Kus

Department of Anthropology and Sociology

Ethnographic field work allows in-depth study of a cultural scene and includes a dialogic mode of gathering information rather than relying on formal and delimited interviewing. This method allows for a penetrating look at cultural complexity, rather than an experimental based glance at a single facet of culture. Through a semester-long "conversation" and participate-observation study with the two certified professional midwives and the lay midwife at the Home Birthing Midwifery Service, I have encountered a cultural scene that offers women a safe and healthy alternative to hospital birthing. My presentation explores the central premise of the midwives' model of care and its implications for the services offered to their clients. The care they provide is based on the premise that pregnancy is natural to women. Consequently, pregnant women do not need to be treated as if they had a disease;

rather, the midwives recognize that women's bodies are capable of giving birth without medication which may harm the mother and her baby. As a result, midwifery centers women in the birthing process in a way that gives them responsibility and autonomy over their bodies and ownership of the health of both themselves and their babies.

**1:20-1:40 Nurses, Catholic School Girls, Hookers and Little Red Riding Hood: A Thick Ethnographic Description of the Strip Club Sub-Culture**

Jennifer Marshall

Faculty Mentor: Peter Ekstrom

Department of Anthropology and Sociology

This ethnography uses thick description to portray the physical and human characteristics of the sub-culture setting of a strip club in Memphis, Tennessee with particular attention to issues of gender relations between men visiting the club and women working at the club. All of the research for this ethnography was obtained through the participant observation and informal interview conducted within the strip club. The data collected is a detailed description of the physical characteristics of the strip club, the workers and the customers, of the interactions between the various parties and of the rituals performed in the strip club. This detailed description shows how physical space operates in defining interactions in the club and the exaggerated social norms of interaction among men and women. These preliminary findings are ripe in possibilities for further research in gender and spatial relations with the fields of anthropology, psychology, sociology, geography and other fields.

**1:40-2:00 Unionization at Federal Express: Friend or Foe?**

Jenna Groner

Faculty Mentor: Tom McGowan

Department of Anthropology and Sociology

For this project, I examined the sociological process of unionization and how it affects the culture of Federal Express pilots. Specifically, I studied how unionization altered or affected crew interactions, relationships with the company, personal job satisfaction, and relationships outside of Federal Express. To do this, I took a small sample of pilots and asked them to submit narratives on a common question, and their participation was both voluntary and anonymous. I collected these narratives and examined them for common themes and patterns. I found that these narratives, while giving various opinions on unionization at Federal Express, also had similar concerns and views on the cultural changes that have taken place since the Air Line Pilots Association has been associated with Federal Express. I believe this research is important, because it gives first hand accounts of people who are directly affected by unionization, which can be used to improve collective bargaining techniques and relations among workers, union leadership, and company executives of other unionized airlines.

**2:00-2:20 "Rainbow-Colored Glasses: A Social/Cultural Look at Color"**

Rania Garnem

Faculty Mentor: Thomas McGowan

Department of Anthropology and Sociology

The purpose of this study is to show how the symbolic meaning of colors changes based on the context in which colors are applied. How the symbolism of color has been socially constructed to represent cultural and religious ideologies is of main concern and will be demonstrated through a series of historical examples. My methodological approach involved an intense literature review of works from the anthropology, sociology, art and history fields. I collected a considerable amount of information illustrating how the meaning of color is created and manipulated, and I found support from several authors who emphasized the context-specificity of color symbolism. I also found that meaning is created both deliberately and often unintentionally, and that racial, descriptive and "natural" color categories are all formed and defined by context. Suggestions for further research would entail an

even more comprehensive literature search to explore how color has been approached, utilized and incorporated into everyday life and meaning throughout the past and present day.

2:20-2:40 **Rearranging the Typical Discourse of Ethnography: A study of photography and anthropology.**

Sarah K. Hays

Faculty Mentor: Susan Kus

Department of Anthropology and Sociology

There exist many criticisms of photography and its uses in the areas of anthropology. These critiques range from the cost of equipment and specialized skills required, to the potential bias of the photographer and the myriad of interpretations and meanings that can be derived from a single shot. Rather than attempting to illustrate the validity of photography in the field of anthropology, the potential ways photography can be used in field research are addressed. This project utilizes photographs and members of the Memphis community to demonstrate the multiple perspectives that can be derived from photographs. Ten photographs of different interactive situations were printed and taken back out into the community to gather individual views and observations of the prints, rearranging the typical discourse of ethnography. The results of this exercise yielded a variety of narratives regarding each photograph. Several similar elements were present across the participants' descriptions, providing interesting insights into the Memphis culture. The premise of this project provides for many possibilities of similar future research; focusing on specific groups utilizing more prints and interpretations relating to the group's specific need or problem.

2:40-3:00 **“The Athenian Agora: Creating and Perpetuating Objective Reality”**

Jenna A. Altherr

Faculty Mentor: Thomas McGowan

Departments of Anthropology and Sociology and Greek and Roman Studies

My research focuses on the Athenian Agora, where I demonstrate how the physical layout and material artifacts of an area illustrate the shared objective reality of a group. The paradigm I am operating in utilizes Berger and Luckman's concept stating that reality is socially constructed; this construction delineates group norms. I performed my research by Kevin Lynch's image of the city. The data was collected from primary sources of physical building remains, ancient layout and building descriptions, and works of ancient authors. My findings and conclusions show physical material artifacts as not only mirroring the current objective reality, but also helping to perpetuate and further create the objective reality. By means of the environmental image, a city can be “read” to discover a group's objective reality. For further research, I suggest compiling the environmental images of Greek cities to determine a *Greek* objective reality in addition to *individual* realities.

3:00-3:20 **Teach For America: does it matter where you live?**

Julie Hallums

Faculty Mentor: Thomas McGowan

Department of Anthropology and Sociology

My project aims to answer: does the corps member's immersion within the community, living inside or outside of their school area, affect their experience within Teach For America positively or negatively and does it influence them at the end of their two years to continue with the program? I collected personal narrative accounts from four Teach For America corps members and examined their written content. I found that the location of the corps members, either within or outside of their student population did not influence their experiences positively or negatively. Instead I found that a large influence was their success professionally and/or personally. With an overall success professionally and personally the corps members were more motivated and more invested in the program than others whom only had success personally or professionally. Some of the corps members living outside the community were more invested in comparison with those that lived in the community because they initiated and invested time in their students and families.

3:20-3:40 **Sticks and String: An ethnographic study or "Yarn to Go"**

Leah Coffman

Faculty Mentor: Susan Kus

Department of Anthropology and Sociology

Participant observation, as the corner stone of cultural anthropology, is the research method of observing a culture while living in it. This method leads to a more complex and comprehensive understanding of a culture because the researcher has spent an extensive amount of time in the culture, and on some level, lived it. I have spent the last semester doing ethnographic fieldwork in "Yarn to Go," a specialty yarn shop, and have observed and participated in the culture of knitting. Knitting is no longer for grandmothers; the craft is experiencing a revival among younger women. This paper will explore knitting as a social statement and knitters as both technicians and artists.

3:40-4:00 **The World according to Burke's: an Ethnographic Study of an Independent Memphis Bookstore**

Leslie Isaacman

Faculty Mentor: Susan Kus

Department of Anthropology and Sociology

The core and enduring anthropological methodology of participant-observation, through an immediate and intimate interaction with a cultural scene, often allows one to gain an intimate and novel perspective of one's field of study. This semester I have been able to go into the field of Burke's Book Store, a local, independently owned bookstore which provides a unique approach to bookselling in our modern and commercialized chain-store world. The combination of old, rough interior features with the musty smell of used books mixed with "funky" eclectic styles of décor and new books makes the store a conundrum in itself. These features, along with others such as the store's relation to Memphis and its diverse customer base, give the store a feel of coziness and relaxation not found in other stores. The store, itself, is a reflection of Memphis, cementing the local roots and character of the city all the while combating the monoculture of Barnes and Noble and Starbucks. This presentation will discuss how Burke's Book Store provides us a basis for a critical analysis of the monocultural, globalizing tendencies of our consumer society.

## **Natural Sciences Oral Presentations – Session 1**

***Frazier Jelke Lecture Hall B, beginning at 1:00 pm until 3:45 pm***

**1:00-1:15 Characterization of the hydrophobic patch domain in the G1 cyclin, Cln3, of *Saccharomyces cerevisiae*.**

Alison Groeger

Faculty Mentor: Mary Miller

Department of Biology

In *Saccharomyces cerevisiae*, G1 cyclins are responsible for initiating the cell cycle in a process that ultimately leads to cell division. Cyclins function by binding to and activating a cyclin dependent kinase, in this case Cdk1. In addition to expression, localization and substrate interaction of the cyclin-Cdk1 complex influences activity. Many cyclins have a hydrophobic patch domain (hpd) in the beginning of the cyclin box. It has been demonstrated that the hydrophobic patch promotes the recruiting of substrates to cyclin-Cdk complexes in the cases of Cyclin A in humans and Clb5 in *S. cerevisiae*. In *S. cerevisiae* the three G1 cyclins are called Cln1, Cln2, and Cln3. To investigate whether or not the function of Cln3 is dependent upon the hpd, we have mutated three residues in the Cln3 hpd and tested the mutant protein, *cln3-hpm*, for function. Tests reveal cases in which the *cln-hpm* is less efficient at rescuing the cell cycle than wild-type Cln3. This investigation supports the notion that the hydrophobic patch domain of Cln3 plays a significant role in the cyclin's activity during the G1 phase of the cell cycle in *S. cerevisiae*.

**1:15-1:30 Signal Transduction Mechanisms of GABA-B regulation of Calcium Currents in Isolated Hippocampal Neurons**

Amir Paydar

Faculty Mentor: Jay A. Blundon

Department of Biology

The neurotransmitter GABA has been shown to have multiple effects in the mammalian brain. GABA receptor activation inhibits, or decreases, calcium ion flow through N-type calcium channels and facilitates, or increases, calcium currents through L-type channels. These discrete effects are often present simultaneously in a single cell. In this study, we investigated the intracellular signal transduction mechanisms for both effects in hippocampal neurons isolated from 5-7 day old Sprague-Dawley rats. Under control conditions, activation of GABA receptors with the agonist baclofen caused no response in 22%, attenuation of N-type current in 67%, and facilitation of L-type current in 11% of the cells. Neurons treated with pertussis toxin (PTX), which inactivates specific intracellular G-proteins, demonstrated no attenuation of baclofen-induced current while 25% still exhibited facilitation, suggesting that the attenuation of N-type currents is mediated by a PTX sensitive G-protein, but the facilitation of L-type currents is not. We also studied the effects of a Protein Kinase A (PKA) inhibitor, RP-cAMP, and found that approximately the same percentage of cells demonstrated baclofen-evoked inhibition (45%) and facilitation (30%) as in the control experiment, suggesting that PKA does not mediate either effect.

**1:30-1:45 Condition Indices of the Asian Clam (*Corbicula fluminea*) in the Wolf River**

Forrest McCullough

Faculty Mentor: David Kesler

Department of Biology

Condition indices of Asian Clams (*Corbicula fluminea*) may provide new methods to assess habitat quality for imperiled native bivalves. We identified different qualities of bivalve habitat within the upper Wolf River by measuring *Corbicula* condition indices. We collected *C. fluminea* individuals at nine locations between Michigan City, Mississippi and LaGrange, Tennessee (distance ca. 8 km) on September 7, 2002. We used tissue percent water, tissue dry mass/shell mass, tissue dry mass/internal shell volume, ash-free-dry-mass/shell mass and ash-free-dry-mass/internal shell volume as indicators

of condition. A significant location effect ( $P < 0.05$ ) was found using a one-way ANOVA for all condition indices. While condition indices did not change consistently from Michigan City to LaGrange, a Tukey's post hoc test revealed that one location (#6) contained *C. fluminea* individuals with significantly higher condition indices than at all other locations. Oxygen, temperature, and conductivity did not differ among sites. We plotted the ten locations on a 1970 USGS topographic map with GIS software. Location 6 did not appear on the main channel of this map suggesting changes in habitat conditions over time. Use of *C. fluminea* condition indices allowed us to recognize location 6 as the most suitable habitat for Asian Clams and by inference other filter-feeding bivalves.

1:45-2:00 **Creation of a Kinase-Defective mPERK Protein by Point Mutation**

Heidi Rademacher

Linda M. Hendershot, Department of Genetics/Tumor Cell Biology, St. Jude Children's Research Hospital

Faculty Mentor: Mary Miller

Department of Biology

Abnormal physiological conditions cause proteins to misfold in the endoplasmic reticulum (ER). This induces ER stress and activates a signal transduction pathway called the unfolded protein response (UPR). This pathway can be activated by the addition of pharmacological agents to cells in culture and also occurs in solid tumors that are not adequately vascularized. One part of the pathway shuts down new protein synthesis, limiting the amount of unfolded proteins within the cell, and is controlled by an ER-localized transmembrane kinase called PERK. To investigate the role of PERK in UPR, we created a PERK with an inactive kinase domain by introducing a point mutation in the kinase coding region, changing the essential amino acid lysine (AAG) to the amino acid methionine (ATG). This involved moving a piece of the PERK gene to the Blue Script plasmid and the subsequent introduction of the DNA sequence mutation. We will move the mutated segment of PERK back into the original PERK expression vector. Theoretically, the mutant PERK will be unable to phosphorylate substrate when cells are treated with ER stress-inducing agents, allowing us investigation of the pathway downstream of PERK by specifically inactivating this part of the unfolded protein response.

2:00-2:15 **Impact of Water Lilies (*Nymphaea tuberosa*) on Predator-Avoidance Behavior of *Daphnia magna***

Lisa Harsch

Faculty Mentor: Romi Burks

Department of Biology

*Daphnia magna*, a common species of freshwater large-bodied zooplankton, undergo diel horizontal migration (DHM) into littoral zones in shallow lakes as a means of predator avoidance. We wanted to determine how different refuge properties of floating-leaved macrophytes, e.g the white water lily, *Nymphaea tuberosa*, influenced the survival of *Daphnia*. For example, stem density of *Nymphaea* might provide complexity while the floating leaves, or pads, could lower light penetration. This experiment tested whether the submerged vegetation, floating canopy, or both proved necessary to attract *Daphnia* and increase their survival against predators during both day and night. We used zooplanktivorous fish and larval odonates, dragonflies, as predators to determine the refuge effects of the macrophytes. Surprisingly, we found no difference in abundance during day and night. However, according to *Daphnia* abundance results pooled among all samples taken from different treatments, the presence of submerged structure significantly reduced *Daphnia* mortality. Overall, our results showed that, in contrast to the control groups containing no plants, floating-leaved macrophytes did serve as a reasonable refuge against predation. However, mortality rates remained high within them and any refuge provided depended on the submerged complex structure.

**2:15-2:30 Mammalian diversity across an urban gradient**

Jennifer Riem

Faculty Mentor: David Kesler

Department of Biology

This study surveyed mammals at six sites along an urban gradient in Oxford, OH to assess the effects of urbanization on mammalian diversity. It has been suggested that urbanization decreases mammal diversity but few studies have been done to test this prediction. Our study was based on studies done in California and Ohio that studied bird and butterfly diversity along an urban gradient. We predicted that both species diversity and species richness would correlate inversely with degree of urbanization. Urbanization was measured using principle components analysis (PCA) values for the sites from Blair (2001). We live-trapped small mammals and detected larger mammals using sooted track plates. We used trap and track data and the Shannon-Wiener diversity index to determine diversity for each site. We found that richness and diversity did not correlate with PCA values. Diversity and richness were highest at a residential site with a moderate level of urbanization. The diversity at this site was significantly different from the diversity at the other sites when compared using the student's t-test ( $\alpha=0.05$ ) after Bower and Zar (1984).

**2:30-2:45 NMDA receptor exhibits decreased  $Ca^{2+}$  permeability and desensitization following incorporation of NR4 receptor subunit**

Matthew Fletcher

St. Jude's Children's Research Hospital, Developmental Neurobiology Department

Faculty Mentor: Jay Blundon

Department of Biology

The N-methyl-D-aspartate receptor (NMDAR), consisting of the NR1, NR2, NR3 and NR4 subunits, is one of the major excitatory receptors in the mammalian central nervous system as it plays a crucial role in synaptic transmission, learning and memory. By transfecting neurons with the DNA from the NR4 subunit, we were able to investigate the properties that this subunit conferred upon the receptor, including such characteristics as  $Ca^{2+}$  permeability, NMDA evoked response, and glycine evoked response. We discovered that transfection and incorporation of NR4 into hippocampal neurons caused a decrease in  $Ca^{2+}$  permeability, as well as a change in the desensitization pattern normally seen in NMDA receptors. The change in NMDAR properties brought about by incorporation of NR4 could provide insight into the underlying causes and mechanisms in the changes in synaptic plasticity seen during typical nervous system development.

**2:45-3:00 An Analysis of the Fibrilization p53tetWT & p53tetR337H**

Prentice L. Bowman

Richard W. Kriwacki, Department of Structural Biology, St. Jude Children's Research Hospital

Faculty Mentor: Terry Hill

Department of Biology

A mutant protein form of the protein p53 is known to cause adrenalcortical carcinoma (ACC) in children. Previous experiments have shown that a domain of the mutant along with the wildtype version forms fibers at pH4 when incubated at high temperatures. By studying the kinetics of this fiber formation, it may be possible to gain more information as to how ACC is caused. It may also be possible to learn more information about other diseases also caused by fibers, such as Alzheimer's and Type II diabetes. Fiber formation kinetics was studied by measuring the fluorescence of the protein when added to the fluorescent compound Thioflavin T, which allowed for the determination of the relative amount of fibers present.

3:00-3:15 **Genetic complementation of Calcofluor White hypersensitive mutants of the filamentous fungus *Aspergillus nidulans***

Timothy A. Hoggard

Daniel Dunnivant\*

Faculty mentors: Darlene Loprete\* and Terry Hill

Departments of Biology and Chemistry\*

Fungi are important and beneficial contributors to the environment and to human economy. Yet, fungi are also capable of being powerful pathogens to plants, animals and humans. The fungal cell wall plays a critical role in fungal growth and maintenance. Fungal viability depends on cell-wall metabolism so understanding how the cell wall is constructed is important. Since human cells lack a cell wall, the ability to manipulate the wall could increase the benefits of fungi or decrease the risks of fungi. We used Calcofluor White (CFW), a chemical that binds to the cell wall, to identify six cell-wall mutants from a collection of mutants in the filamentous fungus, *Aspergillus nidulans*. Those individuals that have a damaged cell-wall gene grow poorly or not at all in the presence of the CFW. Transformation of one of the mutants with a genomic library has currently led to the genetic complementation, rescued growth in the presence of CFW. The rescuing plasmid has been isolated from the mutant, characterized and is currently being sequenced to determine the ORF responsible for the rescue.

3:15-3:30 **Predictors of Self-Reported Physical Symptoms in Children**

Sandra Scott

Faculty Mentor: Chuck Stinemetz

Department of Biology

Reliability of self-report of both medical history and current symptoms is crucial for healthcare practitioners to be able to formulate an accurate diagnosis and manage symptoms, but many factors such as impaired cognitive ability, old age, pain-related anxiety, and perceived vulnerability to illness have been shown to affect the ability of patients to comprehend, recall, and express their symptoms. Assessing the likelihood of children who have recently completed treatment for cancer and of healthy children to report their physical symptoms involved collecting demographic information from and administering measures of physical symptoms, defensiveness, anxiety, anger management, body consciousness, and perceived situational stress to 240 children. Age, anxiety, anger expression, public and private body consciousness, and perceived situational stress correlate positively with self-report of physical symptoms, while defensiveness correlates negatively with self-report of physical symptoms. Correlation is not demonstrated between self-report of physical symptoms and status of physical health, gender, race, socioeconomic status, anger control, or perceived body competence. Awareness of which personality and demographic characteristics are associated with various levels of report of physical symptoms in children might assist clinicians in determining when symptoms have been over- or underreported by children.

3:30-3:45 **The Theory and Application of Glucose Amperometric Sensors (Nonjuried)**

Stanley Ray Vance, Jr.

Faculty Mentor: Bradford Pendley

Department of Chemistry

Diabetes, a condition characterized by the body's inability to uptake glucose properly, can lead to an abnormal excess of glucose in the bloodstream. This metabolic disease affects the lives of millions around the world each year. In order to manage diabetes properly, a person with diabetes should regularly check their blood glucose level and take appropriate action based on the result. In response to the necessity of accurate and rapid measurements of blood glucose levels, the scientific community has developed amperometric glucose sensors to aid patients in monitoring their blood glucose level. At the present time, the commercialized finger-stick glucose sensors are readily available. The presentation will provide a general overview of how these particular amperometric glucose sensors function. In addition to basic theory, the presentation will focus on the similarities and differences

between the most widely used sensors. These sensors are not only on the cutting edge of scientific technology, but they are also the result of theory that interweaves the disciplines of biology, chemistry, and physics.

## **Natural Sciences Oral Presentations – Session 2** ***225 Ohlendorf, beginning at 1:00 pm until 3:45 pm***

### **1:00-1:15 Functional MR Imaging of Pediatric Cancer-Related Attention Deficits**

John Sexton

Robert Ogg, Diagnostic Imaging, St. Jude Children's Research Hospital

Faculty Mentor: Ann Viano

Department of Physics

Children surviving central nervous system related cancer or cancer therapy are at risk for neuropsychological and cognitive impairments impacting academic performance and quality of life. Evidence from behavioral studies suggests cancer and therapy induced deficits in the ability to sustain attention underlie these impairments. We use Functional MRI (fMRI) to investigate the physiological bases for these attention deficits. Subjects were school-aged (6-17) survivors ( $n = 25$ ) of pediatric brain tumors or leukemia, at least one year off treatment, and healthy siblings ( $n = 4$ ) of the same ages. Functional MRI measured brain activation during the Conner's Continuous Performance Task (CPT), a neuropsychological test of sustained attention (counting and go-no-go tasks). Image data from seven regions of interest (right, left inferior frontal cortices; right, left inferior medial occipital cortices; cingulate cortex; inferior parietal lobule; cerebellum) on all subjects were analyzed with SPM99 in Matlab. Research is ongoing (target accrual of 40 subjects in each group), but preliminary results indicate decreased volume of activation ( $p = 0.05$ ) in survivors (total activated voxels = 711) compared to healthy siblings (total activated voxels = 1787). Additionally, average distances of peak activation from our target regions of interest are larger ( $p < .01$ ) for survivors (10.93 voxels) than healthy siblings (4.0 voxels). These initial results indicate uniformly less and more diffuse cortical activation in survivors compared to healthy siblings.

### **1:15-1:30 3-colorability of Minimally Braced Rigid Grids**

Jonathan Hulgan

Faculty Mentor: Eric Gottlieb

Department of Mathematics and Computer Science

Braced grids are studied in the branch of mathematics known as rigidity theory. We have defined a new class of graphs and have shown them to have a proper vertex 3-coloration. It follows as a corollary that minimally braced rigid grids also have such a vertex 3-coloration.

### **1:30-1:45 Effects of Annealing on the Lamellar Structure of UHMWPE**

Karyn Spence\*

Carl Carlson

Asit K. Ray, Department of Chemical and Biochemical Engineering, CBU

Faculty Mentors: Ann Viano\* and Richard Redfean

Departments of Physics\* and Chemistry

Ultra High Molecular Weight Polyethylene (UHMWPE) is currently the standard articulating surface for use in the one million hip and knee replacements performed annually. However, sterilization method, heat treatments, and shelf aging all have subtle and unclear effects on the material's in vivo wear properties. Transmission electron microscopy was used to probe how the organization of crystalline lamellae in the microstructure is affected by these three variables. The images indicate that annealing reduces the instances of lamellar stacking. Pyrolysis coupled with GC-MS analysis further reveals more indicators of altered hydrocarbon structure in the annealed samples. We theorize that the increased molecular mobility induced by annealing allows for the formation of

chemical links between hydrocarbon chains. Such links form a rigid structural matrix and prevent lamellae from stacking under van der Waals attraction. This morphological insight may help explain and correct the wear mechanisms leading to implant failure.

1:45-2:00 **Adding Device Drivers to the MOSES2 Simulator**

Bryan Alexander

Faculty Mentor: Robert England

Department of Mathematics and Computer Science

The Mathematics and Computer Science Department's operating systems course is currently a practical course, with assignments for writing a simulated operating system (OS) centered on system calls, scheduling, and virtual memory. Adding the implementation of device drivers to this set of assignments would expand it to cover all significant areas of OS responsibility, except for file systems. Since file systems are not pedagogically as important a part of operating systems as the other services, this addition would make the programming portion of the course reasonably complete.

The goal of my work was threefold: to determine whether a device driver assignment could reasonably be added to the course workload, to devise an assignment which would be a reasonable amount of work for the course (taking the other assignments into account), and to write an example solution to the assignment. My work has shown that it is possible and reasonable to add a device driver assignment to the course, as long as care is taken to keep the assignment relatively straightforward.

2:00-2:15 **Physics Outreach: Using a "Sock" to Dispel a Stereotype**

Lauren Glas

Faculty Mentor: Ann Viano

Department of Physics

Poor teaching and low participation mark high school physics education in America. As a result, high school students perform poorly on international tests and small numbers of students go on to pursue undergraduate degrees in physics. To fill graduate programs, universities must recruit international students. The American aversion to physics finds its roots in a stereotype; many people believe that only an elite group of male geniuses possess the qualities necessary to succeed in physics research. To dispel the stereotype, colleges and universities are now bringing physics into the community using a variety of methods known collectively as physics outreach. The Society of Physics Students (SPS) Outreach Catalyst Kit (SOCK) focuses on one specific type of outreach, workshop style outreach. The activities featured in the SOCK bridge mathematics and physics for students of all ages and backgrounds. Lessons cover the topics of scaling laws, rainbows, astronomy on spandex, and polyhedra. Plans and materials were tested on a group of children ages 8-13 as well as a group of non-scientist staff members from the ACP. Both tests groups found the activities informative and enjoyable.

2:15-2:30 **Seymour's Conjecture**

Michael Kelley

Faculty Mentor: Eric Gottlieb

Department of Mathematics and Computer Science

A directed graph  $D$ , also known as a *digraph*, is a nonempty finite set of vertices  $V$ , together with a set  $E$  of ordered pairs of vertices in  $V$ . Every ordered pair  $(u,v) \in E$  represents a directed edge from the vertex  $u$  to the vertex  $v$ , this can be thought of as an arrow from  $u$  to  $v$ . The first-outdegree of a vertex is the number of vertices reachable in one step by following the arrows leaving that vertex. The second-outdegree of the same vertex is the number of vertices reachable in exactly two steps by following the arrows, not including the vertices reachable in one step. Seymour's conjecture states that in any directed graph there is at least one vertex whose second-outdegree is greater than or equal to its first-outdegree. I have studied the cases where the graph is  $k$ -outregular (every vertex has exactly  $k$  arrows leaving from it) and have proven that the conjecture holds when  $k = 5$ .

**2:30-2:45 Backscatter Techniques for Ultrasonic Bone Assessment**

Chad Jones

Faculty Mentor: Brent Hoffmeister

Department of Physics

Ultrasound offers a safe, inexpensive, and non-invasive means of measuring bone density in patients suffering from degenerative bone diseases such as osteoporosis. Current ultrasonic techniques use a two-transducer method to measure the speed of sound and/or attenuation of ultrasonic pulses propagated through bone. One limitation of these techniques is that the transducers must be positioned on either side of the bone, restricting accessible sites in the body to bones such as the calcaneus and phalanges. The present study explores the possibility of using single-transducer backscatter techniques for ultrasonic bone assessment. Thirty eight cubic specimens of cancellous bone were acquired from the proximal end of four human and four bovine tibiae. The apparent density of the (dehydrated and defatted) specimens ranged from 0.13-1.17 g/cm<sup>3</sup>. Ultrasonic measurements were made at 144 sites on each sample face along the mediolateral and anteroposterior directions. Three backscatter-based parameters were extracted from the data and plotted as a function of apparent density. Apparent Integrated Backscatter (AIB) showed a significant linear correlation with density for both human ( $p < 0.05$ ) and bovine ( $p < 0.001$ ) specimens. Stronger linear correlations for the human samples were found using Frequency Dependence of Apparent Backscatter (FDAB) (Human:  $p < 0.01$ , Bovine:  $p < 0.002$ ). Apparent Backscatter Attenuation Estimation (ABAE) generated the most significant linear correlation in human specimens ( $p < 0.001$ ) while still showing a strong correlation in the bovine ( $p < 0.001$ ).

**2:45-3:00 The Black-Scholes Model of Option Pricing**

Elizabeth Purves

Faculty Mentor: Tom Barr

Department of Mathematics

The Black-Scholes model of option pricing is an equation that predicts the price of an option based on characteristics of both the option and the option's underlying stock. It makes two assumptions: that changes in stock prices follow a geometric Brownian Motion and that these changes can be represented in a multi-period binomial model. The Black-Scholes equation is widely used in financial markets because it allows traders to recognize when an option is deviating from its expected price and to take advantage of that differential in the expectation that the price will soon return to "normal." Although the model is widely accepted, it has met with varying degrees of success. One possible explanation for inaccuracies in the model's predictions is that the assumption made by Black and Scholes that stock prices follow a Geometric Brownian Motion fails to hold. This presentation explores the relationship between the historical distribution of changes in stock prices and the accuracy of the Black-Scholes equation in predicting a stock's option price.

**3:00-3:15 Mathematical Modeling: Forecasting with the Cobb-Douglas Production Function (Nonjuried)**

Andy Campbell

Faculty Mentor: Tom Barr

Department of Mathematics and Computer Science

The Cobb-Douglas production function is a mathematical model utilized in economics for predicting output in an industry given values of labor and capital. An introductory economics concept, the Cobb-Douglas model provides us with an accessible and easily understood avenue through which to explore the basics of mathematical modeling and forecasting.

This presentation is an examination of the capability and accuracy of the model in predicting future periods of production. Firms have direct control over how many laborers to employ and how much money to invest in capital in upcoming periods, but not always an accurate idea as to how much output those given inputs will produce. The Cobb-Douglas model aims to give those firms an idea of

expected output. In investigating the model's accuracy, we will explore the topics of least squares modeling, time series analysis, and economic concepts such as constant returns to scale.

**3:15-3:30 Symbolic Dynamics and Knot Projections (Nonjuried)**

Jessica Hubbs

Faculty Mentor: Kennan Shelton

Department of Mathematics and Computer Science

Many seemingly unrelated areas of mathematics share some of the same questions, problems and structures. By finding a bridge between two areas, our knowledge of one may provide insight into the other. In symbolic dynamics we would like to know when two shift spaces are in fact simply different representations of the same space (a shift space is a set of infinite strings of symbols chosen from a finite alphabet with a shift map that takes one string to another). In knot theory we are interested in a similar question of classification: when are two knot projections in the plane equivalent (they represent the same knot)? In this presentation I will show how to construct shift spaces corresponding to given knot projections and how these shift spaces relate when the knot projections are equivalent.

**3:30-3:45 Designing a C# Graphical User Interface for MOSES: Microcomputer Operating System Environment Simulation (Nonjuried)**

Jiazhen Zhang

Faculty Mentor: Robert England

Department of Mathematics and Computer Science

A computer operating system manages the hardware and software resources of a computer. At Rhodes, students who take the Introduction to Computer Operating Systems class develop their own mini operating system for use with the Microcomputer Operating System Environment Simulation (MOSES). Developed by Dr. Robert England of the Rhodes College Computer Science Department, MOSES is a virtual machine that simulates some of the hardware and software resources of a real computer and provides a nice platform for the running of the student operating system. To make MOSES a better teaching tool, we designed a graphical user interface to present in real-time the information generated by the MOSES and operating system interaction. We connected the MOSES source code written in C/C++ with the MOSES interface written in C# using the newly introduced Microsoft .NET platform. In this talk, I will briefly describe the MOSES project and explain our design of the MOSES interface.

## **Natural and Social Sciences Posters – Session 1**

***Frazier Jelke Lobby beginning at 1:15 pm until 2:30 pm***

### **Different Handshakes Spread *E. coli* with Varying Success**

Carolyn Pinkerton

Joe Vaughan

Faculty Mentor: Mary Miller

Department of Biology

Infecting at least 2600 people and responsible for 104 deaths, the mysterious outbreak of SARS (severe acute respiratory syndrome) is spreading at an alarming rate worldwide ([www.cnn.com](http://www.cnn.com)). The presence of this highly contagious virus only serves to reinforce the notion that it is imperative to understand the mechanisms by which microbial agents can spread disease. One highly documented mode of transmission is physical contact. On a college campus where students are in close proximity, one prime mode of microbial transfer is through a handshake. In order to determine the ability of different types of handshakes to transfer microorganisms from one person to another, this study observed the spread of bacteria by four different forms of handshakes through a population of 10 people. It was hypothesized that those handshakes which involved contact for the longer periods of time would transmit more successfully. The results of the experiment showed that each handshake's success for spread

depended on contact time and contact surface area, and these findings suggest that handshakes can be an extremely effective way for disease to spread.

### **Pyrolysis GC-MS and transmission electron microscopy in the characterization of crosslinked UHMWPE microstructure**

Carl Carlson\*

Karyn Spence

Asit K. Ray, Department of Chemical and Biochemical Engineering, CBU

Faculty Mentors: Richard Redfean\* and Ann Viano

Departments of Chemistry\* and Physics

Ultrahigh molecular weight polyethylene (UHMWPE) is currently the industry standard for use in large human joint prostheses. The combination of its relative nonreactivity in the body and its mechanical properties make UHMWPE an excellent choice to replace the cartilage in total knee and hip replacements. However, as the prosthesis ages, the UHMWPE begins producing small wear particles, which cause many adverse biological reactions. Techniques of crosslinking have been developed to reduce the production of these wear particles. While the effects of these techniques have been studied using TEM and SEM images, the effects these treatments have on the molecular structure are largely unknown. In order to obtain an understanding of the molecular structure of UHMWPE, we used solid-state pyrolysis coupled with gas chromatography-mass spectrometry to separate and identify off-gases. We identified certain products as coming from reactions due to branching and crosslinking and should be able to quantify the amount.

### **Functional analysis of EBNA-3C required for regulation of the EBV oncoprotein LMP-1**

Courtney Frye

Faculty Mentor: Darlene Loprete

Department of Chemistry

To test the effects of specific protein interaction of the Epstein-Barr virus (EBV) EBNA-3C protein with cellular proteins in its regulation of the EBV oncoprotein LMP-1, modified EBNA-3C genes were cloned into the pTRE vector, which contains a Tetracycline responsive minimal CMV promoter ( $P_{\min\text{CMV}}$ ). The specific plasmids used encoded a Flag tag wild-type EBNA-3C, a Flag tagged EBNA-3C with the amino acids 629-683 deleted, and an EBNA-3C fused N-terminal to an estrogen receptor (ER). Each gene was cloned downstream of the  $P_{\min\text{CMV}}$ , which allows for the regulation of EBNA-3C expression in mammalian cells through the chemical doxycycline. These plasmids were then used to develop a Double-Stable BD Tet-Off cell line in Raji cells. Through PCR (Polymerase Chain Reaction) and Western Blot analysis, this process selected individual cell lines with high EBNA-3C expression in the absence of doxycycline and a lack of EBNA-3C expression in the presence of doxycycline. Selected cell lines can then be used to explore the specific effects of EBNA-3C on the expression of LMP-1.

### **SEM Visualization of Sorbitol-Induced Plasmolysis in Pisum Sativum Roots**

Daniel Keedy

Faculty Mentor: Chuck Stinemetz

Department of Biology

Several studies have demonstrated that plant roots are capable of responding to osmotic gradients similar to those present at most plant/soil interfaces. The root cap has been identified as the osmotic sensing site in roots. However, the root cap sensing mechanism is unknown. The plasmolysis of root cap cells could offer a possible means of sensing an osmotic gradient. In this study, we exposed pea roots to a -1.5 MPa sorbitol solution and then examined the amount of plasmolysis in the root cap, distal elongation zone (DEZ), and elongation zone (EZ) using scanning electron microscopy. Sorbitol-treated root cap tissue exhibited a higher degree of plasmolysis than water-treated controls. Regions of the root basipetal to the root cap (DEZ and EZ) exhibited less plasmolysis even with sorbitol pretreatment of the root cap. Some disruption of cell wall structure by sorbitol is also present. These findings suggest that a -1.5 MPa osmoticum can induce plasmolysis in root caps without altering the structure in the remainder of the root. Thus, these studies support a role for the root cap in sensing soil water gradients.

### **The Effects of Meta-Stereotypes and Attempts to Suppress Racist Thoughts on Interracial Interactions**

Casey Blalock

Betsy Bogler

Faculty Mentor: Chris Wetzel

Department of Psychology

American is an increasingly diverse nation, and as a result, most people interact with people of different ethnicities on a regular basis. One's expectations about how others will perceive them, motivation to suppress racist thoughts and behaviors, and level of self-awareness can impact interracial interactions. Meta-stereotypes, or how one thinks others perceive their in-group, may aid in the suppression of social stereotypes so as to reduce negative evaluations from others (Macrae, Milne, & Bodenhausen, 1998). The present study investigates the effects of meta-stereotypes and attempts to suppress racist behavior on the self-perceptions, observer perceptions, non-verbal behavior, self-awareness, and mood of individuals during interracial interactions. Caucasians interacted with an African American confederate whom they were told expected them to be either prejudiced or non-prejudiced. They were asked explicitly not to act racist or implicitly to just act naturally during the interaction. The results indicated that males in the explicit suppression - prejudiced expectation condition appeared to have more positive interactions with the African American confederate, while males in the implicit suppression and prejudiced expectation condition appeared to have the most negative interactions. Women's interactions were largely unaffected by the independent variables. The implications of these findings for interracial interactions are discussed.

### **Overhearing a racial slur followed by condemnation: Implicit racism as a social disease**

Shelley Fulghum

Kate Strother

Olivia Inscore

Faculty Mentor: Chris Wetzel

Department of Psychology

The present study explored participants' reactions to hearing a racial slur and how that experience would affect their judgments on ratings of an African-American target. Sixty Caucasian college students evaluated an essay, ostensibly written by an African American male applying for a scholarship. While they were reading the essay, a male research accomplice either voiced a racial slur or a non-racial remark. A second female research accomplice either condemned the comments or remained silent. Male participants' ratings of the essay were lowered (contaminated) by the racial slur unless it was confronted by the second accomplice. Male participants' essay ratings were also reduced when the second accomplice challenged a non-racial remark as being racist. Female participants' showed sympathy or compensation effects, increasing their evaluations when they heard the slur, heard a challenge, or heard both. After evaluating the essay, participants provided first impression ratings of their fellow participants allegedly for a separate experiment. Both female and male participants rated the female accomplice as extremely likable when she confronted the racial comment, whereas her likeability decreased when condemning a non-racial comment.

### **Facts in Fiction: The Effects of Text Structure on Reading Comprehension**

Amanda Hathaway

Laura Hilliard

Lindsay Sears

Sarah Donley

Faculty Mentor: Hyun-Jeong Kim

Department of Psychology

The expository text structure found in school text books contains unfamiliar condensed facts and details, which can oftentimes be overwhelming and uninteresting. The purpose of this experiment is to see if a more interesting, relevant text structure, namely narrative structure, will improve comprehension. The qualities of narrative structure should result in better comprehension because of its simplicity, familiarity, and similarity to our everyday lives, whereas expository texts are more decontextualized. Participants included 64 undergraduate

students (45 females and 19 males) at a small, private college. For each of the four text topics, each subject received two expository texts or two equivalent narrative versions of the text, a picture corresponding to one of the texts, two comprehension tests corresponding to each text and a post-test survey. Results show that the narrative text structure yielded significantly higher comprehension scores than expository text structure. This strongly supports previous research, which asserts that narrative texts, when compared to expository texts, improve reading comprehension. By converting the expository structure in school text books to the more familiar and easy-to-read narrative form, overall understanding would ameliorate, thus creating a more knowledgeable world.

### **Deception Detection in the Game Show, *To Tell the Truth***

Sara Addison

Jim Mueller

Faculty Mentor: Chris Wetzel

Department of Psychology

Research has found that deception detection is no better than chance, even when attempting to isolate conditions that increase accuracy, specifically level of involvement in the detection process. By viewing 146 episodes of *To Tell the Truth*, this study tried to show that participants directly involved in the conversation (the panel) would be more cognitively busy than those less involved participants (the audience), and that cognitive overload would cause the highly involved participants to rely on the indirect, nonverbal cues, thus being more accurate in the detection of deception. Over all the panel members were more accurate in deception detection than the audience, with the audience performing worse than chance, the celebrity guests performing at chance, and the regular panel members performing better than chance.

### **Robots as Art and Science (Nonjuried)**

Adam Barnes

Elizabeth Brown

Audrey Bruno

Dustin Diez

Ben Evans

Neil Fore

Chad Jones

Mike Kelley

Anne McMicken

Lloyd Paul

Susan Ratcliff

Jon Rogers

John Sexton

Karyn Spence

Elizabeth Winkelmann

Jiazhen Zhang

Faculty Mentors: Ann Viano\* and Val Valgardson

Departments of Physics\* and Art

A robot is an intelligent connection of perception to action, and one whose creation requires a variety of artistic and scientific skills. In the new interdisciplinary course "Introduction to Robotics" (Physics 307 / Art 366), taught by Professors Viano and Valgardson, physics and art students are developing a conceptual understanding of art-making, learning how to communicate their thoughts in a direct and effective manner through an object- a robot. To create that object, they develop the ability to manipulate materials and tools to create an autonomous robot that interacts with its environment. This presentation will showcase the final robots designed and constructed by the class, and students will be available to answer questions regarding the implications of their work and the technical details of creating a "thinking" machine that responds to environmental stimuli.

## **Natural and Social Sciences Posters – Session 2**

***Frazier Jelke Lobby, beginning at 2:45 pm until 4:00 pm***

### **The Abundance of Chlorinated Pesticides in Soil with Regards to their Distance from Cypress Creek, Method Comparison and Bioremediation**

Jack Stewart

Dan Paull

Faculty Mentors: Richard Redfearn and Bradford Pendley

Department of Chemistry

In our project we had three specific goals: Assess pesticide content of Cypress Creek floodplain, Assess pesticide content as a function of distance from creek and Determine pesticide abundance by two methods for method comparison (Soxhlet and an Association of Analytical Chemists official method). Additionally we continued an ongoing project wherein plant samples were analyzed for chlorinated pesticides to see if the area could be bioremediated.

We chose Cypress Creek as a site for our study because the Cypress Creek floodplain is known to contain pesticides. Previously, a VECA CDC study found aldrin, chlordanes, dieldrin, endrin and other pesticides in soil samples of the plain. Our research is important for two reasons: first of all this floodplain is in a public neighborhood and these pesticides effect public health and secondly this study increases our knowledge of how specific pesticides arrive in the floodplain.

### **Development of a quantitative real time PCR assay for respiratory syncytial virus**

Shaunna A. Torrance

Faculty Mentor: Dr. Chuck Stinemetz

Department of Biology

Respiratory syncytial virus (RSV) is the most common cause of lower respiratory tract infections in infants. To evaluate potential anti viral treatment strategies and to understand RSV pathogenesis requires quantitative tests for RSV. Currently, this is determined by quantitative culture (plaque assay); however, real-time quantitative RT-PCR theoretically offers the potential advantages of increased sensitivity, stability of the assay after specimen freeze/thaw, and low cost. A quantitative viral RNA extraction protocol was developed for use on nasal washings followed by reverse transcription and subsequent real-time PCR reaction using ABI 7900HT. Primers and probes from regions of the N gene and F gene were developed. Results showed correlation for spiked nasal wash samples with RSVA, cultured patient isolates, and direct patient respiratory secretions. Real-time RT-PCR appears to provide sensitive and reliable quantitative assessment of RSV A strains in patient specimens, correlating with existing fresh plaque assay values. Further evaluation is necessary to define the kinetics of RSV using this assay and to compare the plaque assay with the real-time RT-PCR assay under the influences of neutralizing antibodies or other antiviral experimental therapeutics.

### **A comparison of two riparian spider communities of the Wolf River**

Jennifer Riem

Faculty Mentor: David Kesler

Department of Biology

Urbanization is considered to be one of the primary causes for declines in arthropod biodiversity, but few research questions have focused on this presumed relationship. My study compared riparian spider communities at two locations on the Wolf River. One location is urban and was channelized in the 1950s. The other location is within the Ghost Section of the Wolf, which remains unchanneled. Spiders were collected along transects starting at the riverbank and extending 24 meters away from it. All specimens were identified to family. Shannon-Wiener diversity ( $H'$ ) at the family level was calculated for two urban transects and one rural transect. The diversity of one of the urban transects was significantly different from the other two transects.  $H'$  values were compared between transects using a student's t-test ( $\alpha=0.05$ ) following Brower and Zar (1984). The Kolmogorov-Smirnov test for two populations was also performed using family frequencies from each transect. The Kolmogorov-Smirnov test showed

no difference between any of the transects. There was no observable difference between the urban and rural spider communities of the Wolf that were sampled.

### **Characterization of *Aspergillus nidulans* Mutants Defective in Cell Wall Metabolism**

Chip Hartigan

Hung Hoang

Faculty Mentor: Terry Hill

Department of Biology

Fungi are important microorganisms that play essential recycling roles in nature, cause a number of diseases, and participate in industrial processes. The ability to manipulate fungi is not only medically and economically advantageous but is desirable for improving our understanding of nature. The invasive lifestyle of filamentous fungi is characterized by a branched hyphal growth form determined by the cell wall. Much remains to be discovered on how fungal walls are synthesized in regulating fungal growth. Previous work in this lab involved the screening of a collection of *Aspergillus nidulans* mutants and identifying strains that show hypersensitivity to sub-lethal levels of the cell wall inhibiting agent Calcofluor (CFW). The goal of our research has been to establish baseline measurements of growth and spore germination as a preliminary step towards the full phenotypic characterization of several mutant strains. We monitored the germination of a wildtype strain (GR5) and two mutant strains (1-49, 11-92) both in the presence and absence of CFW. Quantifiable aspects were compared in establishing a maximum 3  $\mu\text{L}/\text{mL}$  concentration of CFW that allows for normal germination of the wildtype strain while severely inhibiting the growth of the two mutant strains. Calcofluor at this concentration was proven able to differentiate mutants from wildtype using both colony and microscopic assays.

### **“And I was so happy it felt like I was free”: Children’s narrative construction of emotion**

Alexis Harris

Faculty Mentor: Marsha Walton

Department of Psychology

The construction of emotion in narratives about interpersonal conflict was examined in a sample of 689 narratives written by 452 inner-city Memphis children from 3<sup>rd</sup>–6<sup>th</sup> grade in two schools. A coding system was developed and inter-rater reliability was achieved to identify emotionally laden language and talk about emotions. Feelings, emotional expressions, emotional behaviors/experiences, and desires were coded. Talking about emotion was related to other previously coded variables such as age, gender, and neighborhood in the story. In the higher-risk school, children talked less about emotion while reporting higher levels of violence, and in the moderate-risk school children talked more about emotions as they got older. The relationships between talk about emotions and moral reasoning, naive epistemology, and types of explanations for aggression are also explored.

### **“What Would You Do?”: Comparing Children’s Responses to Hypothetical Conflict Situations and Their Written Narratives**

Jessica Struby

Faculty Mentor: Marsha Walton

Department of Psychology

This study was designed to investigate whether children’s responses to hypothetical conflict situations are related to factors presented by the children in a narrative depicting an actual conflict they encountered. 434 inner city 4<sup>th</sup>–6<sup>th</sup> graders were asked to complete the Hypothetical Conflict Test (HCT), which poses a hypothetical peer conflict situation, providing a list of responses and prompting the student to designate which responses they might use in such a situation. The HCT scores were then compared to numerous factors in children’s autobiographical peer conflict narratives in order to test the validity of the questionnaire as well as to determine some of the factors which may influence children’s resolution strategies. Results indicated that high Hypothetical Conflict scores predict more frequent attempts to resolve narrative conflicts. In addition, HCT scores are related to narrative factors such as violence, emotionality, and morality.

### **A Neighborhood Comparison Investigating Factors that are Related to the Prevalence of Homicides within Certain Neighborhoods in Memphis, Tennessee.**

Sarah Donley

Faculty Mentor: Lizabeth Zack

Department of Psychology

Four hundred and eighty-four homicides that occurred in Shelby County, Memphis, Tennessee, from August 2000 to December of 2001, were investigated for this study. Specifically, there were 238 homicide suspects and 246 homicide victims. Initially, frequencies were run on different variables, such as the incident address, suspect and victim's residence, age, race, gender, and the month, day, and year that the incident occurred. The data was provided by the Memphis Police Department and The University of Memphis' Center for Community, Criminology, and Research. Once frequencies were run, several series of maps, using the Geographic Information System program, were created to help identify patterns and/or "hot spots" where a number of homicides had occurred. Four neighborhoods that contained a number of homicides were then chosen in order to compare the socioeconomic and demographic characteristics of the neighborhoods. This information was obtained from the 2000 United States Census, and the values for those characteristics were tested across all four neighborhoods using an independence of classification chi-square test. Results showed that the following socioeconomic and demographic characteristics not only differed significantly across all four neighborhoods, but also were identified as "risk" factors that correlated to the number of homicides within each of the neighborhoods.

### **Absolute Pitch and its Connection to Dorsolateral Frontal Region Activation**

Julia Walsh

Karen Dobyns

Jen Labreque

Dan Paull

Sean Walton

Mary Williams

Faculty Mentor: Robert Strandburg

Department of Psychology

The purpose of this study was to gain insight into the mechanisms necessary for absolute pitch (AP)—the ability to identify a tone's pitch without contextual musical reference. MRI studies have shown that AP individuals differ from non-AP individuals in produced dorsolateral frontal (DLF) activation when listening to tones. The DLF region is involved in controlling word-object associations, and seems to play a role in AP. We used EEG to measure brain activity in the DLF region of non-AP individuals. The participants learned to associate 5 letters to 5 tones and we recorded their EEG during tone presentation, both before the learning phase and after the learning phase. We expected to find a decrease in alpha power and an increase in beta power in the DLF region (signaling activation in this area) after the subjects learned to associate each tone with its corresponding letter. In essence, AP individuals automatically retrieve tonal/verbal associations from the DLF region during tone presentation which allows them to spontaneously name tones. If non-AP individuals show similar activation of the DLF, then this would indicate a similar processing of pitch information across both AP and non-AP individuals.

### **The Effect of Temperature on Bacteriophage Plaque Formation (Nonjuried)**

Rose Hiner

Faculty Mentor: Mary Miller

Department of Biology

A bacteriophage is a virus that attacks only specific bacterial cells. The virus uses the host cell's mechanisms to produce viral DNA and proteins creating new phages. These phages then lyse the host cell killing the bacterium and creating a zone of clearing in a bacterial lawn called a plaque. These bacteriophages can be effective antimicrobial agents against many bacteria; therefore, research is being done to determine if bacteriophages can be a good substitute for antibiotics. Because bacterial infections tend to be associated with increased body temperature, it is important to determine the temperature sensitivity of these viruses. This experiment tries to determine the effect of temperature on plaque formation. This effect is addressed by incubating *E. coli* with the

bacteriophage, lambda, at 16°C, 30°C, 37°C, and 42°C and determining the number of observed plaques at each temperature. We demonstrated that more plaques are formed as temperature increases in the range provided. Therefore, at higher temperatures, the phages are able to survive and seem to be more effective.

## **Special Sessions:**

### **Campus Environmental Research: Audits, Baseline Studies, and Community Involvement**

#### **Environmental Audits Oral Presentations Session**

***410 Rhodes Tower, beginning at 1:00 pm until 4:20 pm***

*This is a special, non-juried session sponsored by the ACS Environmental Initiative to highlight sustainability on campus and in the neighboring community. The session is designed for students who are at the introductory stage of conducting research.*

#### **1:00-1:20 Gas Guzzling?**

David LeFevor

Elizabeth Cooper

Joan Mcenry

Faculty Mentor: Carol Ekstrom

Department of Physics (Geology)

With the current situation in the Middle East and the well known effects of fossil fuels on the environment, it is important to be cognizant of the amount of gasoline that we, as individuals and as a school, consume. We have generated figures on how much gasoline the average Rhodes student consumes on a daily, monthly and yearly basis on his/her commute to school. We also circulated a questionnaire to assess whether students were aware of the fuel efficiency of their automobiles and to see how a possible change in the campus automobile policies would be taken by the student body. The final part of our project was to collect information from campus safety on the fuel consumption of the campus fleet and decide, on a purely financial basis, whether a switch to more fuel efficient vehicles would be beneficial.

#### **1:20-1:40 Feasibility of a Glass and Plastic Recycling Program at Rhodes**

Andrea Strickland

Jim Hopkins

Faculty Mentor: Carol Ekstrom

Department of Physics (Geology)

We are investigating the possibility of implementing a plastic and glass recycling program. While Rhodes currently recycles aluminum and paper, there is no recycling program for plastic and glass. According to a previous garbology study done at Rhodes, plastic alone accounts for the third highest percentage of garbage generated on campus. Since that study was done, some of the coke vending machines at Rhodes have been changed from dispensing aluminum cans to dispensing plastic bottles and East Village has been built, both of which would most likely increase the amount of plastic generated on campus. We plan to estimate the quantity of plastic and glass generated by Rhodes, as well as the disposal costs. We will then attempt to organize a potential recycling program, dealing with issues such as man power, recycling facilities, and administrative requirements. Our goal is to organize a cost-effective program that a student could begin next year. If this is not possible, we hope to have at least taken the initial steps towards organizing a potential recycling program and towards making the administration aware of Rhodes' need for such a program.

**1:40-2:00 Energy Audit 2003**

Mike Menszer

Joshua Low

Faculty Mentor: Carol Ekstrom

Department of Physics (Geology)

Our environmental audit team conducted a study of energy use on campus. Rhodes College is a major user of energy in the city of Memphis. Energy production and consumption have been conclusively linked to significant environmental problems. Energy is also a cost for the college that can be controlled. We investigated lighting, HVAC, appliances, other energy users, and overall energy use closely to see where gains can be made and to see what trends we can find. Our research shows that Rhodes has many energy efficient practices, but there are significant gains to be made. Rhodes still has many energy inefficient lighting practices that could easily and cost efficiently be corrected. Heating and air conditioning are major users also. Where practical gains could be made, a recommendation was made. We hope that the decision makers at Rhodes College take seriously this and all environmental audits in order to improve the environmental quality of Memphis and the Earth.

**2:00-2:20 Is it Wiser to Have a Miser?**

Anna Burns

Erin Lawton

Swiggett Robbins

Faculty mentor: Carol Ekstrom

Department of Physics (Geology)

We studied the effect of the use of a Vending Machine Miser on kilowatt-hour consumption of cold drink machines. The Miser uses motion sensors to detect when the machine is needed, and then turns off when no one is around. The Miser also turns the machine on to keep drinks cool to cold if there is a long time between uses, and will cycle through this cold sequence quickly to conserve energy. The use of the Miser does decrease the kilowatt-hours consumption by the vending machine, but various factors effect the efficiency of the Miser such as people who simply pass by within the sensor's range and people who tamper with the equipment. The Misers would not be extremely cost effective for the first few years, when the equipment is first being bought, because it is expensive.

**2:20-2:40 Vertical Soil Analysis of the Cypress Creek Floodplain**

Kate Burgess

Nick Van Sant

Faculty Mentor: Carol Ekstrom

Department of Physics (Geology)

Soil in the northwest area of the Cypress Creek floodplain was sampled and analyzed for the presence of certain pesticides. Six samples were taken from a vertical core through the floodplain sediments at spacing of one foot to a depth of five feet. The samples were analyzed for the presence of chlorinated pesticide POPs, persistent organic pollutants, including chlordane, heptacholor, and dieldrin. A Soxhlet extraction was performed to remove the pesticides. The extract was concentrated and analyzed with a gas chromatograph-mass spectrometer. Preliminary results indicate the presence of these compounds. Previous soil studies in the area have been confined to surface samples in the eastern portion of the floodplain, and have concentrated on lateral variations in pesticide amounts away from the river channel. In contrast, the present study focused on vertical variations in the soil in an area that has been more frequently flooded. The results of our study will also be presented to VECA and others interested in the area, as nothing can be done with the floodplain until the extent of soil contamination is known.

3:20-3:40 **Water Audit 2003**

Daniel Bremmer

Enoch DeVors

Faculty Mentor: Carol Ekstrom

Department of Physics (Geology)

For our audit we compare flux and usage between a dormitory and a non-dormitory building. The two buildings that we will use are Spann (dormitory) and the McCoy Theater (non-dormitory). We have interviewed Amy Radford of the Physical Plant and gained information and statistics for the past several years that will help in this audit. We will also be using past audits for comparison. We plan on finding out how water usage has decreased and see if improvements in water conservation technology have helped to solve the problems of wasted water on campus. If not, we will consult the physical plant and see if there is any other method that can be used to conserve water. We will be investigating the possibility of an Eco-house project such as the one they are doing at Centre College. Our base line figures will be the stepping stones for such a project.

3:40-4:00 **Hazardous Waste on Rhodes Campus**

Marcus Cox

John Gordon

Cleve Weise

Faculty Mentor: Carol Ekstrom

Department of Physics(Geology)

As a part of the Environmental Geology 214 Environmental Audit program at Rhodes college, we have decided to discover hazardous material on campus, research the correct disposal techniques of hazardous material, find out if these practices at Rhodes are being followed, and if we can improve upon them. By studying hazardous materials on campus, we may be able to better store and dispose of dangerous materials on campus. Further with the development of an emergency plan we will be able to act quickly and effectively in the time of a spill emergency.

4:00-4:20 **Paper Survey**

Susan Duesler

Katie Duff

Faculty Mentor: Carol Ekstrom

Department of Physics (Geology)

Rhodes potentially wastes a significant amount of paper that could be recycled, put to more efficient/better use, or cut down. We examined the paper usage at Rhodes in the computer center, the purchasing office. We have conducted a cost analysis for paper consumption, tallied student usage of paper, and are examining other options. We have discussed the possibility for double-sided printing in the computer labs, but have concluded that it simply is not feasible. We have also noticed that the students are to blame for most of the paper waste on campus. However, we have other plans: we are hoping to ask faculty to commit to printing double-sided handouts, etc., through their departments and the copy machines. We believe that this will significantly cut down on much of the paper that is wasted. We are also in the process of determining how much paper is recycled and how much trash (that cannot be recycled) is placed within these bins.

**Community involvement in Environmental Research:**  
**SWEEP: Storm Water Environmental Education Project**

*SWEEP is an after-school program that partners Rhodes College and Cypress Middle School to focus on science and environmental education. It is funded by an EPA grant for 2002-2003.*

*Rhodes students Mary Johnston; Rebecca Held, Greta Clinton-Selig, Joanie Mcenry, Jeshenna Johnson, Julian Thomas, and students in Geology 214 have worked with Cypress SWEEP students on a variety of projects.*

*Our SWEEP partners are Ms. Gwendolyn Shorter, Cypress Middle School teacher; Ms. Brenda Pirtle, Cypress Middle School teacher; Mrs. Lora Gibbons, SWEEP Program Manager; and the SWEEP students from Cypress Middle School.*

**Lobby by Frazier Jelke Room 141, and Frazier Jelke Room 145**

2:30-4:00 **Models of Storm Drains, and Edible Landfills in F J Lobby near F J 141**

3:00-3:30 **SWEEP Skit and Songs in F J 145**

**Community Research: the Urban Studies Charette**  
***Orgill Room in Clough Hall.***

***Posters available for viewing 1:00 pm until 5:30 pm***  
***Students are available from 4:30 to 5:30 to answer questions about their posters.***

*This is a special, nonjuried session sponsored by the Urban Studies Program. The term “charette” signifies an intense effort to complete or present a project. The projects reflect fieldwork in Memphis and represent issues related to urban social, political and environmental policy.*

Faculty Mentor for the Charette: Michael Kirby, Urban Studies Program

**Church and Community: How are African American Churches providing for their Neighbors?**

Kate Norman

The project studies African American Churches within the Memphis community and their involvement in their own community. It shows how the congregations are interacting with their community by what services they are offering and the awareness they have of the needs of the community. Also, it examines whether the members of the congregations are living within the neighborhood where the Church is located. This project shows that Churches can have a significant impact on their community by recognizing the needs of their community and by providing services to meet these needs.

**Binghampton, ARE YOU BEING SERVED?**

Ginny Meadows

The project answers the questions if agencies really serve their target areas? It will research various private and public service agencies in the Binghampton neighborhood. Staff were interviewed from each organization to determine what services the organizations provide, information about volunteers and employees, and what clients they serve. A sample of agency clients were interviewed to determine how they viewed the quality of the services.

**Tracking COACT: A Case Study of Midtown Community Policing Practices**

Shayla White

Very little is known about community policing practices in Memphis and even the literature about community policing in other cities is limited. Community policing services and activities are hidden from view to the community and are very difficult for researchers to study. This study was able to obtain unique access to viewing the activities of community policing officers in the Madison Heights neighborhood of Memphis. The student “shadowed” the officers for four days and quantified the extent of time the officers spent on specific community policing activities. This research was supplemented with interviews of residents in the area. The hypothesis of this study was that the officers were not performing community-policing activities in the Madison Heights area. The research did not confirm the hypothesis and found some evidence of effective community policing practices. The study also suggests some ideas for improving community policing of this unit.

### **Jubilee Schools in Memphis**

Allison Grabias

The project examined the newly reopened Jubilee Schools in Memphis. By interviewing students from when the schools were originally opened and then interviewing current faculty, the project was able to compare specific aspects of the schools. Overall, it shows that by addressing the major problems of the original schools, the Jubilee Schools may be more successful.

### **A Redevelopment Strategy for the Sears Crosstown Building**

Curtis Thomas

This project is a study of the redevelopment potential of the Crosstown Sears building in Memphis. The Memphis building is one of many identical buildings that were abandoned when the Sears Corporation left the catalog business in the early 1990s. The goals of this project were twofold: First, to make an informed prediction about the likelihood of a rehab of the building based on an examination of what has been done with similar Sears buildings across the country. Secondly, to present a redevelopment proposal for the site that is sensitive to the needs of the surrounding community, as well as economic trends in Memphis. The redevelopment proposal is based on interviews with community association leaders and experts in the community, as well as an examination of market research and similar development projects. This proposal suggests a community-city partnership to initiate a redevelopment project, which entails a partial demolition of the building coupled with a mixed-use development including retail/service industry and mixed-income housing.

### **Who will take care of the Children? A Study of Quality Day Cares in Memphis**

Sarah Tuttle

This research project studies where quality daycare centers are present in the city of Memphis, their accessibility to low- income families, and what characteristics of the programs determine their level of quality. I will use the State Department of Human Services quality rating of each center. This research will only look at facilities for thirteen sites within four zip codes surrounding the Rhodes campus. Through interviews and studying the paperwork of individual centers, I hope to determine factors that create high quality daycare in low-income neighborhoods.

### **Problems with Funding Sources for CDC's in Memphis**

Libby Shea

The research project examined Community Development Corporations (CDC's) and their sources of funding. It examined the sources of funding problems. The research included interviews that pertained to specific types of funding such as the United Way, HUD, local government, federal grants, private donations, and foundation grants. The project compiled information that examines the problems with administering grants from various sources.

### **Life in Community Centers**

Lilli Bewley

The project delves into the life of City of Memphis community centers, an institution about which little is known. Participant observation studies were used at Lester Community Center and Hollywood Community Center. The study describes the kind of programs they offer and who uses them. It maps the location of the clients of the Centers.

### **Tax Increment Financing**

John Hendricks

The research project gives the reader a description of what Tax Increment Financing and how it is used by the city of Memphis in urban redevelopment. The study examines an actual redevelopment project about to take place on the Adam's Mark Hotel. It examines why Tax Increment Financing will be used in this project and some of the problems that Memphis and other cities have with Tax Increment Financing.

### **The Financial Cost of Misdemeanor Conviction in Shelby County**

Natalie Pennington

The project examined the cost to the convicted offender of specific criminal charges. The misdemeanor charges, prevalent in the lower court, are theft of property, prostitution, driving with a suspended license, violation of probation, assault, driving under the influence, and possession of controlled substances. The project was researched in collaboration with the Shelby County Criminal Justice Coordinator. Cost factors include bail, fines, court costs, restitution, probation fees, required program fees, and attorney fees. The project will inform government officials and hopefully, will act as a deterrent to would-be offenders.

### **Community Research: Memphis Connection Projects** *Orgill Room in Clough Hall*

*Posters available for viewing 1:00 pm until 5:30 pm*

*Students are available from 4:30 to 5:30 to answer questions about their posters.*

### **Community Assets in the Rhodes Collaborative Area**

Anne Hughes	Courtney Lundeen
Kyle Cutright	Laura Bishop
Libby Shea	Samantha Scott

### **Problem Properties in the Rhodes Collaborative Area**

Chip Hartigan	Darrell Clark
Erin Fleischer	Joseph McKinney
Phil Hartigan	

### **Problems and Solutions for a Gateway Street**

Rob Dalton	Teresa Clower
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### **Friends of VECA and the Urban Forest**

Elizabeth Enger

### **Local Voting Districts in the Rhodes Area**

Tom Carter

### **The Terrible Ten Polluters**

Katherine Edmonds

### **Foreclosures in Frayser**

Jenny McCarthy

**Industrial Facilities Discharging into Cypress Creek**

Kate Burgess

**A Decade of Change in Hickory Hill**

Rodriquez Bailey

**Biology II Laboratory Projects: Crayfish Behavior**

*Frazier Jelke 141w and 143w, beginning at 1:15 pm until 2:45 pm*

*This special, nonjuried session displays posters of research conducted over the last two weeks by the two Tuesday sections of the Biology II introductory labs.*

**The effects of female chemical signals on the agonistic behavior of male crayfish**

Stephanie Gong

Jessica Graham

Leah Kaye

Kristin McKenna

Faculty Mentor: David Kesler

Department of Biology

**Visual recognition ability in crayfish**

Kelley Babcock

Bethany Drehman

Adam Master

Faculty Mentor: David Kesler

Department of Biology

**Comparing dominance in male and female crayfish**

Rami Almefty

Peter Igoe

Kristen Andrews

Elizabeth Nabers

Faculty Mentor: David Kesler

Department of Biology

**The role of sex in crayfish agonistic behaviors**

Lydia Andras

Harrison Golden

Abigail Ray

Chasie Wallis

Faculty Mentor: David Kesler

Department of Biology

**Patterns of offensive and defensive behavior in crayfish: fight or flight**

James Frost  
Angela Kornman  
Richa Thapa  
Susan Wright  
Faculty Mentor: David Kesler  
Department of Biology

**Intensity and length of aggressive behavior between same sex crayfish**

Tyler Gamble  
Jonathan Huckeba  
Mark Stratton  
Faculty Mentor: Carolyn Jaslow  
Department of Biology

**Gender differences in crayfish (*Orconectes virilis*) exploration.**

Tristan Hill  
Johanna Ogden  
Lydia Vincent  
Sean Lowry  
Faculty Mentor: Carolyn Jaslow  
Department of Biology

**Crayfish habitat: color or physical barrier**

Meghan Davis  
Patti Mahautmr  
Stephanie Norris  
Ashley Steichen  
Faculty Mentor: Carolyn Jaslow  
Department of Biology

**The effect of serotonin on the aggressive behavior of crayfish**

Chelsea Ashworth  
Jessica Devitt  
Whitney Pickett  
Faculty Mentor: Carolyn Jaslow  
Department of Biology

**The effect of female presence on male crayfish behavior**

Michael Hohos  
Graham Little  
Adam Wilkinson  
Faculty Mentor: Carolyn Jaslow  
Department of Biology

**Acknowledgement and Special Thanks  
to the following contributors:**

**Judges**

David Jilg (Fine Arts)	Victor Coonin (Fine Arts)
Maria Talero (Humanities)	Tim Huebner (Humanities)
Terry Hill (Natural Sciences)	Romi Burks (Natural Sciences)
Mary Miller (Natural Sciences)	Darlene Loprete (Natural Sciences)
Brad Pendley (Natural Sciences)	Tony Becker (Natural Sciences)
David Jeter (Natural Sciences)	Shubho Banerjee (Natural Sciences)
Robert England (Natural Sciences)	Xinxin Jiang (Natural Sciences)
Greg Matthews (Social Sciences)	Natalie Person (Social Sciences)
Mark Pohlman (Social Sciences)	Tom McGowan (Social Sciences)
Chris Wetzel (Social Sciences)	Joyce Kim (Social Sciences)
Kim Hendrickson (Social Sciences)	

**Rhodes Jazz Combo**

John Ross (Director, guitar)  
Angela Kornman (alto sax)  
Jenni Scott (tenor sax)  
Matt Lum (drums)  
Nick van Sant (bass guitar)  
David Kottwitz (guitar)  
Neal McGough (piano)

**Special Session Organizers**

Carol Ekstrom: Campus-Community Environmental Research  
Michael Kirby: the Urban Studies Charette  
Carolyn Jaslow and David Kesler: Biology II Laboratory Poster Session

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