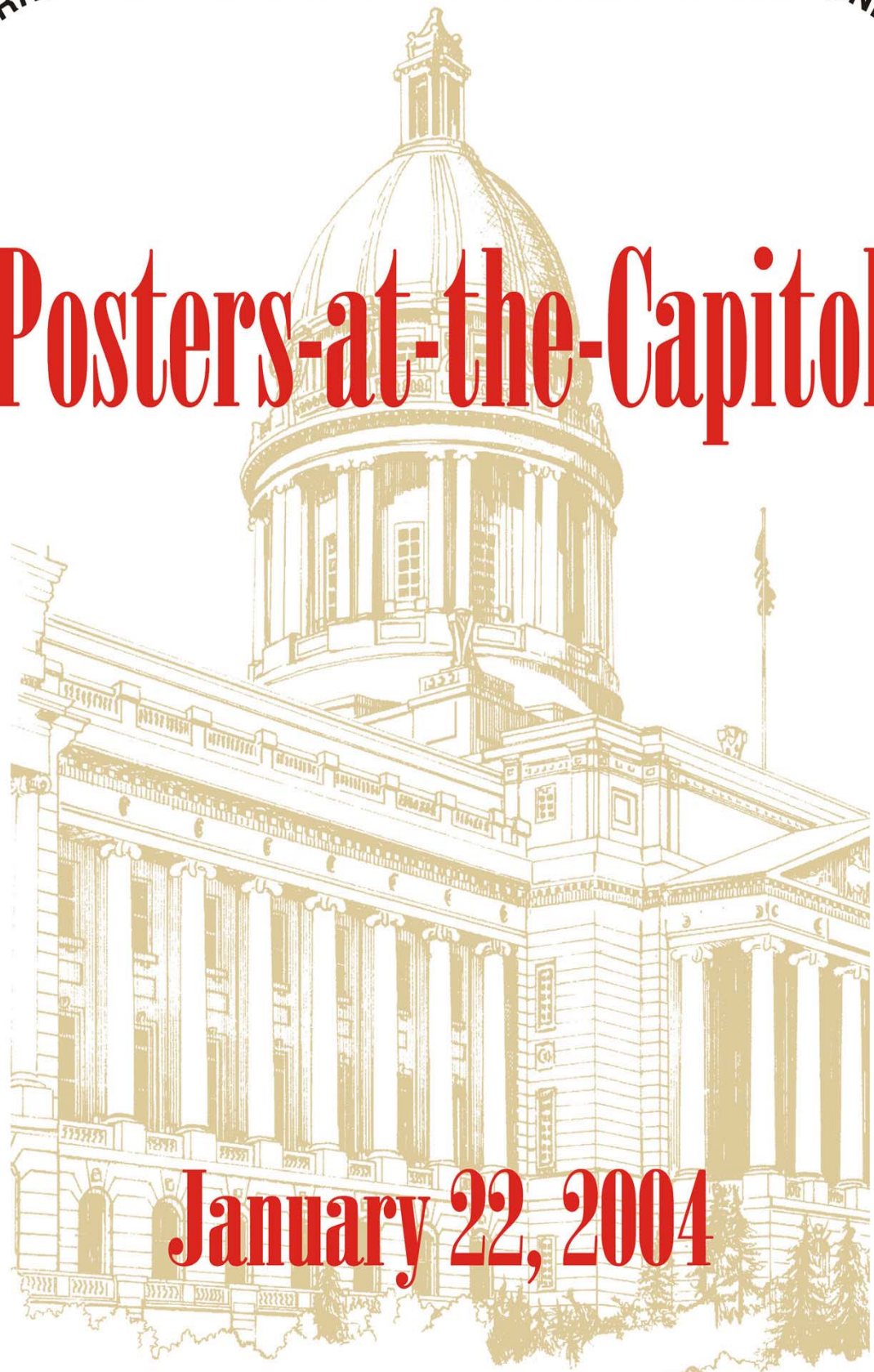


MURRAY STATE UNIVERSITY • NORTHERN KENTUCKY UNIVERSITY
UNIVERSITY OF KENTUCKY • UNIVERSITY OF LOUISVILLE • WESTERN
KENTUCKY UNIVERSITY • EASTERN KENTUCKY UNIVERSITY
KENTUCKY STATE UNIVERSITY • MOREHEAD STATE UNIVERSITY

Posters-at-the-Capitol



January 22, 2004



Joanne K. Glasser
President

Welcome from Eastern Kentucky University:

Eastern Kentucky University is proud to participate in the third annual *Posters-at-the-Capitol* program because we believe it demonstrates conclusively the high quality and tremendous value of public higher education in our Commonwealth.

Just as this impressive showcase celebrates the scholarly and creative achievements of our best and brightest students, it also reflects the collaborative efforts of dedicated faculty – inspirational professors who help students to reach within themselves to realize their full potential.

Undergraduate research is an integral part of the teaching-learning process at EKV, where we are committed to providing our students with myriad educational opportunities that enhance their classroom experiences and develop habits of scholarship and intellectual curiosity. Each year, our students’ outstanding work is displayed in a week-long Showcase for Undergraduate and Scholarly Activities. For faculty and students alike, this discovery and application of new knowledge is exciting and rewarding.

I commend all the faculty mentors in the *Posters-at-the-Capitol* program for providing yet another quality learning experience for their students. To all the students, I offer my congratulations and this challenge: let this experience be only the beginning of a lifelong educational journey. As I often say about Eastern Kentucky University, the best is yet to come for you. Go for it!



William H. Turner
Interim President

Welcome from Kentucky State University:

Tradition – Change – Transformation -- Renewal

James Allen, writing in *As a Man Thinketh* (1922), said it best; an expression of KSU’s mission: “People hold within themselves the key to every situation they face...[they] contain within themselves that transforming and regenerative agency by which they make of themselves what they will.”

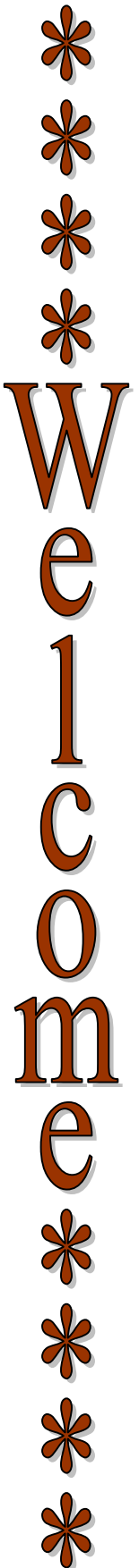
At Kentucky State University, small classes provide the ideal situation in which our teachers are the keys to the transformation and regeneration of our students...who make of themselves “what they will.”

KSU has, for more that 115 years, been a place where students -- from one end of the spectrum to the other -- are changed: young, fresh-out-of high school good students are transformed to great ones; and, similarly, older/adult, non-traditional students find renewed interests and vigor for lifelong learning.

KSU’s entries in Posters-at-the-Capitol provide our legislators with a glimpse of how our faculty members advise, guide, and tutor our students, all in keeping with our motto, “Enter to Learn, Go out to Serve.”

KSU, the Commonwealth’s most unique liberal arts public college, offers an extensive variety of professional degree programs at the associates, bachelors, and masters levels. KSU may well be the nation’s most multi-ethnic campus: our student body, faculty and staff represents people from all walks of life, from across the Commonwealth and scores of points around the globe.

KSU prides itself for providing the human and organizational resources to help students make of themselves what they will. KSU: time-honored traditions on the cutting edge of change.





Ronald G. Eaglin
President

Welcome from Morehead State University:

We at Morehead State University are very pleased to once again participate in the *Poster-at-the-Capitol* event. What a creative way to showcase the scholarly research accomplishments of our undergraduate students. At Morehead State University, we take great pride in our commitment to provide high quality research experiences to undergraduate students. We believe that these research experiences strike at the core of education by providing opportunities for faculty and students to work together in the development of new knowledge. In addition, these faculty-mentored projects allow students to interact on important topics, and reinforce cooperation in academic pursuits. The diversity of projects reflects the multidisciplinary research that will be needed to solve the issues facing our world, and strengthens the inter-connectivity among disciplines in formulating solutions to these issues. My congratulations to all participants, and thanks again for including Morehead State University in this cooperative effort.



F. King Alexander
President

Welcome from Murray State University:

As Kentucky's universities strive to help the Commonwealth's students achieve their full potential, engaging our students in research, scholarly and creative work under the watchful eye of a caring faculty is an essential component of that education. We at Murray State are again pleased and proud to be represented at *Posters-at-the-Capitol* by a set of undergraduate projects that clearly demonstrate the kind of high quality work students and faculty at Murray State are engaged in today.

Throughout the year, our students work closely with outstanding faculty from an array of academic disciplines to develop and foster new ideas that are on the cutting edge of their disciplines. This kind of scholarly collaboration between students and faculty produces new knowledge that can shape the career paths of our students while also affecting the social and economic development of our cities, counties, and states.

Murray State is not interested in the status quo. We are taking steps to see that even greater numbers of undergraduates have the opportunity to engage in scholarly work with our faculty. We have established the Undergraduate Research and Scholarly Activity Office to help ensure that these educational opportunities are available to students across our entire campus. Through this office, students at Murray State have the opportunity to submit proposals and to obtain campus-based funding to support their faculty mentored work. We are also showcasing our students' accomplishments to the Murray community through a weeklong celebration called *Scholars Week*.

I look forward to watching these educational opportunities grow at Murray State and throughout Kentucky in the years to come. I invite all residents of Kentucky to come to *Posters-at-the-Capitol* and see how our students are contributing ideas that are impacting our communities and our understanding of the world around us.



**James C. Votruba
President**

Welcome from Northern Kentucky University:

Two of the Strategic Goals of Northern Kentucky University are to “Strengthen our commitment to ‘up close and personal’ as a defining quality of the NKU experience”, and to “Expand student participation in undergraduate research and other forms of creative activity as a defining characteristic of NKU.” These goals point to the very important role that undergraduate research plays in the fabric of our university life. Direct interaction between faculty and students in undergraduate research and creative activities results in development by the students of critical thinking and analytic skills as well as oral and written communication skills needed to present their work. These interactions also foster the deep intellectual bond between faculty member and student that is a defining characteristic of our students’ education.

We are proud and pleased to present our students’ work at this event in the State Capitol. These posters are the culmination of much effort by these students and their faculty mentors and exemplify the quality work by undergraduate researchers at Northern Kentucky University. We know that the students displaying their work here are future leaders in the development of the intellectual infrastructure of the Commonwealth and are therefore confident of Kentucky’s future.



**Lee T. Todd, Jr.
President**

Welcome from the University of Kentucky:

Research is a powerful engine that helps drive the economic and educational missions of the Commonwealth. I believe some exposure to and participation in the research process is important for every college student’s academic career. The experience opens the mind to new ideas and new possibilities.

Posters-at-the-Capitol is an excellent opportunity to recognize undergraduate research as an essential part of the educational experience; one that benefits both students and faculty. For students, undergraduate research affords an opportunity to work collaboratively with faculty and peers, to participate directly in the creative process and the generation of knowledge, to experience the rewards of inquiry based learning, and to expand upon the lessons learned in the classroom. Through undergraduate research, students experience personally the intellectual passion that is the foundation of scholarship at the University of Kentucky.

For faculty, there is no more rewarding teaching opportunity than to serve as a mentor for an eager young mind. The goals that inspire faculty and establish teaching as one of the truly noble professions include opportunities to excite imagination, foster curiosity, and celebrate the values of academic scholarship. Supervision of undergraduate research and creativity projects maximize those kinds of teaching opportunities.

The University of Kentucky is proud of its strong commitment to undergraduate research and creativity. That commitment is reflected by our recent efforts to expand support of undergraduate scholarship, the creation of Kaleidoscope -- a new University journal dedicated to scholarly accomplishments of our undergraduates -- and the Annual National Conference on Undergraduate Research that was held at the University of Kentucky in 2001. We look forward to building upon this success.

Thank you for being a part of this event and remember research is never ending. It has no limits and can take you anywhere you are willing to explore. Enjoy the journey.



James R. Ramsey
President

Welcome from the University of Louisville:

The University of Louisville is delighted to participate in the third annual *Posters-at-the-Capitol* program on January 22, 2004. Not only does this event give our students an opportunity to share with state leaders the excitement we have for undergraduate research, but it also allows our students to interact with the legislators who shape state policy. We are pleased to support this program, which introduces undergraduate students to the importance of scientific investigation, the creation of new knowledge, and the investment of the state in R&D. This collaborative event brings together talented undergraduates, their faculty-mentor, and elected officials to showcase the academic achievement of Kentucky's higher education system.



Gary Ransdell
President

Welcome from Western Kentucky University:

Western Kentucky University takes great pride in the fact that excellent faculty from a wide array of academic disciplines involve students in research activities outside the classroom. The comprehensive university in America has as its primary responsibility the applied use of its intellectual capacity to identify and solve problems which exist in its region. These scholarly collaborations utilize the concepts learned in the classrooms thereby better preparing students for the workforce and graduate/professional schools. In addition, many of the research projects address issues important to constituents outside the University thereby impacting the social and economic development of our community, counties, state, and nation.

As in last year's event, it is very gratifying to see the number and diversity of student scholars along with their faculty mentors participating in *Posters-at-the-Capitol* project. It is vitally important that our legislators meet these students and witness the tangible benefits accruing from ongoing student research at our Universities and its potential impact on an improved quality of life for all Kentuckians. WKU is proud to participate in the *Posters-at-the-Capitol* Project.

Schedule of Activities

9:00 a.m. to 11:00 a.m.Poster Setup

9:00 a.m. to 2:00 p.m.Legislative Visits

11:00 a.m. to 1:00 p.m.Student Oral Presentations (Rotunda)

- Wesley Penn.....Eastern Kentucky University
Modeling the Human Adrenergic Receptors
- Danielle Rascoe..... Kentucky State University
Assessment of the Utility of ISSR Markers for Evaluating Genetic Diversity in Asimina and Annona Species
- Elizabeth Flynn..... University of Kentucky
Mechanism of Multiple Lysine Methylation by SET Domain Enzyme Rubisco LSM1
- David Charles.....Morehead State University
Subclinical Depression Masquerading as Adult AD/HD on the Brown ADD Scales: A Preliminary Study
- Natalie Bisha Krupansky.....Murray State University
An Investigation Into the Bel Canto Style and How Rossini Used Bel Canto Techniques While Having a Major Impact on Mezzo-soprano Roles
- Janice Mueller.....Northern Kentucky University
The Medieval Manuscript: The Production, Design, and Purpose of a Fifteenth-Century Book of Hours
- Monica Nicole Hall.....University of Louisville
The Role of COUP-TF in Tamoxifen Resistant Breast Cancer Proliferation
- Gretchen Berryman.....Western Kentucky University
Occurrence and Distribution of Mercury in Mammoth Cave National Park Phase I

11:00 a.m. to 5:00 p.m.General Poster Session Viewing

3:00 p.m. to 5:00 p.m. Reception

***Posters-at-the-Capitol* Organizing Committee**

John Mateja, Chair
Murray State University

Rose Perrine
Eastern Kentucky University

Paul Bibbins, Jr.
Kentucky State University

Bruce Mattingly
Morehead State University

Phil Schmidt
Northern Kentucky University

Philipp Kraemer
University of Kentucky

Pamela Feldhoff
University of Louisville

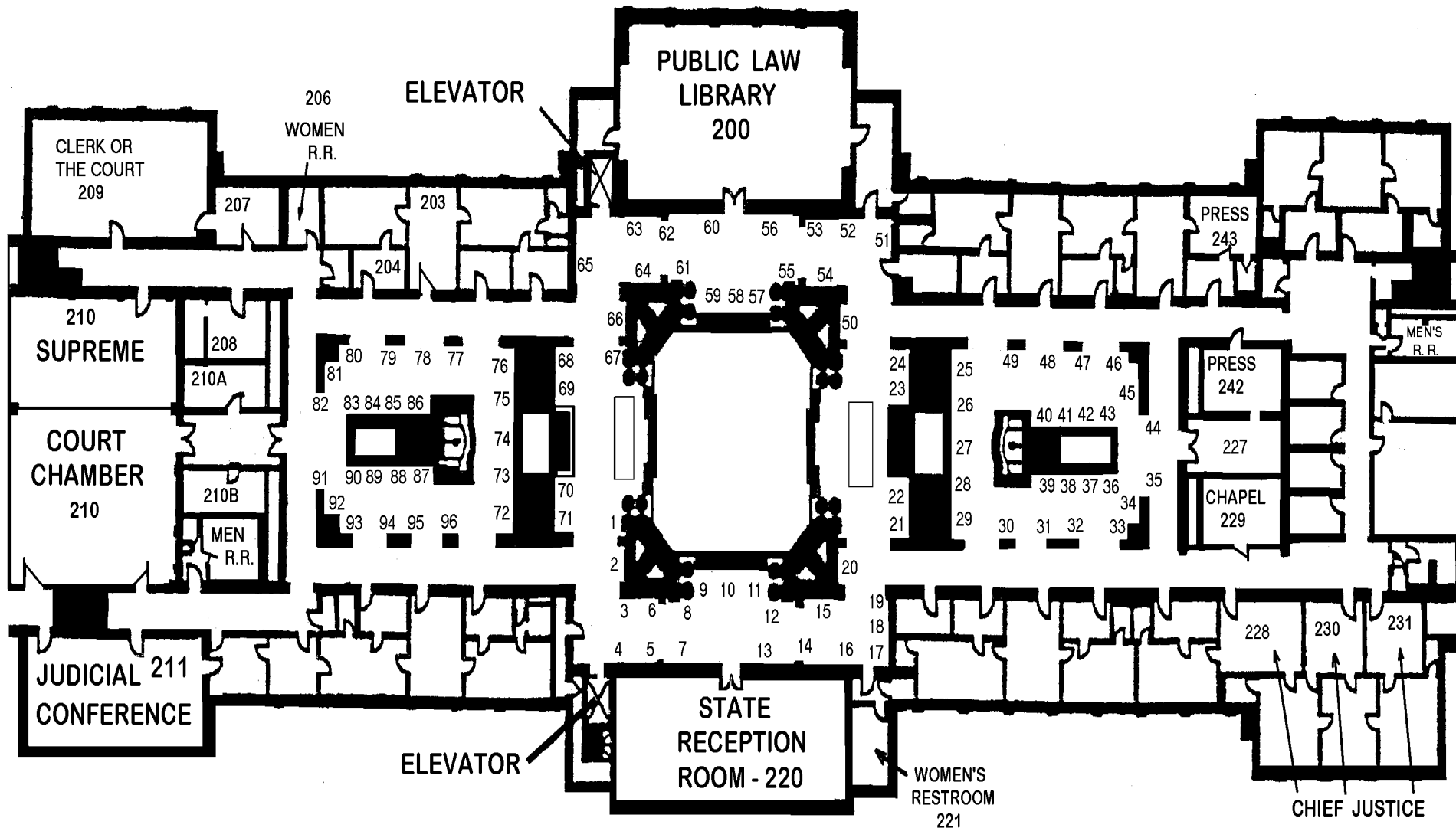
Blaine Ferrell
Western Kentucky University

Please visit the *Posters-at-the-Capitol* web site at:
<http://campus.murraystate.edu/services/ursa/>



Poster Locations

January 22, 2004



**SECOND FLOOR
(JUDICIAL BRANCH)**

Posters by University

Eastern Kentucky University

Poster No.	Students		Faculty Sponsor		Page No.
52	Lisa	Carpenter	Debra	Bautista	28
82	Alexandra	Carter	Isabelle	White	43
32	Michele	Gillock	Kelli	Carmean	18
72	Jordan	Hall	Debra	Bautista	38
86	Jordan	Hussey-Anderson	Barbara	Hussey	45
82	Kimberly	Mayfield	Isabelle	White	43
82	Sheena	Moran	Isabelle	White	43
32	Kevin	Morrison	Kelli	Carmean	18
68/OP	Wesley	Penn	Debra	Bautista	36
32	Erin	Robertson	Kelli	Carmean	18
86	Crystal	Sparks	Barbara	Hussey	45
23	Amanda	Stevens	Debra	Bautista	13
06	Brent	Wilhelm	Robert	Lierman	03

Kentucky State University

47	Erin	Allen	Tamara L.	Brown	26
07	Kelli	Fields	James	Tidwell	04
22	Blakney	Grey	Avinash	Tope	13
01	Clarence	Jordan	George	Antonious	01
60	Gayle	Joseph	James	Tidwell	32
91	Abraham	Mekonnen	Kazi	Javed	48
39	Samuel	Mutisya	George	Antonious	22
65	Russell	Neal	James	Tidwell	35
95	Hermine	Ngwang	Myna	Panemangalore	50
13	Daddy	Nimoh-Boateng	George	Antonious	07
22	Esughani	Okonny	Avinash	Tope	13
83	Esughani	Okonny	Carolyn	Klinge	44
75/OP	Danielle	Rascoe	Kirk Pomper	T.S. Kochhar	40

Morehead State University

81	Lisa	Brinley	Christine	McMichael	43
12	Brent	Caudill	Ilsun	White	06
OP/98	David	Charles	Sean	Reilley	52
81	Laurel	Curtis	Christine	McMichael	43
87	Amanda	Day	Shari	Kidwell	46
53	Christopher	Garris	Laurie	Couch	29
05	Drew	Gilliam	William	Grise	03
61	Dennis	Griffith	Wesley	White	33
12	Nao	Hagiwara	Ilsun	White	06
08	Nao	Hagiwara	Ilsun	White	04
81	Jennifer	Hardin	Christine	McMichael	43
81	Heidi	Hassel	Christine	McMichael	43
12	Andy	Hogge	Ilsun	White	06
66	Billy-Paul	Holbrook	Capp	Yess	35
12	Lee	Meade	Ilsun	White	06
81	Amanda	Meyer	Christine	McMichael	43
87	Aimee	Mullins	Shari	Kidwell	46
26	Ryan	Mynatt	Mark	Blankenbuehler	15
43	Matthew	Preece	Adrian	Mandzy	24
33	Ashley	Ratliff	David	Olsen	19
20	Tiffany	Smith	Sean	Reilley	11
81	Janette	Stidham	Christine	McMichael	43
87	Brandy	Stiltner	Shari	Kidwell	46
81	Jennifer	Thompson	Christine	McMichael	43
12	Christopher	Whitaker	Ilsun	White	06
78	Christopher	Whitaker	Ilsun	White	41

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Posters by University

Murray State University

Poster No.	Students		Faculty Sponsor		Page No.
50	Richard	Blalock	Terry	Derting	27
15	Travis	Brown	Claire	Fuller	08
57	Brandon	Chandler	Patrick	Williams	31
50	Steve	Coe	Terry	Derting	27
50	Stephen	Compton	Terry	Derting	27
57	Lindsey	Donoho	Patrick	Williams	31
92	Anis	Drira	Theodore	Thiede	48
57	Jesse	Gray	David	Ferguson	31
57	Brad	Hall	Jay	Morgan	31
57	Chad	Hall	David	Ferguson	31
57	David	Hayden	Patrick	Williams	31
57	Cory	Hicks	Ken	Bowman	31
46	Jennifer	Hughes	Renee	Fister	25
57	Meigan	Jackson	Jay	Morgan	31
27	Ross	Jones	Mark	Masthay	16
30	Matthew	Kelleher	Mark	Masthay	17
OP/99	Natalie Bisha	Krupansky	Sonya	Baker	53
70	Trenton	LeBaron	Ricky	Cox	37
57	Scott	Lowe	Jay	Morgan	31
50	Caleb	Mathis	Terry	Derting	27
84	Michelle	Meyer	Ivan	Pulinkala	44
57	Josh	Monroe	Ken	Bowman	31
14	Brianna	Moore	George	Kipphut	07
48	Elaine Beth	Moss	Scott	Lewis	26
70	Tara Rica	Murdock	Ricky	Cox	37
38	Robert	Reding	Nancy	Boling	21
62	Satinder	Sidhu	David	Canning	33
50	Maninder	Virk	Terry	Derting	27
30	Lindsey	White	Mark	Masthay	17

Northern Kentucky University

16	David	Arnold	Douglas Krull	David Silvera	08
34	Jennifer	Eisenman	Judy	Neimi	19
74	Brad	Fitzpatrick	Thomas	Sproat	39
16	Tracy	Gramer	Douglas Krull	David Silvera	08
18	Nicholas	Haigis	Richard	Durtsche	09
80	Aaron	Hamlin	David	Hogan	42
88	Tom	Huesman	David	Hogan	46
09	Steffanie	Johnson	Vinay Kumar	Heather Mayfield	05
56	Jennifer	Jones	Judy	Neimi	30
42	Stephanie	Kenyon	Douglas	Krull	23
34	Matthew	Koehl	Judy	Neimi	19
56	Heidi	Mazor	Judy	Neimi	30
64	Amy	Menning	Andrew	Long	34
31	Melissa	Miller	Richard	Durtsche	18
OP/100	Janice	Mueller	Tamara	O'Callaghan	53
16	Ashley	Munzy	Douglas Krull	David Silvera	08
71	Kate	O'Toole	Patrick	Schultheis	38
16	Mary	Ott	Douglas Krull	David Silvera	08
25	Jennifer	Quammen	Richard	Durtsche	15
16	Christy	Richardson	Douglas Krull	David Silvera	08
16	Nicky	Weber	Douglas Krull	David Silvera	08

Posters by University

University of Kentucky

Poster No.	Students		Faculty Sponsor		Page No.
96	Katina	Ball	Susan	Barron	51
63	Brandon	Barker	Jerzy Jaromeczyk	Charles Staben	34
79	Michael	Cieraszyński	Thomas	Zental	42
76	Adam	Craig	Melody	Carswell	40
21	Jerrold	Dempsey	David	Atwood	12
21	Lauren	DePue	David	Atwood	12
03	Fabiola	Djojo	David	Westneat	02
40	William	Dotson	Mary	Cain	22
63	James M.	Downs	Jerzy Jaromeczyk	Charles Staben	34
OP/97	Elizabeth	Flynn	Robert	Houtz	52
96	Rebecca	Gilbertson	Susan	Barron	51
35	Bethany	Hoffman	Donald	Saucier	20
63	Andrea	Hunt	Jerzy Jaromeczyk	Charles Staben	34
63	Jeremy	Leachman	Jerzy Jaromeczyk	Charles Staben	34
96	Kelly	Lewis	Susan	Barron	51
28	Jason	Long	Mark	Prendergast	16
96	Sarah	Mills	Susan	Barron	51
96	Kelly	Morrow	Susan	Barron	51
63	Jean-Hughes	Niclaire	Jerzy Jaromeczyk	Charles Staben	34
10	Evan	Richardson	Richard Milich	Monica Kern	05
96	Darby	Schulman	Susan	Barron	51
96	Suzanne	Sizemore	Susan	Barron	51
63	Jamie	Unseld	Jerzy Jaromeczyk	Charles Staben	34
21	Miguel	Viveros	David	Atwood	12
89	Matthew	Williams	Keith	MacAdam	47

University of Louisville

55	Larry	Adamson	Cynthia	Gulledge	30
73	Kim	Bogle	Barbara Burns	Julia Robinson	39
19	Stefanie	Bumpus	James	Wittliff	10
73	Elizabeth	Davis	Barbara Burns	Julia Robinson	39
11	Jennifer	Ferrell	Patricia	Cerrito	06
73	Angela	Givian	Barbara Burns	Julia Robinson	39
73	Diana	Golub	Barbara Burns	Julia Robinson	39
OP/101	Monica Nicole	Hall	Carolyn	Klinge	54
85	Samuel	McNeely	Christopher	States	45
58	Suzanne	Nichols	David	Brown	31
04	Amber	Nickels	Barbara	Burns	02
93	Kevin	Price	Michael	Losavio	49
49	Lesley	Ramos	Marianne	Hutti	27
55	Erin	Roberts	Cynthia	Gulledge	30
45	Mary	Rollins	Deborah	Davis	25
73	Sarah	Schmidt	Barbara Burns	Julia Robinson	39
85	Venetta	Smith	Christopher	States	45
85	Frazier	Taylor	Christopher	States	45
69	Jason	Wells	Stephen	Onifer	37
37	Daniel	Williams	Clara	Leuthart	21
73	Travis	Wimsett	Barbara Burns	Julia Robinson	39
24	Michael	Young	Susan	Galandiuk	14

Western Kentucky University

OP/102	Gretchen	Berryman	Cathleen	Webb	54
77	Daniel	Brame	Gordon	Smith	41
17	Chelsea	Campbell	Cathleen	Webb	09
51	Richard	Cohen	Cheryl	Davis	28
90	Shauna	Cornwell	Chris Grove	Beth Ann Robb	47
44	Douglas	Foster	Keith	Phillips	24
36	Rick	Fowler	Shivedra	Sahi	20
59	Benjamin	Hutchins	Scott	Grubbs	32
67	Jason	Kuykendal	Chris	Grove	36
41	Jospeh	McDaniel	Gordon	Smith	23
51	Kiran	Padigala	Cheryl	Davis	28
36	Eli	Roberson	Shivedra	Sahi	20
29	Thomas	Ruley	Shivedra	Sahi	17
59	Christopher	Thomas	Scott	Grubbs	32
51	Lewis	Watson	Cheryl	Davis	28
02	Travis	Wilson	Pitt	Derryberry	01
54	Earl	Wood	Sergey	Marchenko	29
94	Robert	Zimmerman	Sergey	Marchenko	49

01. Clarence Jordan

Kentucky State University

Faculty Sponsor: George F. Antonious

Impact of Soil Management on Herbicide Movement in Soil and Water

Runoff from agricultural watersheds carry enormous amounts of pesticides. During crop production, pesticides may move from application site into runoff water and runoff sediment following irrigation systems or natural rainfall events. Organic amendments, commonly used to enrich soils of low organic matter content, can modify the soil surface and stimulate soil microbial activity which could potentially lead to pesticide degradation and reduce amount of chemical available for leaching. Field studies were conducted at Kentucky State University Research Farm (Franklin County, KY) to assess the influence of composted sewage sludge mixed with native soil at the rate of 50 tons/acre (on a dry weight basis) on trifluralin (Treflan) and napropamide (Devrinol) movement from the application site into runoff water. Following herbicide spraying, triplicate water samples were collected periodically for trifluralin and napropamide analysis using a gas chromatograph equipped with nitrogen-phosphorus detector. Results have indicated that the use of sewage sludge can become a useful technique for trapping non-polar pesticides such as trifluralin and may reduce surface and groundwater contamination by non-polar pesticides.

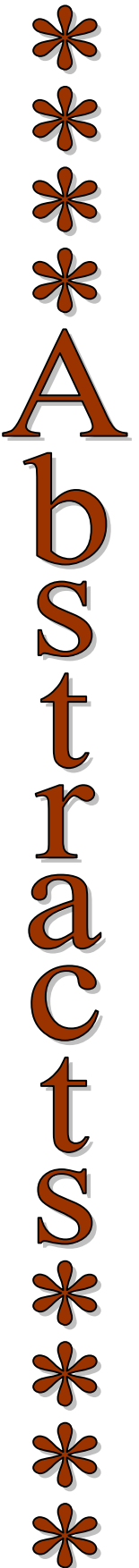
02. Travis Wilson

Western Kentucky University

Faculty Sponsor: Pitt Derryberry

Differences in Factors Contributing to the Moral Judgment of College Students and Gifted Youth

In order to better understand moral judgment developmental differences and processes, this study examined gifted and college student samples. Considered were indices and scores from the Defining Issues Test (DIT), ACT scores, Attributional Complexity Scale (ACS), and a five-factor based Personality Descriptor Recognition Questionnaire (PDRQ). Compared in the current study was a sample of 101 college students with a sample of 93 gifted youth. In order to first account for any differences between samples, a multivariate analysis of variance (MANOVA) was conducted. Revealed were significant differences favoring the gifted sample particularly for DIT, ACT, PDRQ Agreeableness low pole, and PDRQ Openness to experience high pole scores. In order to ascertain if ACS, PDRQ, and ACT/SAT scores contributed differently to DIT scores in each sample, Stepwise Hierarchical Regression models were conducted. For college students, two steps were revealed with ACT scores loading first and ACS loading second. For the gifted youth, three steps were specified with ACS scores loading first, ACT scores loading second, and PDRQ Conscientiousness high pole scores loading third. Taken together, these findings suggest college students rely on different raw materials in making moral judgments than do gifted youth and that such process differences may also contribute to certain advancements. This study therefore supports that contributions to moral judgment development should not be considered the same across varying demographics and encourages future efforts to understand populations prone to early advancement such as the gifted in the hopes of transferring gained knowledge to other populations.



03. Fabiola Djojo

University of Kentucky

Faculty Sponsor: David Westneat

West Nile Virus in House Sparrow

West Nile Virus (WNV) is an emerging disease of great importance to human health and economy. It spreads via interactions between its normal host, birds, and its vector, mosquitoes, which may bite incidental hosts such as horses or humans. The house sparrow (*Passer domesticus*) is the most common bird in our environment and may be an important host reservoir for WNV. We analyzed blood samples collected from adult and juvenile house sparrows during the summer of 2002. We extracted viral RNA and used reverse transcription to make a DNA copy. We then used PCR to amplify a known segment of the DNA. Samples producing a band of the correct size were considered positive for WNV. We found that 38 of 133 birds (28.6%) were positive for WNV. Most cases of WNV occurred in July and in juveniles. We also found that infection frequency varied by location. These results have implications for understanding the ecology of WNV in avian populations and the risks to humans and livestock of contracting the disease.

04. Amber Nickels

University of Louisville

Faculty Sponsor: Barbara Burns

An Examination of Attention Abilities and Comprehension in Children of Poverty

This study examines the relationship between aspects of attention and comprehension of a televised story in children from economically disadvantaged backgrounds. A method of looking at three attention networks is used to measure attentional abilities, including orienting, alerting, and executive function. The method involves three computerized games, which tap into these three networks. A naturalistic TV viewing task is used to assess comprehension of both factual and causal information of a story. In this task there are two conditions, toys available to play with while watching the program and no toys present. Results show that children did significantly better on factual questions than on causal questions overall. Also, children who did well on the causal questions also had lower reaction times on the orienting and alert attention tasks. We also found that in the toys present condition, children who did well on the factual questions had lower reaction times on the orienting and alerting attention tasks. However, there were no significant differences in factual questions in the toys absent condition. We conclude that there may be a relationship between being able to understand causal relations and using abilities such as orienting, shifting and maintaining attention. These abilities may also be needed to perform well on factual questions when a distracter is present.

05. Drew Gilliam

Morehead State University

Faculty Sponsor: William Gris 

Testing, Development, and Implementation of an Improved Security System, Involving Electrical, Mechanical, and Data Communication Solutions

The project focused on the analysis and solution development of an individual door-alarm security system at a self-storage facility. An improved system was designed to address recurring failure points, instability issues, and consequential legal concerns. Preliminary, on-site investigations led to extensive research and experimentation. Possible solutions were developed and tested in a laboratory setting, to determine system parameters. The principal solution component involved an innovative, latch activity detection circuit, which monitored door latch activity, and utilized LED notification to inform tenants of the latch status. Implementation involved functional wiring between a multiplexer, sensor-switch, and LED. Multiplexer expansion and configuration were necessary. A centralized, standalone access control device and system data file also required programming, to recognize the additional circuitry. Mechanical components included a magnetic block and sensor-switch. This circuit supplemented an improved door activity monitoring system, which incorporated enhanced steel bracing, and threaded fasteners to secure the existing components. The final solution methods were tested on-site, and reevaluated as necessary. Testing procedures scrutinized the electrical, mechanical, and data communication fortitude of the improved system. Solution support included AutoCAD diagrams, thorough implementation cost analysis, testing and implementation photographs, and authentic log printouts verifying the success of the improved system.

06. Brent Wilhelm

Eastern Kentucky University

Faculty Sponsor: Robert Lierman

Constructing a Geologic Map: Farmers and Salt Lick Quadrangles of Rowan County, KY

The Farmers and Salt Lick 7.5 minute quadrangles are located in Rowan County, KY. The quadrangles were mapped as a course project in Fall Semester of 2002. The reasoning behind the project was to: 1) better understand deltaic sequences of Devonian and Mississippian Age rocks, 2) find the trend of the depositional setting through analysis of lithologic formations and beds, and 3) create stratigraphic columns, structural contour maps, and a Geologic Quadrangle incorporating the information from the field area. There were eight total outcrops that were analyzed and the rock formations were characterized by grain size, weathering characteristics, bed thickness, bed shape, fossils, and depositional location. Once a precise boundary was decided between each formation, elevation readings could be recorded. This allowed the class to discover the trend in the depositional setting that tilted the rock formations in an easterly direction. This information was seen in magnitude when the structural contour maps were created. The Geologic Map created was imposed on a topographic map and formation boundaries were carefully sketched in according to elevation. In conclusion, all students better understood the depositional setting of Central and Eastern Kentucky as the physical work solidified classroom theories about deltaic settings. The Geologic Map created describes the physical nature of the rocks and can be read to find the elevations of areas within the two quadrangles. The authors are currently conducting further research to conclude the reasoning of the trend in the rocks.

07. Kelli Fields

Kentucky State University

Faculty Sponsor: James Tidwell

A Comparison of Potential Chemical Treatments for Reducing pH Levels in Freshwater Prawn Production Ponds

Commercial producers of freshwater prawns have experienced significant problems with high pH levels in the growout ponds. This is especially true in new ponds where pH levels may exceed 10 and result in significant or even complete prawn mortality. Different chemical approaches have been proposed to lower potentially lethal pH levels. Alum can reduce carbonates, gypsum adds calcium, baking soda adds carbonates, and sugar breaks down to carbonic acid, all of which could potentially reduce pH levels. However, these approaches have not been scientifically evaluated. Alum, gypsum, baking soda, and sugar were each evaluated for their ability to control pH at treatment concentrations of 5 and 10 mg/l. There were four replicates of each treatment and control (0 mg/l) using 36 380-l tanks. All tanks were filled from a single reservoir tank that had been fertilized to promote phytoplankton growth that in turn increased pH to near 10. Treatment compounds and concentrations were added at 1600 h and pH was checked each day at 1600 h over a three day period. pH values were then regressed over time and slopes of the regression lines were compared. Statistical evaluation determined slopes from experimental ponds were not significantly different ($P>0.05$) from those of untreated controls. Future research should evaluate higher concentrations of these chemicals for reduction of pH in prawn ponds.

08. Nao Hagiwara

Morehead State University

Faculty Sponsor: Ilsun White

Differential Involvement of the Prefrontal Cortex and the Nucleus Accumbens in Visuospatial Learning

The medial prefrontal cortex (mPFC) and the nucleus accumbens (NAc) are thought to play an important role in spatial learning. Neuroanatomical studies indicated a topographical organization: NAc-core region projects to the dorsal mPFC and NAc-shell region projects to the ventral mPFC. The present study examined differential involvement of subregions within mPFC and NAc during two visuospatial tasks using reversible lesions with lidocaine. Lidocaine produces a temporal blockade of neural transmission. Wistar rats were trained on two tasks; one required a correct barpress on cue location (matching); the other required a correct barpress opposite to cue location (non-matching). Upon reaching a criterion ($\geq 85\%$ correct, 3 consecutive sessions), rats were cannulated in mPFC (dorsal/ventral) or NAc (core/shell). After recovery, rats were retrained until their performance reached the pre-surgery criteria, and received lidocaine and saline infusions into each subregion of mPFC or NAc. Lidocaine infusions into neither subregion of mPFC affected performance on the matching task. Lidocaine infusions into the ventral, not dorsal, mPFC decreased correct responses on the non-matching task. Interestingly, lidocaine infusions into either shell or core decreased performance on both tasks. Our preliminary data indicate that activation of D1-dopamine receptors within shell, but not core, is critical for successful performance during the non-matching task. Our data suggest that visuospatial discrimination requires both mPFC and NAc, and that involvement of each subregion within mPFC and NAc depends on the nature of behavioral tasks.

09. Steffanie Johnson

Northern Kentucky University

Faculty Sponsor: Vinay Kumar

Examination of Ethylene Glycol Concentrations and Biological Oxygen Demand in Natural Waters

This project is a collaborative effort between the Sierra Club Water Sentinels Program and Northern Kentucky University. There are currently no federal regulations on the amount of glycol that may be present in natural water. Glycol is the main component of de-icing fluid used on airplanes. While de-icing is an important function in maintaining air transportation safety, it is believed that the glycol causes increased Biological Oxygen Demand (BOD) in surrounding streams. At the beginning of this project a method for quantifying ethylene glycol was developed. Quantitative and qualitative monitoring of the streams around the Cincinnati Northern Kentucky Airport is ongoing. The comparison of glycol concentrations and BOD data will be used by Sierra Club in an effort to establish a need for regulations on the amount of glycol that can be released into natural waters.

10. Evan Richardson

University of Kentucky

Faculty Sponsors: Richard Milich and Monica Kern

The Role of Individual Differences and Forgiveness in Women Who Have Been Victimized

The present study assesses how individual differences may modulate the role of forgiveness in women who have been victimized in the past, in hopes of decreasing levels of negative affect and finding differences in cognitive coping strategies. The major purpose of this study is to replicate a previous study by Witvliet et al. using a sample of women who have reported being victimized in the past. The present study will assess if focusing on either interpersonal (more traditional view of forgiveness, willingness to show compassion for the perpetrator) or intrapsychic (no longer holding a grudge or ruminating about the hurtful event) aspects of forgiveness affect the level of distress and negative affect revealed by victimized women, and whether the women's responses differ according to their level of optimism. Participants included 120 women enrolled in an introductory psychology class at the University of Kentucky. Inclusion criteria for the participants were previous experiences with victimization. Women who were currently being counseled by a professional were excluded. Screening measures were administered to the psychology students at the beginning of the semester. Women who scored high on a measure of victimization were recruited for the present study; they received class credit for their participation. In the study, participants were randomly assigned to one of three conditions. In the Letting Go condition, participants were instructed via audiotape to stop ruminating about the event and let it go. In the Forgiveness condition, participants were instructed to forgive the perpetrator. Lastly, the control condition consisted of relaxation techniques. After listening to the tapes, participants then wrote narratives about their victimization. The results of the study should offer valuable insights into which type of forgiveness is the best component in designing interventions in the future.

11. Jennifer Ferrell

University of Louisville

Faculty Sponsor: Dr. Patricia Cerrito

Statistical Analysis of Pacemaker Placement Data and the Effects on the Overall Quality of Life

The purpose of this research project is to use different statistical models to examine relationships of data in a clinical trial. The data include demographic variables, treatment variables, clinical measurements, and quality of life data. Through different techniques, we will try to discern how quality of life will be improved over time with the implantation of the pacemaker. The different techniques we will use include linear models, tests for categorical data, and kernel density estimation. By using these techniques, we will show the effectiveness of pacemakers and implantable cardioverter defibrillator (ICD) on patients' health over time. Data concerning quality of life were collected for 12 months after a device was implanted. Data were collected on a total of 101 patients. Through analyzing the data, we will be able to determine how the overall quality of life changes with time.

12. Brent Caudill, Christopher Whitaker, Nao Hagiwara, Lee Meade, and Andy Hogge

Morehead State University

Faculty Sponsor: Ilsun White

Effects of Blockade of Muscarinic Receptors and Nicotinic Receptors on Spatial Discrimination

Previous studies reported that blocking muscarinic receptors disrupts performance in spatial working memory task, and that performance impairment worsens when the delay period gets longer, suggesting that spatial working memory is sensitive to muscarinic receptor blockade. The present study compared the effects of muscarinic receptor antagonist (scopolamine) and nicotinic receptor antagonist (mecamylamine) on visuospatial discrimination using a spatial task without a delay component. Wistar rats were trained on a visuospatial task that required a correct barpress opposite to the cue location. Once the animals reached a behavioral criterion (>85% correct, 2 consecutive sessions), the drug phase began. On the day of testing, the animals received either a single dose of scopolamine (0.25-1.0 mg/kg, i.p.), mecamylamine (2.5-10mg/kg, i.p.), or saline in a counterbalanced manner. The same behavioral criterion (>85% correct, 2 consecutive sessions) was required between injections. We found that scopolamine disrupted correct responses in a dose-dependent manner and increased response latencies. Mecamylamine failed to affect correct responses. Our data are consistent with previous report that successful performance in spatial discrimination depends on activation of muscarinic receptors. Given the absence of a delay in our task, our results provide critical evidence that performance deficit after scopolamine reflects deficits in reference memory rather than working memory.

13. Daddy Nimoh-Boateng

Kentucky State University

Faculty Sponsor: George F. Antonious

Phytochemicals for Pest Control

Several wild tomato accessions of *Lycopersicon hirsutum* that are not consumed by humans were planted under greenhouse conditions for mass production of leaves. The foliage of the wild tomato *Lycopersicon hirsutum* f. *glabratum* (Mull); *L. hirsutum* f. *typicum* (Humb & Bonpl.); and *L. pennellii* Corr. (Solanaceae) is covered with glandular trichomes (plant hairs). Glandular trichomes on the leaves of *Lycopersicon hirsutum* f. *typicum*; *Lycopersicon hirsutum* f. *glabratum*; *Lycopersicon pennellii*; and *Lycopersicon pimpinellifolium* were counted monthly. Trichome contents were separated, purified, and quantified using a gas chromatograph equipped with mass selective detector (GC/MSD) for biochemical composition. Considerable variations in biochemical constituents among accessions were detected. Two sesquiterpene hydrocarbons, zingiberene and curcumene, were found in *L. hirsutum* f. *typicum*. An average three month old plant of *L. hirsutum* f. *typicum* (PI-127827) has 1.30 kg fresh leaves averaging about 28,130 cm² exposed leaf surface area produced 17.2 g zingiberene and 1.8 g of curcumene. Four methyl ketones (2-tridecanone, 2-dodecanone, 2-undecanone, and 2-pentadecanone) were found in *L. hirsutum* f. *glabratum*. Two methyl ketones, 2-undecanone and 2-tridecanone, having insecticidal activity against many herbivorous insects predominated hair secretions in five of the *L. hirsutum* f. *glabratum* accessions tested. Concentrations of total methyl ketones ranged from 81.3 µg/g fresh leaflets on *L. esculentum* cv. *Fabulous* (a commercial tomato cultivar) to 5.5 mg/g fresh leaflets on *L. hirsutum* f. *glabratum*.

14. Brianna Moore

Murray State University

Faculty Sponsor: George Kipphut

The Factors Controlling the Growth of the Ledbetter Embayment Mudflat, Kentucky Lake Reservoir

The Ledbetter embayment mudflat of the Kentucky Lake Reservoir in western Kentucky has been actively growing for over half a century. This study is focused on identifying the sources, movement, and accumulation of the sediments in the mudflat and documenting the growth of the mudflat through time. The project is aimed at learning more about the interaction between physical, geological, and biological aspects of the mudflat. A major research objective is to determine whether the growth of the mudflat is episodic, as a result of flood and stream events, or if the growth of the mudflat is steady and constant over time. The project is investigating how water movement and vegetation growth move and hold the sediment, and how the sediment types, accumulation, and flow affect the shape and growth of the mudflat. The potential significance of this research lies in the creation of a database about similar environments in reservoirs. Research methods include sediment collection and identification, stratigraphy analysis, mapping of the mudflat, and ground and aerial photograph analysis.

15. Travis Brown

Murray State University

Faculty Sponsor: Claire Fuller

Differences in Body Weight and Parasitism of White-footed Mice (Peromyscus leucopus) Between Floodplain and Dry Sites

Abiotic environmental factors such as cold and moisture can have a major effect on host animals and on host-parasite relationships. These factors have been linked to increased stress and decreased immunity. In this study, we sampled floodplain areas adjacent to a reservoir and dry areas outside of that floodplain to assess the effect of flooding as an environmental stressor. We trapped *Peromyscus leucopus* on two dry and two floodplain areas monthly for a one-year period. Each animal was weighed and tested for *Eimeria arizonensis* (Protista; Coccidia) parasitism each month. Male *P. leucopus* on floodplain sites were parasitized significantly more often ($P=0.015$) than on dry sites, but there was no significant difference in female parasitism between floodplain and dry sites ($P=0.660$). However, female *P. leucopus* caught during fall/winter months on dry sites were significantly heavier ($P=0.012$) than those caught on floodplain sites. Weights of females caught during spring/summer were not significantly different between site types. There were no significant differences in male weights between site types. These results suggest, through higher prevalence of parasites in males and lower body weights in females, that the floodplain represents an area of increased stress for *P. leucopus*.

16. David Arnold, Tracy Gramer, Ashley Muzny, Mary Ott, Christy Richardson, and Nicky Weber

Northern Kentucky University

Faculty Sponsor: Douglas Krull

David Silvera, The University of Tromsø

Anything You Can Do I Can Do Better: Effects of Self-Focus on Self-Judgments and the Better-Than-Average Effect

The goal of this research was to investigate whether self-focusing influences the positivity of self-ratings. It was expected that participants who focused on themselves would rate themselves better than average on ambiguous traits, but not on clear traits. Participants were randomly assigned to read one of two paragraphs. One group read a paragraph that encouraged self-focus and was instructed to circle all words within the paragraph pertaining to the self: me, my, I, etc. The other group read a paragraph that did not promote self-focus and was instructed to circle all conjunctions: and, but, or, etc. All participants then rated themselves on the same set of clear and ambiguous traits (9 point scale). A 2 (Self Focus: Self, Non-Self) x 2 (Traits: Ambiguous, Clear) analysis of variance (ANOVA) revealed a significant interaction, $F(1,32) = 8.56, p = .006$. Whereas ratings for clear traits were similar in the self-focus ($M = 5.74$) and non-self-focus ($M = 5.79$) conditions, ratings for ambiguous traits were lower in the self-focus condition ($M = 5.56$) than in the non-self-focus condition ($M = 6.38$), contrary to expectations. These results suggest that self-focus does not increase the better-than-average effect. Rather, self-focus may enhance the accuracy of judgments about the self.

17. **Chelsea Campbell**

Western Kentucky University

Faculty Sponsor: Cathleen Webb

Arsenic Remediation of Drinking Water using Limestone: Contaminant Interference and Surface Morphology

The Environmental Protection Agency (EPA) has proposed lowering the Maximum Contaminant Level (MCL) for arsenic, currently set at 50 ppb or less. Current remediation technologies are expensive. This will result in increased economic pressure on rural communities with high levels of arsenic in their drinking water. The proposed lower MCL for arsenic has spurred the development of appropriate new technologies. This research focused on the development of a remediation technology that has shown the ability to reduce arsenic in drinking water at the source, with added benefit of low-cost disposal of a stable and benign waste product in ordinary landfills. Arsenic, at pH 8.0 and above, is known to be readily soluble and transports easily through ground water. Previous work indicates that arsenic has significant retention in contact with calcium and magnesium carbonates. This could be a result of adsorption on the limestone and dolomite mineral surfaces or precipitation. Adsorption batch tests with crushed limestone have been shown to reduce arsenic from 100 ppb to <5 ppb. Various common drinking water contaminants such as chloride, nitrate, iron, and sulfate were studied to determine the impact on removal efficiency of arsenic. Typically, little interference was found. The temperature dependence of the removal efficiency was also investigated. Scanning Electron Microscopy was used to determine surface morphology of the limestone base and the waste product. Single crystals of arsenic-containing materials were observed. Sintering was also performed to examine the thermal stability of the waste product.

18. **Nicholas Anthony Haigis**

Northern Kentucky University

Faculty Sponsor: Richard Durtsche

Observations on Habitat Selection and Spatial Use Patterns of the Eastern Hognose Snake, *Heterodon platyrhinos*.

The eastern hognose snake, *Heterodon platyrhinos*, is a possible candidate for consideration of conservation. However, poor habitat selection and spatial use patterns are not well enough defined to allocate resources for a conservation plan. An important management tool for conservation has been the translocation of taxa from harsher areas to more suitable ones, though this has sometimes been unsuccessful. This study was conducted at Sam Houston State's Center for Biological Field Studies (CBFS) in Walker County, Texas. One male resident and one translocated male *H. platyrhinos* were monitored for GPS coordinates, macrohabitat, and microhabitat use over 23 and 22 day, respectively. For each snake, 55 individual and random habitat observations were recorded. During the tracking period, the resident snake occupied an area of 2.05 ha and the translocated snake occupied 4.41 ha. Macrohabitat use for the resident snake was 74.5% pine woods and 25.5% deciduous forest while the translocated snake occupancy was 45.5% pine woods, 32.7% deciduous forest, 14.5% riparian habitat and 7.3% open grassland. Microhabitat use for the resident snake comprised mostly of leaf vegetation (38.2%), pine needles (24.9%), and stick debris (20.1%). The translocated snake used the microhabitats pine needles (35.6%), leaf litter (29.6%), and leaf vegetation (16.9%). The translocated *H. platyrhinos* appeared to be less selective overall of its microhabitat choice possibly suggesting that translocated snakes may poorly adapt to unfamiliar areas. This could result in higher mortality rates in translocated snakes as has been documented in other snake species.

19. Stefanie B. Bumpus

University of Louisville

Faculty Sponsor: James L. Wittliff

Human Estrogen Receptors- α & β as Probes in a Biosensor for Detecting Therapeutic and Environmental Estrogen-Mimics

Estrogens are the focus of health concerns currently, and a multitude of naturally-occurring and synthetic compounds may exhibit endocrine-disrupting activities. We and IA, Inc. (Ann Arbor, MI) developed an evanescent fiber optic sensor (Patent No. US6,300,082B1) for screening compounds for estrogen-like activity, utilizing CY5-labeled recombinant human estrogen receptors (hER) as probes. The hypothesis is that receptor isoforms hER α and hER β may be used to distinguish diverse estrogen mimics by their ligand binding specificities. hER α and hER β were incubated independently with [³H]estradiol-17 β in the presence of increasing concentrations of an unlabeled putative estrogen mimic using a titration array (Raffelsberger & Wittliff, J Clin Ligand Assay 18:211, 1995). Results were analyzed for specific binding capacity (pmol/mg protein), apparent dissociation constant (K_d, M), IC₅₀ and K_i values. Using [3H]estradiol-17 β , hER α exhibited K_d = 2-6 x 10⁻¹⁰ M compared to hER β , which gave K_d = 1-7 x 10⁻⁹ M indicating a lower affinity for this potent, naturally-occurring estrogen. Of 22 compounds studied, zearalenone and α -zearalenol associated with hER α and hER β with similar affinities. However, hER β bound the phytoestrogens, daidzein (K_d = 2-6 x 10⁻⁹ M) and genistein (K_d = 1-5 x 10⁻⁹ M), with 10 to 20-fold higher affinities than observed for hER α . Biochanin A was recognized by hER β (K_d = 2-3 x 10⁻⁷ M) with low affinity but not by hER α . Ethynylestradiol, bound to hER α with a 8-fold greater affinity (K_d = 3-7 X 10⁻¹⁰ M) than hER β . Nafoxidine also recognized hER α with a higher affinity than hER β . Tamoxifen recognized hER α and hER β similarly with affinities of 1-6 x 10⁻⁸ M, while 4-hydroxytamoxifen also bound to hER α and hER β with similar affinities 2-8 x 10⁻⁸ M. These results and others indicate that hER α and hER β isoforms may be employed as biosensor probes to distinguish estrogen mimics with a broad range of affinities.

20. **Tiffany Smith**

Morehead State University

Faculty Sponsor: Sean Reilley

The Effects of Gender, Scoring Procedures, and Administration Format on Stroop Color-Word Test Scores

Versions of the popular Stroop (1935) test are frequently used to assess AD/HD difficulties specific to inhibitory control. Although multiple Stroop versions are available, the Golden (1978) Stroop Color-Word test has been most used and gender effects have not previously been found. Golden & Freshwater (2002) recently re-normed and updated their scoring procedures to include age and education corrected scores. Norms on both Stroop versions are largely based on a group administration in which participants silently indicate their responses rather than providing them verbally in an individual testing situation common in clinical practice. Four studies were conducted to compare the effects of gender, old (age correction) vs. new (age and education correction) scoring procedures, and individual (ns = 48 and 86), small group (n = 122), and large group (n = 160) administration formats on Stroop performance. Multivariate analysis of variance (MANOVA) and univariate ANOVA procedures with follow-up t-tests were used to test group level differences. As expected, gender differences did not emerge on either version of the Stroop Color-Word Test. Significantly higher Stroop scores were obtained as expected using age and education correction relative to age correction alone. Finally, Stroop scores differed only for the Word task when individual and group administration formats were compared. Although more research is needed to examine Word differences between formats, performance on the critical Stroop task for AD/HD, Color-Word, did not significantly differ between groups, thus suggesting initial evidence for use of group norms when individually administering this instrument in clinical practice.

21. Applications of Basic Chemistry to Everyday Life

University of Kentucky

Faculty Sponsor: David Atwood

Jerrod Dempsey

Determination of Harmful Organic Contaminants in Turnout Coats of Firefighters

Firefighting in the modern day world is a complex and dangerous job. The dangers that firefighters face include exposure to chemicals and toxins. The development of an effective self-contained breathing apparatus has minimized the exposure to these toxins through inhalation. Contaminated turnout gear is still a potential hazard. Hazardous chemicals are embedded in the turnout coats and without effective cleaning, these chemicals may stay in the firefighter's coat or leach out over long periods of time. This project tested a new technology for detecting contaminants in firefighters clothing and discovered that typical cleaning procedures do not remove all of the hazardous materials from the fabric.

Lauren De Pue

Catalytic Dealkylation of Phosphates with Binuclear and Mononuclear Group Thirteen Compounds

Salen Schiff base ligands in combination with boron reagents form some unique binuclear compounds of the general formulae: $L(BR'_2)_2$ ($R' = OMe, OEt, Cl, Br$) with $L = Salen^{(t)Bu}$. These Salen ligand types have different "backbone" connections between the two imines that may be increased or decreased to bind specific targeted compounds between the two metal centers. Mononuclear boron and aluminum compounds can also be synthesized with the same R' groups. The reactivity of these bidentate and monodentate Lewis acid compounds towards the catalytic dealkylation of phosphates will be discussed. These compounds work by breaking the P-O-C bond of the phosphate ester. Since this P-O-C bond is present in chemical warfare agents: VX, Sarin, and pesticides (such as chlorpyrifos), this research might be important for the detoxification of these chemicals.

Miguel Viveros

Study of 1,3-benzenediamidoethaneethiol in the Chemical Precipitation of Nickel with Future Insight for Wastewater Treatment.

Heavy metals pollution in water comes mainly from industrial discharges that contain nickel, mercury, copper, cadmium, and zinc among other metals. Many of the remediation efforts used to treat contaminated water are expensive and ineffective. A new approach utilizes a series of substances named collectively as MetX (1,3-benzenediamidoethaneethiol). The effectiveness of MetX has been proven in the precipitation of Cd, Hg, and Pb in multiple lab studies as well as in wastewater samples. The present work is intended to prove the efficiency of MetX in precipitating nickel from both laboratory samples, as well as determining the likely stability of the metal-ligand complexes both on the immediate and medium terms.

22. Blakney Grey and Esughani Okonny

Kentucky State University

Faculty Sponsor: Avinash Tope

Cytogenetic Biomonitoring: Micronuclei Analysis in Peripheral Blood Lymphocytes of Farm Workers

Chronic low level exposure to pesticides has been implicated in many health conditions such as induction of oxidative stress, cytogenetic damage, and cancers in humans. An increase in micronuclei (MNi) in lymphocytes is a good indicator of cytogenetic damage. The objective of this study was to determine cytogenetic changes in lymphocytes of farmers from surrounding counties in Kentucky and to evaluate the effects of continuous exposure to pesticides through changes in micronuclei counts. Blood was collected once a month for three months, from June 2003 through August 2003, from farmers (n = 43) and controls (unexposed n =22). Lymphocytes from the blood were separated, grown in RPMI-1640, supplemented with 10% fetal calf serum incubated with 5% CO₂ at 37° C for 48 hours, and cytochalasin was added to block cytokinesis. Cells were harvested after another 24 hours of incubation, stained with 5% giemsa and 1000 cells per slide were scored for binucleated cells and binucleated cells with micronuclei. Although a two times increase in MNi formation was observed in the occupationally exposed farmers as compared to the control 11.4±2.0 and 6.1±1.3 respectively; the means were not statistically different at P<0.05.

23. Amanda D. Stevens

Eastern Kentucky University

Faculty Sponsor: Debra Bautista

Simulated Docking of the α_{2B} Adrenergic Receptor with Agonistic and Antagonistic Ligands

Alpha 2-Adrenergic Receptors (α_2 -ARs) belong to the superfamily of G-Protein-Coupled Receptors (GPCRs). In this study, the receptor of interest was the alpha 2_b receptor. These receptors have been shown to play an integral role in cellular signaling. The alpha 2_b receptor has been found to have control of lipolysis during exercise in adipose tissue. All GPCRs are predicted to share a common molecular architecture consisting of seven alpha helical transmembranes linked by alternating intracellular and extracellular loops. The extracellular receptor surface has been shown to be critical for ligand binding, and the intracellular surface is known to be involved in G-protein recognition and activation. The alpha 2_b model was of interest because it is known to play an integral role in smooth muscle contraction. A model of the Antagonist alpha 2_b AR was made by using Bovine Rhodopsin to facilitate rational drug design. Bovine Rhodopsin is used because it is the only known GPCR crystallized to date. Secondly, known antagonist ligands were used in docking simulations to the model to see if they interacted with the model as predicted by the literature. Results indicate that further refinement of the alpha 2_b AR model is necessary.

24. Michael Young

University of Louisville

Faculty Sponsor: Susan Galandiuk

Is There a Role for Cyclin D1 in Ulcerative Colitis-Related Neoplasia?

Ulcerative colitis (UC), a form of inflammatory bowel disease (IBD), is associated with a significantly increased risk of colorectal cancer development. The specific cause of this is unknown. Cyclin D1 (CCND1) plays a significant role in cell growth regulation by enabling the cell-cycle progression through the G1/S checkpoint. A common single nucleotide polymorphism (SNP) exists within exon 4 of CCND1. This SNP (A870G) correlates with altered alternative mRNA splicing, with exon 5 excluded from the polymorphic transcript. Exon 5 is critical in regulating the stability of the CCND1 protein, and its exclusion enhances CCND1 protein stability. The mutant A870G SNP is associated with the development of a variety of tumors including nasopharyngeal and colorectal cancers. The goal of this study was to define associations between the CCND1 A870G SNP and UC-related cancer. Our preliminary data from U95A Affymetrix[®] cDNA microarrays experiments showed 3 times greater CCND1 expression in dysplastic UC colonic mucosa vs. non-dysplastic UC, and 6.5 times greater expression in UC-cancer vs. non-dysplastic UC. These data emphasize a significant differential expression of CCND1 in dysplastic/cancerous colonic mucosa as compared to benign tissue in UC. We hypothesized that the presence of the A870G polymorphism promotes neoplastic progression in colonic UC through abnormal cell-cycle stimulation secondary to enhanced CCND1 stability. We performed a case-case/case-control study to correlate the presence of the A870G SNP with UC-associated dysplasia and colorectal cancer. The study population consisted of 232 non-Jewish Caucasian individuals with non-dysplastic UC (n=79), UC-dysplasia (n=15), UC-cancer (n=9), and sporadic colorectal cancer (n=61), as well as 68 unrelated controls. The A870G polymorphism was genotyped from germ-line DNA using SNP-specific polymerase chain reactions (PCR) and Taqman allelic discrimination. CCND1 A870G allele and genotype frequencies were compared using chi-squared analyses. Comparisons were performed between disease and control populations, as well as between non-dysplastic UC and UC-dysplasia/UC-cancer populations. These comparisons did not reveal a significant association of A870G allele and/or genotype frequencies with disease status, thus disproving our hypothesis. However, our data do reveal some interesting trends, with the frequency of the homozygote mutants being higher in the UC-dysplasia (5/15 [33%]) and lower in the UC-cancer (1/9 [11%]) populations when compared to both the non-dysplastic UC (16/79 [20%]) and control (16/68 [24%]) populations. However, we must conclude that this current study lacks statistical power due to low numbers in both the UC-dysplasia and UC-cancer groups. In summary, this current study does not reveal a significant correlation between the CCND1 A870G polymorphism and UC-associated cancer. However, these results show a trend towards differing CCND1 genotype distributions in UC-associated cancer. This trend, in addition to our microarray results, implies a continued requirement for investigation of the role of Cyclin D1 in UC-related cancer.

25. Jennifer Quammen

Northern Kentucky University

Faculty Sponsor: Richard Durtsche

Digestive Enzyme Activities in Anuran Tadpoles Under Varying Food Conditions.

Aquatic tadpoles can encounter foods that vary in terms of nutritional value and quality. Studying digestive enzymes of tadpoles gives insight into their capabilities to consume and digest differing foods available at unpredictable intervals. This study compared the digestive enzymatic activities in two tadpole species, the Wood frog (*Rana sylvatica*) and the American toad (*Bufo americanus*) exposed to changing diets throughout a 108 hour experimental period after a 12 hour acclimation period. The diets fluctuated from algae (carbohydrate), to shrimp (protein), and back to algae (carbohydrate) with equally divided feeding periods on each food. This investigation is the first to report evidence of digestive enzyme plasticity in larval anurans. We determined that the levels of amylase and trypsin activities varied between species and among time periods, and that both enzymes were more active in *B. americanus* than *R. sylvatica*. Pepsin had the lowest specific activities and was not significantly different between species. Lipase did not vary across time periods or between these species throughout the experiment. Trends in the levels of carbohydrase and protease activity varied with different foods consumed across the experimental periods, indicating that enzymatic plasticity is present for these tadpoles as diet shifts. Knowledge of tadpole digestive enzymes can help us decipher the physiological changes that must take place for these animals to reach metamorphosis, when encountering these unpredictable environmental food resources.

26. Ryan Mynatt

Morehead State University

Faculty Sponsor: Mark Blankenbuehler

Synthesis of Symmetric Substituted Hydroxyfulvenes

There will always be a need for new pharmaceuticals as long as there are those that will be around to use them. In the area of inflammation relief and pain suppression, the newest drugs on the market have a heterocycle of sulfur, oxygen, and nitrogen, and these drugs commonly use a pyrazole or a pyridazine central structure to enhance the pharmaceuticals biological activity inside the body. The purpose of these experiments is to synthesize hydroxyfulvene precursors to a cyclopenta[d]pyridazine structure. These pyridazines could be used as a possible pharmaceutical with uses ranging from a non-steroidal anti-inflammatory drug (NSAID) to an anticancer treatment. The final closing of the ring is done with a monosubstituted hydrazine to add the functional sulfonamide group into the fused cyclopenta[d]pyridazine structure and was attempted on some hydroxyfulvene products. Characterization of the hydroxyfulvenes was carried out using NMR and IR spectroscopy.

27. Ross Jones

Murray State University

Faculty Sponsor: Mark Masthay

Mechanistic Studies of the Photodegradation of β -Carotene in Chloromethane Solvents

Light-activated herbicides used to kill broadleaf weeds in wheat and soybean agriculture mediate their toxicity by destroying antioxidant carotenes via an herbicide-to-carotene photoinduced electron transfer (PET) process. We find that orange solutions of β -carotene (β C) dissolved in carbon tetrachloride (CCl_4), chloroform (CHCl_3), and dichloromethane (CH_2Cl_2) solvents become colorless upon exposure to ultraviolet and visible light from mercury lamps. The color loss is induced by wavelengths that are absorbed by solvent (e.g., the 254 nm mercury line, which is absorbed by CCl_4), as well as by wavelengths at which β C absorbs but the solvents are transparent (e.g., the 281.7, 313, and 436 nm mercury lines). Free radical quenchers slow the reaction rates significantly. In combination, these results suggest that the photodegradation proceeds via two competing mechanisms: (i) a β C-to-solvent PET mechanism in which the solvents dissociate to yield $\bullet\text{CH}_x\text{Cl}_{3-x}$ radicals and Cl^\cdot , which subsequently add across the double bonds of β C, and (ii) a solvent photolysis mechanism in which solvent molecules absorb light and dissociate to yield $\bullet\text{Cl}$ and $\bullet\text{CH}_x\text{Cl}_{3-x}$ which add across the double bonds. In our poster, we detail these two proposed mechanisms, and discuss their significance with regard to the mode of action as well as the design of light-activated herbicides.

28. Jason Long

University of Kentucky

Faculty Sponsor: Mark Prendergast

Neurotoxic Effects of HIV-1 and Identification of Drugs That Are Protective in a Rat Model of HIV-related Brain Damage

The present study investigated how individuals infected with human immunodeficiency virus type-I (HIV-1) develop neurological symptoms such as motor and memory problems. These symptoms most likely occur after HIV-1 releases proteins in the brain following replication. Our laboratory has studied the neurotoxic effects of the HIV replication promoter Tat in isolated portions of the rat brain that were maintained for several days to: (1) identify the mechanism by which this HIV protein injures the brain and (2) identify types of medications that may reduce the toxic effects of HIV-1 proteins. We observed that brief exposure to Tat (5 min) produced large increases in neuronal Ca^{2+} content and significant damage in the rat hippocampus, even at very low concentrations. Both effects of Tat were reduced by co-exposure to drugs (MK-801 and arcaine) that reduced the function of NMDA-type glutamate receptors. Further, co-exposure of the brain to a novel cholinergic receptor agonist, MHP-133, also reduced the toxic effects of Tat exposure. In sum, these data suggest that the HIV-1 replication promoter Tat damages brain tissue, in part, by activating NMDA receptors. Additionally, exposure to drugs that moderate the function of this excitatory receptor or which stimulate the function of cholinergic receptors may possess a therapeutic efficacy in the treatment of HIV-related brain damage.

29. Thomas Ruley

Western Kentucky University

Faculty Sponsors: Shivendra Sahi

Lead Tolerance in Sesbania drummondii

Sesbania drummondii, a Fabaceous shrub of the Southeastern United States, is a hyperaccumulator of lead. Studies have indicated that lead and other heavy metals are toxic to plants and trigger both disturbances in photosynthetic activity and oxidative stress reactions in plant cells. Oxidative stress reactions are correlated with activities of antioxidative enzymes such as catalase and superoxide dismutase. In the present experiment, activities of catalase and superoxide dismutase in plants treated with 500mg/L $\text{Pb}(\text{NO}_3)_2$ in combination with various concentrations of EDTA, HEDTA and DTPA was determined at 0, 7, 14, 21 and 28 days. Activities of these enzymes in plants exposed to Pb did not show any significant change with respect to controls. Further studies will be necessary in order to completely discern the effect of Pb on activation of antioxidative reactions. Growth parameters of Pb-exposed plants were also studied. No significant change was observed. These results indicate that *Sesbania drummondii* has some mechanism to counteract the toxic effects of lead, and thus hyperaccumulates Pb while not affecting antioxidant enzymatic activity. Further evidence of the lead tolerance of *Sesbania drummondii* will be presented. Pb uptake of plants grown in soil containing 0-15,000 ppm $\text{Pb}(\text{NO}_3)_2$ will be determined and presented.

30. Lindsey White and Matthew Kelleher

Murray State University

Faculty Sponsor: Mark Masthay

Cooperative Interactions in the Laser-Induced Purple-to-Blue Transition of Bacterial Purple Membranes: Implications for Degenerative Diseases of the Retina.

Epidemiological evidence suggests that age-related macular degeneration (AMD), the leading cause of blindness in the elderly, is caused in part by toxic free radicals generated when the visual pigment rhodopsin absorbs light. Characterizing these free radicals has proved difficult because of the difficulty of obtaining large quantities of rhodopsin, and because of its photolability under laboratory conditions. Hence the use of model visual pigments in free radical studies is highly desirable. We are characterizing the laser-induced purple to blue color change of the model visual pigment bacteriorhodopsin (BR), which imparts the purple color to halobacterial purple membrane (PM). BR - which is a close structural relative of rhodopsin - is both readily available and photostable. PM - which consists of a tightly packed lattice of BR molecules - converts to "laser-induced blue membrane" (LIBM) upon exposure to green laser pulses. Our studies to date indicate that the generation of LIBM is photocooperative (i.e., that photodamaged BR molecules facilitate the photodamage of other BR molecules in their immediate vicinity). In this poster, we describe results from recent experiments designed to test this "PM-to-LIBM photocooperativity" hypothesis. Because the PM to LIBM photoconversion appears to be mediated by free radicals, these studies may provide new insights regarding the origin and treatment of AMD.

31. Melissa A. Miller

Northern Kentucky University

Faculty Sponsor: Richard Durtsche

Microhabitat Use and Food Selection by Tadpoles of the Wood Frog (Rana sylvatica)

In order to better understand the complexity of the anuran larvae diet we examined resource and microhabitat use, in particular the use of food resources by tadpoles. Microhabitats, and the availability of food found there in, may play a determining factor in the use of food resources by tadpoles. In addition, we examined comparisons between foods that *Rana sylvatica* tadpoles consume in their natural habitat to what the tadpoles choose to consume in a laboratory setting when offered a selection of foods varying in quality. This allowed us to examine the tadpoles' ability to gauge the quality of available foods when making a food selection choice. Another factor examined was the effect of canopy cover on the distribution and availability of microhabitats. The four ponds observed during the study ranged from closed tree canopy cover, moderate canopy cover, or open canopy. Tree canopy cover was analyzed to determine its role in the resource use of a particular microhabitat by tadpoles. Results of the study suggest that there are significant differences of food resource use based on microhabitat.

32. Michele Gillock, Kevin Morrison, and Erin Robertson

Eastern Kentucky University

Faculty Sponsor: Kelli Carmean

Archaeology at the Broaddus Site: A Middle Fort Ancient Village and Mound Site in Madison County

This poster depicts the results of archaeological field studies conducted at the Broaddus Site. This material was excavated during the 1999 and 2002 Eastern Kentucky University archaeological field schools in cooperation with the Blue Grass Army Depot in Madison County. Based on our fieldwork, we now know that this Middle Fort Ancient site radiocarbon dates to the early AD 1200s. Also based on our fieldwork, we established that the Broaddus Site consists of a midden ring encircling a cleared plaza and a central burial mound. In addition to a general overview of the site, this poster discusses the ceramic and faunal remains excavated from the Broaddus Site. Using previous publications, the Statistical Package for the Social Sciences, and the Surfer mapping program, we were able to reconstruct various life ways of the people who inhabited the Broaddus Site.

33. Ashley Ratliff

Morehead State University

Faculty Sponsor: David Olson

Depressive Personality Styles, Shame, Guilt, and Protection of Self-Esteem

This study explored the relationship between two personality dimensions proposed to confer vulnerability to depression, dependency, and self-criticism, and dispositions towards self-conscious affects as well as self-protective strategies. One hundred sixteen men and women completed questionnaires of personality orientation, shame-and guilt-proneness, and self-handicapping. Bivariate correlational analyses between the personality dimensions and self-conscious affects revealed that both dependent and self-critical individuals reported greater proneness to shame and guilt and the use of self-handicapping strategies. Partial correlations involving shame and guilt and depressive personality styles indicated that dependency and self-criticism are positively related to guilt-free shame, while dependency is associated shame-free guilt. The current findings extend our knowledge of the affective and behavioral correlates of depressive personality styles and are consistent with current conceptualizations of the differential attributes of shame and guilt.

34. Jennifer Eisenman and Matthew Koehl

Northern Kentucky University

Faculty Sponsor: Judy Niemi

Cutting Overtime Costs While Continuing to Provide Quality Nursing Care During the Shortage

Introduction: Hospitals in Northern Kentucky are battling overtime costs. Nursing shortages are jeopardizing patient care. Outpatient area staff are forced to stay after designated shift hours to finish the work from the day. Inpatient nurses are forced to finish their shifts late because of increasing paperwork and patient load. Admission forms are tedious, taking up to thirty minutes to complete. This doesn't include initial physical assessments. **Problem Statement:** The majority of overtime in hospitals is directly related to nurses staying past their scheduled shifts to complete assignments. **Research Question:** Would changing shift hours and adding admission nurses decrease overtime costs while increasing nurse efficiency to complete daily assignments on time? **Hypothesis:** Overtime hours will decrease by changing shift hours in outpatient units and utilizing nurses with restrictions in inpatient units. **Methodology:** A Retrospective pilot study collecting overtime hour data comparing eight hour and ten hour shifts in a busy Cardiac Cath Lab (CCL) and gathering data from Transitional Care Unit (TCU) on the number of admissions and the time that could be saved using Admission RNs. Estimated costs of using Admission Nurses that are currently out on medical leave due to workers' compensation restrictions and unable to perform the essential functions of their normal nursing positions will also be collected. Results will be completed and displayed on Posters-at-the-Capitol in Frankfort.

35. Bethany H. Hoffman

University of Kentucky

Faculty Sponsor: Donald Saucier

“How Prejudiced Do You Think We Are?” The Effects of the “Average Person’s” Prejudice on Individuals’ Subsequent Expressions of Prejudice

Previous studies show that prejudice is an undesirable social attribute and individuals are often motivated to inhibit expressions of prejudice. This study tests the hypothesis that participants’ levels of prejudice will change as a result of their perceptions of the average person’s levels of prejudice. For example, if the average person’s prejudice level is high, then the participants’ prejudice level will also be high. The studies asked participants to respond to thirteen arguments and conclusions related to issues involving Blacks for which they were given the supposed responses for the average person. The results supported the hypothesis in three studies. Participants increased their prejudicial responses when led to believe the average person was higher in prejudice and they lowered their responses if the average person was lower. Participants changed their prejudice responses in both cross-sectional (Studies 1 and 2) and pretest-posttest (Study 3) designs. It can be concluded that participants based their responses on the average person’s responses. This study is important because it shows that when (e.g., through the media) people are led to believe that prejudice is more prevalent they may be more likely to show their own prejudice toward others. The study also suggests that the media can be used as a tool to decrease prejudice by exhibiting that people are less prejudiced, promoting inhibition of individuals’ expression of prejudice toward others.

36. Eli Roberson and Rick Fowler

Western Kentucky University

Faculty Sponsor: Shivendra Sahi

Development of Rapid Quantitative Real-Time PCR Method to Detect Total Environmental Fungi

Fungi are nearly ubiquitous in the environment. There are currently accepted methods to quantify fungi from environmental samples; however, most methods are based on culturing fungal organisms, they are time consuming, and not representative of total fungal abundance. The downfall of such methods is failure to represent species that are difficult to culture or species that have specialized growth requirements. These pitfalls can be avoided by utilizing polymerase chain reaction (PCR) to detect environmental fungi. More advantageous than standard PCR is quantitative real-time PCR (qRT-PCR), which allows measurement of initial DNA concentration. For fungal detection, previously described fungal specific primers for 18s rDNA were compared and a primer pair that previously demonstrated a high degree of fungal specificity was chosen. Primer annealing temperatures were optimized using a temperature gradient qRT-PCR experiment; the optimal annealing temperature was confirmed through analysis of PCR product melting curves and polyacrylamide gel electrophoresis. Fungal primers were used in qRT-PCR reactions with genomic DNA extracts from several different cultured fungi species, genomic bacterial DNA, genomic mammalian DNA, genomic invertebrate DNA, and genomic plant DNA in order to test primer specificity. To prove PCR products were generated from the intended targets, successful PCR reactions were sequenced and confirmed to be the suspected fungal targets. *Saccharomyces cerevisiae* genomic DNA was chosen as the qRT-PCR DNA concentration standard; the *S. cerevisiae* standards were used to quantify genomic DNA extracted from cultured fungi in order to prove the viability of this method in amplifying and quantifying a broad spectrum fungal species.

37. Daniel Williams

University of Louisville

Faculty Sponsor: Clara Leuthart

Spatial Analysis of Mistletoe in Eastern Jefferson County, Kentucky

Mistletoe, *Phoradendron* species, is found in trees in the Louisville, Kentucky Metro area. Preliminary analysis indicates more frequent occurrence within areas included in the Louisville East Geologic Quadrangle. Its distribution is far from uniform. Initial observance indicates that the distribution of mistletoe in the area may not be random and that certain environmental characteristics must be available for germination and growth. Factors that may influence distribution are: underlying bedrock and specific nutrients that trees uptake and mistletoe concentrate, proximity to a local water source, and host tree species. Does the location of mistletoe in Eastern Louisville correlate directly to underlying geology? Are the specific nutrients needed for mistletoe growth found in the soils and leached out by trees, the dependent variable for mistletoe growth? Will it also be absent in areas that do not suggest a correlation with geology, specifically, will it be found across the Ohio River on New Albany Shale geology? For analysis of the hypothesis, random quadrats with the Louisville East Geologic Quadrangle will be selected for sampling. Spatial correlation of trees with mistletoe with underlying bedrock type will be performed using GIS analysis. ArcGIS, specifically the Spatial Analyst tool and SID files of geology and topography.

38. Robert Reding

Murray State University

Faculty Sponsor: Nancy Boling

Creating Classroom Communities: A Real-Life Experience for Elementary Students

This abstract is an example of a classroom management project developed during my student teaching experience. The project was created and implemented to allow me, the teacher, more instructional time while decreasing time spent on everyday classroom tasks. It allows students to take on classroom responsibilities while experiencing the real-life workings in a community setting. This was introduced and implemented in a third grade classroom but could be easily adapted for any age group. The students receive the opportunity to serve on a city council, police their peers, and handle classroom tasks such as bathroom monitoring and maintaining classroom computers. The project worked wonders on a third grade class that was experiencing multiple behavior problems. The classroom community idea also implemented and addressed several areas of Kentucky's Core Content for Assessment and Academic Expectations.

39. Samuel Mutisya

Kentucky State University

Faculty Sponsor: George F. Antonious

Application of Sewage Sludge in Land Farming: Advantages and Disadvantages

The Environmental Protection Agency estimates that 15 million tons of biosolids and 31 million tons of yard waste are discarded annually in the United States. Recycling this material as soil amendments for reclamation sites, forestlands, and agricultural land would 1) reduce the need for landfill disposal and/or incineration and 2) reduce the impact of these disposal methods on environmental quality. The objective of this study was to assess the effect of class-A biosolid and yard waste compost on potato and bell pepper yields under field conditions. Field studies were conducted on a Lowell silty loam soil located at the Kentucky State University Research Farm, Franklin County, Kentucky. Six replicates of each soil amendment were mixed with native soil at a rate of 50 tons/acre on a dry weight basis in standard USLE research plots (22 x 3.7 m, 10% slope). Total potato and pepper yields from yard waste compost amended soils (3330.9 lbs/acre and 9187 lbs/acre, respectively) were significantly higher ($p < 0.05$) than yields from either the soil amended with class-A biosolid (2835 lbs/acre and 6984 lbs/acre, respectively) or the unamended soils (2429.6 lbs/acre and 7161.7 lbs/acre, respectively).

40. William Dotson

University of Kentucky

Faculty Sponsor: Mary Cain and Michael Bardo

Novelty Disruption of Amphetamine Self-Administration in High and Low Responder Rats

A recent study in our laboratory has demonstrated that novel stimuli presented during amphetamine self-administration decreases responding in rats that are highly active in a novel environment (high responders; HR) more than rats that are relatively inactive (low responders; LR). The specific aim of this project is to determine if individual differences in response to novelty predict the ability of novel stimuli presented prior to amphetamine self-administration to attenuate responding either during the acquisition or maintenance phases. Rats were screened for their response to novelty and classified as HR or LR. Prior to each session, rats in the handle condition were briefly handled and rats in the novelty condition were placed for 15 minutes in a chamber with 6 novel plastic objects. In Experiment 1, rats were trained on a fixed-ratio schedule to self-administer amphetamine (0.03 mg/kg/infusion) following exposure to novelty or handling. In Experiment 2, rats were trained to self-administer amphetamine (0.1 mg/kg/infusion) and then the effect of novelty or handling was evaluated across a range of amphetamine doses (0.056, 0.03, 0.01, and 0.003 mg/kg/infusion). Novelty presented prior to the session during acquisition decreased amphetamine self-administration. LR rats were more disrupted by the novelty than HR rats during the first thirty minutes of the session. Novelty presented prior to the session once animals have acquired amphetamine self-administration did not attenuate responding at any of the doses tested. These results suggest that novelty presented prior to amphetamine self-administration decreases responding only during acquisition.

41. Joseph McDaniel

Western Kentucky University

Faculty Sponsor: Gordon Smith

Visualization of Fluid Flow in a Thermoacoustic Prime Mover

Thermoacoustic devices are robust heat engines, using heat to create sound, using sound to transport heat, or both. They are attractive to industry for their low-maintenance costs, simple design, and environmental considerations. While the theories behind the devices are fairly well understood, there still exist unknown losses within the device that hinder the operational efficiency. Flow measurements made utilizing an optical technique called laser Doppler anemometry (LDA) and careful examination of the temperature profile of the machine revealed the presence of anomalous flow behavior. Large jetting flows were observed within the device. Understanding the cause and effect of this jetting may lead to a fundamental understanding of the mysterious losses. The current work involves automating the data acquisition process, utilizing the industry standard LabVIEW Development Environment, so that enormous amounts of data can be taken relatively quickly and easily. Initial data from the experiment will be presented.

42. Stephanie Kenyon

Northern Kentucky University

Faculty Sponsor: Douglas Krull

When Stereotypes Collide: Evaluations of People with Multiple Group Memberships

People can be categorized in many ways based on race, gender, career, and other variables, making it important to understand how stereotypes about multiple categories are integrated to form judgments about individuals who belong to those categories. The objective of this study was to investigate how observers combine information about multiple stereotypes in making judgments about personality traits. Participants read a description of a female individual who was described as “a student at a local university” and were randomly assigned to either receive or not receive additional information that the individual was a member of two groups: sorority members and engineering majors. Participants were asked to rate the target person on several personality traits. Composite indices were created for traits related to stereotypes about sorority members and engineering majors, and were used as dependent measures in two 2 (sorority member or not stated) by 2 (engineering major or not stated) between-subjects ANOVAs. For the engineering index, participants used an additive model to combine group stereotypes - engineering majors were rated higher than non-engineering majors and sorority members were rated somewhat lower than non-sorority members; no interaction was found between the two categories. For the sorority index, a different pattern of results was observed. Sorority members were rated higher than non-sorority members and engineering majors were rated lower than non-engineering majors. There was a significant interaction between sorority and engineering category membership such that engineering major information was only used when the target was not a sorority member. Thus the two stereotypes were applied hierarchically, with sorority membership used over engineering major membership.

43. Samuel Mutisya

Kentucky State University

Faculty Sponsor: George F. Antonious

Application of Sewage Sludge in Land Farming: Advantages and Disadvantages

The Environmental Protection Agency estimates that 15 million tons of biosolids and 31 million tons of yard waste are discarded annually in the United States. Recycling this material as soil amendments for reclamation sites, forestlands, and agricultural land would 1) reduce the need for landfill disposal and/or incineration and 2) reduce the impact of these disposal methods on environmental quality. The objective of this study was to assess the effect of class-A biosolid and yard waste compost on potato and bell pepper yields under field conditions. Field studies were conducted on a Lowell silty loam soil located at the Kentucky State University Research Farm, Franklin County, Kentucky. Six replicates of each soil amendment were mixed with native soil at a rate of 50 tons/acre on a dry weight basis in standard USLE research plots (22 x 3.7 m, 10% slope). Total potato and pepper yields from yard waste compost amended soils (3330.9 lbs/acre and 9187 lbs/acre, respectively) were significantly higher ($p < 0.05$) than yields from either the soil amended with class-A biosolid (2835 lbs/acre and 6984 lbs/acre, respectively) or the unamended soils (2429.6 lbs/acre and 7161.7 lbs/acre, respectively).

44. Douglas Foster

Western Kentucky University

Faculty Sponsor: Keith Philips

Dung Beetles (Scarabaeinae) in the Upper Guinean Forests of Ankask, Ghana, West Africa

The Upper West African Guinean forests are considered one of 25 biodiversity hotspots in the world and are a vital refuge and region of high species endemism. Our knowledge of insect diversity in this habitat is poor relative to that found in other threatened areas in the tropics. There is extreme urgency for the study of Upper Guinean forests because this ecosystem is more threatened and is disappearing more quickly than most other global hotspots. Hence, there is also little time remaining to increase information on the ecology of its dung beetle species, a group of great interest because of the complex communities and behaviors exhibited. Studies have begun on dung beetles to document the species, their biology, and make comparisons of the diversity in Ankasa to that found in other regions in Africa.

45. **Mary P. Rollins**

University of Louisville

Faculty Sponsor: Deborah Davis

Attention Networks and Parental Report of Behavioral Problems in Children Born Prematurely

Children born prematurely, especially those born of very low birth weight (VLBW) are at risk for many deficits impacting their academic success. Attention problems are one area frequently reported. Although it is known that VLBW children have many adverse outcomes related to attention, little is understood about the underlying mechanisms. Posner and Peterson (1990) have identified three specific attention networks (alerting, orienting, and executive control) in normally developing children. The identification of these networks has potential for contributing to our understanding of individual differences in developmental outcomes of VLBW children, especially those outcomes related to attention. To date Posner and Peterson's model of attention networks has not been used in the study of VLBW children. Therefore this exploratory study will describe how VLBW children perform on measures of 3 specific attention networks and examine the relation between parental reports of children's behavior problems and performance on each attention network. The sample consists of 65 children who weighed < 1500 grams at birth and who are now 4-5 years old. Three computerized attention games designed for this purpose (Berger, Jones, Rothbart, & Posner, 2000) were used to assess the 3 attention networks. Behavior problems were assessed using the Child Behavior Checklist (CBCL). Data coding is in progress. Descriptive and correlation analyses will be reported. Because of the exploratory nature of these data, we cannot predict how the measures will relate or how the children will perform on measures for each attention network.

46. **Jennifer Hughes**

Murray State University

Faculty Sponsor: Renee Fister

Optimal Control Applied to Immunotherapy

We investigate a mathematical model for the dynamics between tumor cells, immune-effector cells, and the cytokine interleukin-2 (IL-2). In order to better determine under what circumstances the tumor can be eliminated, we implement optimal control theory. We design control functionals to maximize the effector cells and interleukin-2 concentration and to minimize the tumor cells. Next, we show that an optimal control exists for each problem. After which, we characterize our optimal control in terms of the solution to the optimality system, which is the state system coupled with the adjoint system. Finally, we analyze the various optimal controls and optimality systems using numerical techniques.

47. Erin Allen

Kentucky State University

Faculty Sponsor: Tamara L. Brown

Using the Internet to Increase African American Participation in Psychological Research

Currently, few psychological studies involve adequate numbers of African Americans as research participants. This is unfortunate because their lack of involvement limits the generalizability of the findings from psychological studies. The question this study sought to begin to answer is whether researchers can increase African American participation in psychology research by using the Internet. To begin to answer this question, we compared the quality of data collected through in-person surveys to that collected through Internet surveys using measures of participants' alcohol use, alcohol expectancies, and sensation seeking. Results showed that there were no significant differences between data collected via in-person surveys and that collected via the Internet. Though more research is needed, this finding suggests that using web-based studies might be a way to include African Americans in psychological research.

48. Elaine Beth Moss

Murray State University

Faculty Sponsor: Scott Lewis

An Alternative Schedule for Double Elimination Tournaments

Double elimination schedules are commonly used for many games and sports including Olympic sports such as softball and volleyball. The most common form of double elimination begins with a winners' bracket and then places teams in the losers' bracket as they lose games. The winners of these two brackets then play each other in order to determine the winner of the tournament. Some advantages of using a double elimination schedule instead of a single elimination schedule are that a double elimination schedule allows a good team to play poorly in one game without losing the entire tournament as a result and guarantees every participant at least two games in the tournament. An alternative double elimination tournament schedule is presented in the project for any number of players equal to a power of two. In this alternative schedule, for any two teams the difference in the number of wins needed in order to win the tournament is at most one, which is significantly smaller than in the standard double elimination schedule. Also, the sit outs of the tournament are distributed so that no team sits out more than one round whereas in the standard double elimination schedule, the winner of the winners' bracket sits out several rounds. The point of the project is to make changes to the standard form of double elimination scheduling in order to make it shorter and more equitable.

49. Lesley Ramos

University of Louisville

Faculty Sponsor: Marianne Hutti

Perinatal Loss and Birth of a Subsequent Child

The purpose of this study is to evaluate the influence of previous perinatal loss on mothers' emotional distress during the birth of a subsequent healthy infant. Perinatal loss includes fetal death (early or late) or neonatal death within the first 28 days of life. Such losses are traumatic events in the lives of families and may have long-term consequences for the psychological health of parents. Expectant mothers frequently experience apprehension about the outcome of the current pregnancy that oftentimes leads to depression and anxiety. It is unclear whether increased psychological distress during subsequent pregnancies continues after the birth of a healthy infant. The specific aims of this study are to: 1) determine whether mothers' depressive symptoms, anxiety, and healthcare utilization vary by prior loss experience during the late perinatal period, and 2) determine whether mothers' depressive symptoms, anxiety, and healthcare utilization vary by the type of loss experience (miscarriage, still-birth, neonatal death) during the late perinatal period. A three-group, three-wave panel design will be used to collect data from expectant mothers in the third trimester of pregnancy, between 24-28 weeks gestation. The sample will consist of 50 mothers with a history of prior perinatal loss (early or late fetal or neonatal death), 50 mothers pregnant for the first time, and 50 mothers who have experienced a previous pregnancy and no loss. Measures include: depressive symptoms, anxiety, impact of the previous loss on current emotions, healthcare utilization. Knowledge gained from this study may help healthcare practitioners provide more informed and compassionate care to these highly distressed and vulnerable mothers.

50. Maninder Virk, Caleb Mathis, Richard Blalock,

Stephen Compton, and Steve Coe

Murray State University

Faculty Sponsor: Terry Derting

The Effects of Habitat Fragmentation on the Health of White-footed Mice (Peromyscus leucopus)

Anthropogenic disturbances leading to white-footed mouse habitat fragmentation may affect the health of animals in disturbed areas. To determine those effects, if any, we tested the null hypothesis that anthropogenic disturbances have no effect on immunocompetence, stress level, and masses of gastrointestinal or reproductive organs. We studied two types of habitat patches; those disturbed by human activities, specifically agriculture and urbanization, and those that were undisturbed. Adult males were trapped live. Blood samples and white blood cell counts (WBC) were prepared following capture. To challenge humoral and cell-mediated branches of the immune system, subjects were injected with sheep red blood cells (SRBC) the morning after capture and phytohemagglutinin (PHA) seven days later. Final blood sampling and dissection were performed on the eighth day. Mice from disturbed habitats had a greater cell-mediated immune response, but a reduced humoral immune response compared with those from undisturbed habitat. Mice in disturbed habitats also had a lower hematocrit, and tended to have a smaller increase in WBCs in response to SRBC injection. Mice caught in disturbed habitats also tended to have heavier mass of adrenal glands, and greater stomach and caecum masses. Masses of reproductive organs and corticosterone levels showed no significant differences. We concluded that white-footed mice from disturbed habitats exhibited reduced humoral immune function compared with animals in undisturbed habitat. In contrast, cell-mediated immunity, diet quality and stress level were not adversely affected by anthropogenic disturbances. These results suggest that habitat fragmentation and human disturbances have specific, rather than general, effects on health of white-footed mice.

51. Lewis Watson, Richard Cohen, and Kiran Padigala

Western Kentucky University

Faculty Sponsors: Cheryl D. Davis

Impact of Pro-oxidant Diet on Cytokine Production in Mice Infected with Toxoplasma gondii

Toxoplasmosis, particularly toxoplasmic encephalitis has emerged as a major cause of morbidity and mortality in patients with AIDS. Patients infected with HIV typically experience chronic oxidative stress, and concurrent infection with the intracellular parasite, *Toxoplasma gondii*, would be expected to further exacerbate this condition. However, previous studies in the laboratory have provided evidence that dietary supplementation with antioxidants is actually harmful during experimental Toxoplasmosis in mice, whereas a pro-oxidant diet (deficient in vitamin E and selenium) results in decreased numbers of tissue cysts and dramatically reduced pathology. The present study was designed to measure the levels of various Th1 and Th2 regulatory cytokines in serum samples and in spleen cell culture supernatants in this experimental model. Two groups of 5 Swiss mice received anti-oxidant supplementation, and 2 groups of 5 mice received a diet deficient in vitamin E and selenium. Two additional groups were maintained on a normal diet of Purina Rodent Chow containing the recommended daily allowances of both vitamin E and selenium. After 4 weeks, 1 group of mice from each dietary treatment received an intra-peritoneal injection of 1000 tachyzoite stages of *Toxoplasma gondii* (ME49 strain). At 2 weeks post-infection sera and spleen cell culture supernatants were obtained from all mice (*T. gondii* infected and non-infected) and cytokine levels were quantified by an antigen capture enzyme linked immunosorbent assay. Preliminary results suggest that protective Th1 cytokine expression is enhanced in the acute phase of infection in mice maintained on a pro-oxidant diet.

52. Lisa Carpenter

Eastern Kentucky University

Faculty Sponsor: Debra Bautista

Computational Studies of the Human Mu and Kappa Opioid Receptors

Opioid receptors belong to the superfamily of G protein coupled receptors and are primarily responsive to opiates to produce analgesia, but also produce a variety of side effects. Opioid receptors are divided into three types “mu (μ), kappa (κ), and delta (δ)”. Each type can be further subdivided based on their pharmacological and physiological characteristics. Homology models of human μ and κ receptors were developed based on bovine rhodopsin. Each receptor binds to a selective and a non-selective agonist. Morphine acted on both receptors at similar positions. Morphine binds to serine residues at the same position on both receptors. Morphine also binds specifically with His 321 and Trp 320 residues on the μ receptor. At those same positions on the κ receptor, morphine binds with Tyr 313 and Tyr 312 residues, respectively. Therefore, it is apparent that relief of pain by morphine and the characteristic side effects produced are dependent on the residue located at a specific position on a specific opioid receptor. Morphine is more likely to provide analgesia, without induced side effects, when interacting with residues specific for to the μ receptor. It is conceivable that morphine is a non-selective agonist for the κ receptor and their interaction may be the determinant factor in whether or not adverse side effects occur.

53. Christopher Garris

Morehead State University

Faculty Sponsor: Laurie Couch

Exploring Loneliness: The Effects of Self-consciousness and Other Intrapersonal Factors

Loneliness is a feeling of deprivation and dissatisfaction produced by a discrepancy between the kind of social relations we want and the kind or social relations we have, and it affects millions of people. The literature suggests relationships between loneliness and interpersonal factors associated with poor quality relationships, such as social skills deficits; however, little research attention has been focused on the intrapersonal factors associated with loneliness. The current study is an exploratory investigation of the factors. It was specifically hypothesized that loneliness would be associated with various forms of self-consciousness. Additionally, because previous research on gender differences in relationships suggests that women invest more of themselves in social thinking, we predicted these relationships to be stronger for females. A sample of 122 college students (25 males, 97 females) was used. Participants completed basic demographic questions as well as several measures of loneliness and self-consciousness, including: the UCLA Loneliness Scale (revised version), The Self-Consciousness Scale, and the Imaginary Audience Scale. Correlational analyses were conducted separately for males and females. For females, the results showed significant relationships between loneliness and public and private self-consciousness, social anxiety and the imaginary audience phenomenon. For males, loneliness was related to social anxiety and aspects of the imaginary audience phenomenon, but not to private or public self-consciousness.

54. Earl Wood

Western Kentucky University

Faculty Sponsor: Sergey Marchenko

Detecting Dust Generating Stars in the Milky Way and Beyond

Wolf-Rayet (WRs) stars, the final evolutionary stages of massive stars, are placed among the most prodigious sources of hot, freshly formed dust in our Milky Way galaxy. These stars may have been among the dominating dust-producers in the early Universe. Here we discuss a simple method allowing robust detection of dust-generating WRs with the aid of the recently compiled 2MASS point source catalogue. Constructing the J-H vs. H-K color diagrams based on the reprocessed data from the catalogue, we have been able to clearly distinguish the dust-producing WRs from the rest of the galactic population. The probability of detection can reach 90-99%, depending on the characteristics of the stellar system. Applying this technique to the population of WR stars in the Magellanic Clouds, we find that the relative proportions of the dust-producing WR stars in the LMC and SMC are radically different from the corresponding statistics drawn from the galactic sample.

55. Erin Roberts and Larry Adamson

University of Louisville

Faculty Sponsor: Cynthia Gullede

cFos/FosB and μ -Opioid Receptors in the MPOA of Postpartum Rats.

cFos and FosB are immediate-early gene proteins whose expression increases in the medial preoptic area in brains of postpartum rats exposed to pups and may be necessary for expression of maternal behavior. Activation of μ -opioid receptors in the medial preoptic area represses maternal behavior in postpartum rats, raising the possibility that μ -opioid receptors act via suppression of cFos/FosB neuron activity. On the day of parturition we removed pups from one group of Sprague-Dawley rats, while another group was allowed to interact with their pups for one day. All females were euthanized one day after parturition and their brains assessed for colocalization of μ -opioid receptors with either cFos or FosB in medial preoptic area neurons using double-label fluorescent immunohistochemistry. Our detection of colocalized neurons supports the hypothesis that μ -opioid receptors inhibit maternal behavior by interfering with cFos/FosB neuron output.

56. Heidie Mazor and Jennifer Jones

Northern Kentucky University

Faculty Sponsor: Judy Niemi

Lengthening Orientation for New Graduates or Hiring Seasoned Nurses into Critical Care

Introduction: Research supports seasoned Registered Nurses (RN) working in Critical Care (CCU) areas. RNs with greater than three years of experience have the organizational skills, time management skills and nursing instincts that are needed in the CCU setting. Turnover rates appear to be higher in new RN graduates entering CCU. Patient acuity is consistently high with different alarms and equipment not seen on medical surgical unit. Many factors affect job turnover rate. One factor is the type of orientation the RN has had to the CCU. **Problem Statement:** New graduate RNs lack the organizational skills, time management skills and nursing instinct to be successful in the ICU. If orientation is unable to be lengthy and consistent, seasoned nurses with greater than three years critical care experience need to be hired. **Research Question:** Would the turnover rate decrease with longer, consistent orientation periods for new graduates or by hiring seasoned nurses? **Hypothesis:** Hiring seasoned nurses and increasing orientation length, content and consistency for new graduate RNs would indeed decrease the turnover rate. **Methodology:** A qualitative pilot study will be conducted through administering a self-report survey of ten questions to a convenience sample of RNs representing a variety of years of experience. **Results:** It is expected the results will support that hiring new graduates into Critical Care demands a longer, consistent orientation period than exists today. If longer, consistent orientation periods are not supported, then seasoned nurses should be hired.

57. Lindsey Donoho, Brandon Chandler, David Hayden, Scott Lowe, Meigan Jackson, Brad Hall, Chad Hall, Jesse Gray, Cory Hicks, and Josh Monroe

Murray State University

Faculty Sponsors: Ken Bowman, David Ferguson, Jay Morgan, Patrick Williams, and Tony Brannon

Four Studies Concerning Tobacco Experimental Varieties

On the campus of Murray State University, we have five acres of dark fire-cured tobacco for research test plots. In the *Donoho, Chandler, Hayden, and Williams* study, the research plots were used to increase the quality and yield for future tobacco production. Replicated trials were used to compare the advantages and disadvantages of experimental breeding lines. Tests were conducted in hopes of improving the amount of disease resistance, gross pounds per acre, and leaf quality. The goal of the *Lowe, Jackson, Hall, and Morgan* study was to help producers to select the best varieties of tobacco to grow. They conducted replicated trials to compare the advantages and disadvantages of conventional and experimental tobacco varieties during the 2003 growing season. They will be reporting the overall yields, yield of each leaf grade, and the quality of the leaves from each variety. Statistical analyses were conducted to determine differences between the varieties. *Hall, Gray, and Ferguson* will be presenting the results of two studies performed on herbicide applications on dark tobacco. The first involves the sulfonylurea herbicides CGA362622 trioxysulfuron-sodium and halosulfuron-methyl. The second study involved applications of Clomazone and dimethenamid-p. Data collected included visual ratings of crop tolerance and weed control, plant height, and leaf yield by stalk. The last study, *Hicks, Monroe, and Bowman* involved an attempt to discern optimal nitrogen levels for dark-fired tobacco. Required rates of nitrogen are usually between 200 and 300 pounds per acre. Typically, farmers use more than 300 pounds per acre in an attempt to increase yields. Although nitrogen rates vary depending on weather conditions, too much nitrogen can result in delayed maturity and curing problems.

58. Suzanne Nichols

University of Louisville

Faculty Sponsor: David Brown

A Study of Beampipe Background Using Bhabha Events

Spurious protons from beampipe interactions are known to contaminate high energy electron-positron scattering and annihilation events. This forms a serious background to studies of particle decay modes involving baryons. In this project, we examine data from the BaBar Experiment at the Stanford Linear Accelerator Center. Bhabha events ($e^+ e^- \rightarrow e^+ e^-$), in which either of the outgoing particles interacts inelastically with the beampipe, provide a kinetically well-tagged data sample useful for characterizing the proton background. We select candidate events using a set of global and local cuts. We find that the candidate events comprise 1.12% of all events triggered in the detector. From the candidate set we characterize the nature and extent of proton contamination in generic events.

59. Benjamin Hutchins and Christopher Thomas

Western Kentucky University

Faculty Sponsor: Scott Grubbs

A Comparative Analysis of Voltinism Patterns of Stoneflies (Plecoptera) from an Intermittent-perennial Stream Continuum

Aquatic insects that inhabit intermittent streams must possess life history mechanisms to survive during periods when surface flow is lacking. Nymphal growth (= voltinism) can be characterized as determinate or indeterminate. The principal difference between the two forms of voltinism lies in whether the length of nymphal growth is determined by local climatological or hydrologic conditions. Although there has been considerable research on life history patterns of stoneflies from mid-order streams and small rivers, zero-order (intermittent) and first-order streams (springs) are rarely studied. We initiated a comparative life history study of four species of stoneflies (*Plecoptera*) that inhabit an intermittent-perennial stream system. The intermittent section emanates on sandstone and flows before dropping vertically down a 20 m break. Surface flow ceases during June and does not resume until late autumn. Natural flow patterns of the lower (perennial) section are enhanced by the upper (intermittent) section only during winter and spring, yet is maintained during summer by two small springs. We hypothesized that each of the four species would exhibit identical life history attributes (i.e., adult flight activity, egg development time and timing of hatching, seasonal nymphal growth patterns) in each stream section (intermittent vs. perennial). Regular sampling has occurred since May 2002, as well as monitoring water temperature, precipitation, and stage height. Each species has displayed similar flight periods in each section. Examination of nymphal growth histograms through June 2003 has demonstrated that the hydrologic discrepancy has not altered nymphal growth patterns, suggesting that each species displayed a determinate voltinism pattern.

60. Gayle Joseph

Kentucky State University

Faculty Sponsor: James Tidwell

*Effects of Different Tilapia *Oreochromis niloticus* Densities on Water Quality in Freshwater Shrimp *Macrobrachium rosenbergii* Ponds*

Regional prawn farmers have at times experienced problems with high pH in grow-out ponds due to excessive algal blooms. Nile tilapia are known to graze on phytoplankton and may potentially be used to thin algal blooms. The objective of this study was to determine the effect of two densities of caged tilapia on the water quality of prawn ponds. The experiment lasted 115 days and was conducted in nine 0.04 hectare ponds and consisted of three treatments with three replicates each. Control ponds (CTL) contained only prawns. Low density polyculture (LDP) contained two cages of tilapia and high density polyculture (HDP) contained four cages. All ponds contained circulators and substrate. Each pond was stocked with juvenile prawn (0.9 g) at 69,000/ ha. Tilapia (115 g) were stocked in 1 m³ round cages at 100/m³. Tilapia were fed a 32% protein floating pellet once daily to satiation. Prawn were fed a 32% protein sinking diet twice daily based on a feed chart. Overall means for afternoon pH were significantly lower in polyculture treatments (7.79 mg/L) than control ponds (7.93 mg/L). Nitrite-nitrogen concentrations were significantly higher in polyculture treatments (0.21 mg/L) than in control ponds (0.05 mg/L). Total ammonia-nitrogen concentrations were significantly higher in polyculture treatments (1.00 mg/L) than in control ponds (0.73 mg/L). However, un-ionized ammonia concentrations did not differ significantly by treatment and averaged 0.60 mg/L overall. The presence of tilapia resulted in lower pH levels likely due to the grazing of phytoplankton. While feeding tilapia resulted in slight increases in total ammonia, the toxic un-ionized form was not increased due to the lower pH.

61. Dennis Griffith

Morehead State University

Faculty Sponsor: Wesley White

Dopamine D₂ Receptor Activation and Acute Withdrawal

Administration of amphetamine (2.0 mg/kg sc) appears to produce an acute withdrawal state around hour 20 post-treatment in rats. One behavioral indicator of this state is hypo-activity. The purpose of the study was to see if the selective dopamine D₂ receptor agonist quinpirole also produces hypo-activity around hour 20 post-treatment. Thirty-two male Wistar rats were individually housed in cubicles (40cm x 20 cm) in a 12-12 hour light-dark cycle and with free access to food and water. Images from a camera mounted above each cubicle were used to quantify activity in terms of total distance moved per hour. Animals were divided into four treatment groups, with eight animals in each group. Rats were first given at least two control treatments (rubbing of the nape of the neck or subcutaneous saline administration) followed by at least two experimental treatments (in different groups, saline, 0.2 mg/kg quinpirole, 0.4 mg/kg quinpirole, or 2.0 mg/kg amphetamine). Treatments were given at the start of the light period and were separated by at least a 48-hour interval. Patterns of activity following drug treatments were compared to patterns following control manipulations. Selective stimulation of the D₂ receptor subtype with quinpirole produced a general suppression of activity through approximately hour 20 post-administration, but it did not appear sufficient to produce the hypo-activity around hour 20 indicative of acute withdrawal. Activation of the D₂ receptor subtype does not appear sufficient to produce symptoms of withdrawal.

62. Satinder Sidhu

Murray State University

Faculty Sponsor: David Canning

Inhibition of Differentiation by Chondroitin Sulfate in the Early Chick Embryo.

The central area pellucida epiblast (CAPE) region of the chick blastoderm gives rise to all subsequent embryonic tissues. At gastrulation it produces axial mesoderm and endoderm under instructive influences from the marginal zone. Later, the anterior CAPE forms the head and anterior CNS due to factors secreted in the prechordal plate. However, the actual cellular mechanisms allocating epiblast cells to specific fates are largely unknown. We have examined the state of specification of CAPE cells from the onset of gastrulation through the head stage. By extirpating tissue from various stages, we have used isolation cultures, in combination with in-situ hybridization and immunocytochemistry to map the time-course of the degree of commitment of the CAPE. Our studies have revealed specific roles for molecular components of the extracellular matrix in the allocation of cell fates from the CAPE. One of these, chondroitin sulfate (CS), appears to suppress certain cell fates relative to others. In the pre-gastrula, CS inhibits N-cadherin expression and muscle differentiation, while promoting notochord differentiation. Following gastrulation, CS assists in the formation of head structures from the prechordal plate region. As the head develops, CS delineates nervous tissue areas from mesenchymal tissues. Isolates from the anterior CAPE fail to form head tissues if CS is experimentally removed. This mechanism appears to be mediated by suppression of N-cadherin activity during morphogenesis. The results are currently being confirmed by using neural markers and the genetic expression for the same process is being analyzed by in-situ hybridization of whole embryos and head cultures.

**63. James M. Downs, Brandon Barker, Andrea L. Hunt,
Jeremy Leachman, Jean-Hugues Niclair, and Jamie Unseld**

University of Kentucky

Faculty Sponsors: Jerzy Jaromczyk and Charles Staben

Are We Cartilage Experts? - Software and Experiment to Assess the Accuracy of the Segmentation for MRI Images of Knees.

Magnetic resonance imaging (MRI) is a powerful, noninvasive method that provides medical images, for use in studying and diagnosing various illnesses. Researchers at the University of Kentucky are using MRI images to study the rates and levels of decay of knee cartilage in patients, a common problem among elderly patients. Due to complexities in imaging and software processes, such as the significant amount of noise in MRI images, it is difficult to precisely identify knee cartilage. Software has been developed by Dr. P. Hardy lab at the Davis-Mills MRI UK center to semi-automatically segment (identify the boundary of) cartilage from digitized images and determine its condition. During Summer 2003, as a part of the Bioinformatics Experience for Undergraduates program at UK, as a part of a group we participated in extending and testing the software to provide additional statistical information about the accuracy of the system and its users. The package identifies a "ground truth" segmentation for an MRI image, based on the consensus selection of expert users. The process implements the maximal expectation optimization algorithm and provides and visualizes a number of statistics regarding the accuracy. With this information, we can better measure the quality of the automatic tools and the level of training, thus substantially decreasing the time required to analyze MRI images.

64. Amy Menning

Northern Kentucky University

Faculty Sponsor: Andrew Long

Modeling Disease Spread in Raccoons

Rabies is an epizootic disease, infecting many species of mammals and resulting in almost certain death. Raccoon (*Procyon lotor*) rabies was absent from the state of Connecticut prior to 1991; that year, the disease emerged and steadily progressed from the western to the eastern part of the state. Data were collected from brain tissue obtained from dead raccoons between 1991 and 1995. Animals were submitted by private citizens, veterinarians, law enforcement officials, and town or state officials throughout Connecticut, and tested by qualified laboratories. We model the space-time spread of the rabies virus across the state, compare the disease spread analysis to previously reported analyses, and use the model of the spread to synchronize the data so as to generate an empirical model of the local effect of the epizootic at the town level (which we compare to the predicted theoretical model). In our most recent analyses we look at geographical barriers to disease spread (e.g. rivers) and attempt a predictive model with regard to these barriers. Three major rivers run north to south within the state of Connecticut: using Geographical Information Systems (GIS), we demonstrate that rivers appeared to slow the spread.

65. Russell Neal

Kentucky State University

Faculty Sponsor: James Tidwell

*Effect of Partial Fish Meal Replacement on Growth and Feed Conversion in Largemouth Bass *Micropterus salmoides*, Fed Isonitrogenous Diets*

A 12-week feeding trial was conducted in aquaria with juvenile largemouth bass to examine the effects of substituting fish meal with other plant and animal protein sources in prepared practical diets. Feed-trained largemouth bass (3.1 g) were randomly stocked at 25 fish/aquaria into eighteen 113.6-L glass aquaria. Fish were fed twice daily to apparent satiation one of six isonitrogenous diets, each containing 38% protein and 10% lipid. The control diet (Diet 1) contained 30% fish meal and 35% soybean meal. Diets 2-6 each contained 15% fish meal and 35% soybean meal with the remainder of the protein made up of either meat and bone meal (Diet 2), soybean meal (Diet 3), poultry byproduct meal (Diet 4), 50% blood meal and 50% corn gluten meal (Diet 5), or 50% feather meal and 50% soybean meal. There were three replicate aquaria per dietary treatment. After twelve weeks, there was no significant difference in survival, which averaged 92% overall. Only fish fed Diets 4 (Poultry meal) and 5 (Blood meal and corn gluten) had average individual weights and feed conversion efficiencies that were not significantly different from the control diet (Diet 1). Based on these data, 50% of fish meal can be replaced with either poultry by-product meal or a combination of 50% blood meal and 50% corn gluten meal in practical diets for largemouth bass.

66. Billy-Paul Holbrook

Morehead State University

Faculty Sponsor: Capp Yess

Synthesis and Characterization of a Bifunctional Bridging Ligand for Photoinduced Electron and Energy Studies

The synthesis and characterization of a bifunctional bridging ligand for use in the study of photoinduced electron and energy transfer was undertaken. The synthesis was approached in two parts. First, 4-trimethyltin-2,2'-bipyridine was prepared in five steps from 2,2'-bipyridine. Next, a 5-bromo-m-(CH₂CHCO₂H)₂-xylene compound was synthesized from 5-bromo-m-xylene. These components represent the two halves of the desired ligand, where the bipyridine fragment is available binding a Ru^{II} metal center and the carboxylic acid functional groups can support formation of a dinuclear Fe^{III} core. The final ligand was synthesized via a Stille cross coupling reaction to form 4-(3,5-di(methyl-3-propionate-1-ene))benzyl-2,2'-bipyridine.

67. Jason Kuykendal I

Western Kentucky University

Faculty Sponsor: Chris Grove

Atmospheric Transport of the Herbicide Atrazine in South Central Kentucky

Atrazine (2-chloro-4-ethylamine-6-isopropylamino-S-triazine) is a triazine-class herbicide that is used widely in Kentucky to control broad-leaf weeds in corn cultivation. It is a Restricted Use Pesticide, and since 1994 has been the subject of a Special Review by the US Environmental Protection Agency. The Maximum Contaminant Level (MCL) for atrazine in treated drinking water is three parts per billion (ppb), and recently attention has been drawn to potentially serious developmental impacts among amphibians exposed to low concentrations. Starting in April, 2003, atrazine concentrations in rainfall were monitored throughout south central Kentucky. Samples were collected using glass funnels that directed rainfall into glass VOC bottles, and analyzed using Quantitative Immunoassay. Of 199 samples collected between April 17 and August 29, 180 (90%) were positive (>0.05 ppb). 43 samples exceeded 1 ppb, six were over 2 ppb, and two samples over the MCL of 3 ppb. The mean concentration overall was 0.5 ppb. One sample of condensed fog and one of dew had concentrations of 1.7 and 1.8 ppb, respectively. Four samples taken sequentially through one storm in April showed a clear atmospheric scavenging effect: the first sample of over 3 ppb was followed by three that were all an order of magnitude lower. This same effect resulted in high concentrations for trace rainfalls. Samples collected during the spring herbicide application season (assumed to end on May 31) had a mean (0.70 ppb) almost three times higher than later samples (0.25 ppb), and almost 80% of the non-detects also occurred after this date.

68. Wesley Penn

(Oral Presentation)

Eastern Kentucky University

Faculty Sponsor: Debra Bautista

Modeling the Human Adrenergic Receptors

For humans the preferred method of communication is speech, cells however use messengers, like hormones, which are analogous to the words we speak. In place of an ear to hear these cellular “words”, cells have structures on their surfaces that are known as receptors. Receptors act to transmit a message from the “outside” or extra cellular environment of a cell to inside the cell allowing various processes to occur. These receptors however are unlike our own ears in that they do not “hear” every message that is sent, so multiple kinds of receptors are necessary for a cell to function. One of the largest receptor classes is the G-Protein Coupled Receptor (GPCR) Superfamily. This family represents over 1000 different subtypes of receptors that play a role in controlling virtually every process the human body undertakes. Therefore, drugs that target these receptors have the potential to have a tremendous impact on a person’s health. In fact, current drug therapies that target GPCRs include Claritin, Cozaar, Plavix and Singulair. Specifically the Adrenergic Receptors have been found to play a role in such diverse body processes as smooth muscle contraction, locomotion, and hypertension. Thus developing compounds that effectively turn-on and off these receptors could be extremely beneficial, however random testing of compounds to achieve these goals would be extremely time consuming and costly with very little likelihood of success. These odds are improved substantially through the use of Rational Drug Design. To that end, our research has focused on developing computer based models of the Human Adrenergic Receptors for use in guiding drug development.

69. Jason Wells

University of Louisville

Faculty Sponsor: Stephen Onifer

Assessing Sensory, Motor, and Proprio-spinal Recovery After Thoracic Spinal Cord Injury

There are about 11,000 spinal cord injuries in the United States each year. Spinal cord injury (SCI) results in damage of sensory and motor axonal pathways responsible for locomotion. Proprio-spinal axons involved in the coordination between upper and lower limbs during locomotion can also be damaged. Behavioral and electrophysiological assessments are critical for measuring and understanding dysfunctions and functional recovery after SCI. Using a clinically relevant adult rat SCI model, contusion injuries of 6.25 g=B7cm (n=3D1), 12.5 g=B7cm (n=3D1), 25 g=B7cm (n=3D1), 125 Kdyn (n=3D2), and 175 Kdyn (n=3D2) were produced at the T10 spinal cord segment. The extremes of SCIs showed a direct relationship to locomotion measured with the Basso, Beattie, Bresnahan (BBB) Open Field Locomotor Scale. TcMMEPs, an index of motor transmission through the ventral cord, were not recorded in any rat at any time post-SCI. SSEPs, an index of sensory transmission through the dorsal cord, were never recorded in the most severely injured rats. Interenlargement reflex responses were recorded in least severely injured rats whose BBB scores indicated that they had forelimb and hindlimb coordination. Histology revealed that the extent of damage to axons passing through the SCI site had a direct relationship to the behavioral and electrophysiological results. We conclude that behavioral, electrophysiological, and anatomical assessments after SCI allow for the evaluation of functioning and recovering axonal pathways. This novel study of interenlargement reflexes showed that they will be useful for assessing recovery of neurotransmission along proprio-spinal pathways after SCI.

70. Trenton LeBaron and Tera Rica Murdock

Murray State University

Faculty Sponsor: Ricky Cox

Recognizing the Adenine Ring in Type IIa and IIIa Aminoglycoside Antibiotic Kinases

The rise in bacterial resistance to antibiotics has reached a crisis level and is considered a public health emergency. Pathogenic bacteria have countered the overuse of antibiotics by expressing a multitude of gene products that render the drugs ineffective. A family of bacterial enzymes that serves as detoxifying agents of aminoglycoside antibiotics has been identified as ATP-dependent aminoglycoside 3'-phosphotransferases (APH(3')). Along with hydrogen-bonding interactions, these enzymes utilize a pi-pi stacking interaction involving an aromatic amino acid to bind the adenine ring of bound nucleotides. Our results derived from steady-state kinetics and quantum-mechanical calculations suggest that these contacts with the adenine ring determine the specificity in the adenine-binding region of these enzymes. Compounds that contain guanine-type ring systems do not block the entry of ATP into the active site of the IIa and IIIa enzymes, while other aromatic systems distinct from the adenine ring are competitive inhibitors of the enzymes with respect to ATP. Overall, the data suggests that there are strict electrostatic requirements for recognition in the adenine-binding region of these kinases and that contacts such as the pi-pi stacking interaction may be exploited to design inhibitors of these antibiotic resistance enzymes. Such inhibitors may serve as potentiators of aminoglycoside action and help regain the clinical effectiveness of these antibiotics.

71. Kate O'Toole

Northern Kentucky University

Faculty Sponsor: Patrick Schultheis

Characterization of Antibodies Raised Against Synthetic Peptides of a Novel P-type ATPase

A putative magnesium-transporting P-Type ATPase was identified in a previous study. In order to gain further insights into the function of this novel transporter, antibodies were raised against selected peptide sequences of the protein. To identify immunogenic peptides the novel P-type ATPase was analyzed using the algorithms of Hopp and Woods (predicts hydrophilic domains), Kyte and Doolittle (predicts hydrophobic domains), and Chou and Fasman (predicts B-turns). These programs predict which regions of a protein are hydrophilic and that tend to form loop structures such as β -turns, both of which are common at protein surfaces, and are a hallmark of antigenic peptides. Candidate peptides were then analyzed for glycosylation motifs because carbohydrates can shield antigenic sites. Two peptide sequences which met the aforementioned criteria were submitted to Sigma Genosys, a company that provides a complete service for polyclonal antibody production including peptide synthesis, conjugation, immunization and sera collection. ELISA assays were subsequently performed to determine the titer of the resultant immune sera. Peptide specific antibodies were then affinity purified from high titer immune sera using a sulfolink column. To accomplish this, the peptides were linked to the column material via a thioether bond. Immune sera were then passed over the columns, and following several wash steps, peptide specific antibodies were eluted. The highly purified antibodies will be used in Western blotting and immunohistochemistry experiments to determine the location and relative abundance of the novel P-type ATPase in tissues and cells.

72. Jordan Hall

Eastern Kentucky University

Faculty Sponsor: Debra Bautista

*Purification Of Rete Muscle From Mako Shark, *Isurus oxyrinchus**

Enolase is a glycolytic enzyme that is coded for by three genes, and thus exists in three forms $\alpha\alpha$, $\beta\beta$, and $\gamma\gamma$. Each form is active in the heart muscle and brain respectively. However it must be said that only the mentioned forms are in the said tissue, the genes that code for $\gamma\gamma$ are inactive in muscle and vice versa. The Mako shark, *Isurus oxyrinchus*, is a member of the makeral shark family and thus has a specialized muscle group called rete muscle. This red colored muscle contains the rete merabiliae, an intertwining mass of arterioles and venules that create a counter current exchange system to help heat the sharks' blood. Enolase was purified from this muscle after a purification of regular white mako shark muscle yielded a high enolase concentration. 11.44 mg of enolase were obtained showing .409 ABS specific activity. Two peaks of activity were found via DEAE ion exchange and isoelectric focus sing, suggesting protease activity within the muscle.

73. **Kim Bogle**

University of Louisville

Faculty Sponsor: Julia Robinson

A Longitudinal Analysis of Maternal Scaffolding with Head Start Children in a Problem-Solving Task

The purpose of this study is to investigate how maternal verbal scaffolding behaviors change over time in families living in poverty. Bridging a gap between cognitive research and affect research, this study connects developing cognitive systems with socio-emotional characteristics. Previous research has shown that children from disadvantaged backgrounds are at risk for a number of learning and academic problems (Cambell & Ramsey, 1990) and have high rates of attentional disorders (Eisenberg et al., 1997). Also, these particular factors are being examined because it has been shown that attention develops in a social context (Vygotsky, 1978). Verbal scaffolding is one way in which the adult supports the child's problem-solving performance. This scaffolding may be one factor that serves to buffer the detrimental impact of poverty on children's attention regulating abilities. Furthermore, scaffolding could also be a key factor in assisting impoverished children to attend to the critical elements of tasks while they are developing early problem-solving skills. Not only will this study examine the impact of maternal verbal scaffolding on children's attention regulation, but will also look at how these maternal scaffolding behaviors change across time. Transcripts from a parent-child puzzle completion task will be coded to identify the frequency and types of verbal scaffolding. In addition, analyses will be done to determine if specific types of parental verbalizations in the parent-child task relate to performance in a child-alone task. Data coding and analysis is in progress.

74. **Brad Fitzpatrick**

Northern Kentucky University

Faculty Sponsor: Thomas Sproat

BIOTA: Promoting Undergraduate Involvement In P-12 Science Education

Involving undergraduate science students in university outreach programs exposes them to potential careers in teaching and provides inquiry-based learning opportunities for Kentucky schoolchildren. The Department of Biological Sciences at Northern Kentucky University has created the Biology Integration and Outreach for Science Education (BIOSE) program to promote life science education in northern Kentucky's P-12 classrooms. To support BIOSE's mission, Biology Integration and Outreach for Teacher Advancement (BIOTA) is a student group that helps present outreach programs for area schools. BIOTA is designed to:

- 1) involve NKU students in science outreach activities,
- 2) promote biology content instruction,
- 3) provide NKU students with opportunities to explore teaching careers, and
- 4) encourage community involvement for undergraduate educators

BIOTA has participated in area educational programs such as "CAT's Meow", which prepares elementary students for state CATS testing, and "Elementary Science Day", which brings fourth grade students to NKU's campus to see different facets of science studies. BIOTA is also creating its own inquiry-based outreach programs that will present life science topics from Kentucky's Core Content for Science Assessment. These programs will not only provide valuable experience for undergraduate students at Northern Kentucky University, but will also provide area schools with supplemental instruction, technology, and activities promoting biological sciences. This poster describes the BIOTA program, discusses future goals of this undergraduate outreach program, and reviews benefits it presents to education in the Commonwealth of Kentucky.

75. Danielle Rascoe (Oral Presentation)

Kentucky State University

Faculty Sponsor: Kirk Pomper and T.S. Kochhar

Assessment of the Utility of ISSR Markers for Evaluating Genetic Diversity in Asimina and Annona Species

The genus *Asimina* is the only temperate representative of the tropical Annonaceae, or Custard Apple family, and includes eight species that are indigenous to North America. The best-known species is *Asimina triloba* (L.) Dunal, the North American pawpaw, which has the largest edible fruit native to the United States. The USDA National Clonal Germplasm Repository for *Asimina* species is located at Kentucky State University (KSU); therefore, assessment of genetic diversity is an important research priority for KSU. The inter-simple sequence repeat PCR (ISSR-PCR) methodology has been used successfully to characterize genetic diversity within and among populations of many plant species. The objective of this study was to assess the utility of ISSR markers in evaluating genetic diversity in members of the *Asimina* genus, as well as closely related tropical relatives in the *Annona* genus. Leaf samples were collected from three plants each of *Asimina longifolia*, *A. obovata*, *A. parviflora*, *A. reticulata*, *A. tetramera* and *A. triloba*. Leaf samples were also collected from three plants each of *Annona cherimola*, *A. squamosa*, *A. reticulata*, *A. muricata*, *A. glabra*, *A. diversifolia*, and *A. montana*. DNA was extracted from leaf samples and subjected to ISSR-PCR using the REDExtract-N-Amp™ Plant PCR Kit. DNA samples were screened with ISSR primers using the University of British Columbia microsatellite primer set #9. Three primers, UBC812, UBC841, and UBC873 were found to produce 84 scorable ISSR markers and allowed the determination of genetic relationships among *Asimina* and *Annona* members examined.

76. Adam Craig

University of Kentucky

Faculty Sponsor: C. Melody Carswell

Effects of Direct to Consumer Advertising on Physician Prescription Intention

Spending by the pharmaceutical industry on Direct-to-Consumer Advertising (DTCA) tripled from 1996 to 2000 and shows the recent change in the marketing practices of this \$259 billion industry. Proponents claim this advertising facilitates the communication between physicians and their patients but may in fact be harming this relationship by exploiting it for marketing purposes and higher profits. With patients presenting more persuasive messages derived from pharmaceutical advertising, physician resistance to this form of persuasion may increase; the result could be an intention to resist this marketing strategy by prescribing generic drugs. This study seeks to evaluate the effect of DTCA on the patient-physician relationship by interviewing physicians, and to predict their intended prescription behavior. Physicians ranging in specialties and years of practice are interviewed in a semi-structured process in order to determine their perceptions and intentions towards the pharmaceutical industry. Responses are examined by evaluating physician resistance to persuasive messages and correlating the number of encounters to persuasive messages (patients requesting specific drugs) with intent to prescribe generic drugs. We hypothesize that as encounter rates increase physicians showing higher rates of resistance to DTCA prescribe fewer name brand drugs in order to restore balance in the relationship model that contains the physician, patient, and pharmaceutical company. Consequently, the relationship remains unbalanced if physicians continue to view the pharmaceutical companies negatively. Results provide direction for further academic research regarding the processes involved in persuasion that DTCA promotes. Implications for future advertising and marketing efforts in the medical field are provided.

77. Daniel Brame

Western Kentucky University

Faculty Sponsor: Gordon Smith

Developing a Visual Interface for DeltaE, the Numeric Simulator for Thermoacoustic Devices

Thermoacoustic devices are robust heat engines, using heat to create sound, or using sound to transport heat. They are attractive to industry for their low-maintenance costs and environmental considerations. However, device efficiencies are problematic, prompting searches for new and better designs. Thermoacoustic devices typically begin their development utilizing DeltaE, a numerical simulator developed by researchers at the Los Alamos National Laboratories. The program is highly popular among the thermoacoustics community for its ability to successfully describe the physical parameters and geometries that a thermoacoustic device requires to operate. However, the program is text-based, and is somewhat counterintuitive to the novice user. Many attempts have been made to develop a visual version of DeltaE that is more user-friendly, but none have the computing abilities of DeltaE (and so have not been widely accepted in the thermoacoustic community). This approach differs from earlier efforts in that no attempt is made to replace DeltaE itself. A front-end interface possessing the intuitive benefits of graphical programs has been created, which itself runs DeltaE. Details of the beta version of the program will be presented.

78. Christopher Whitaker

Morehead State University

Faculty Sponsor: Ilun White

Non-Dopaminergic Influence on the Mesolimbic Dopamine System

The mesolimbic dopamine system, which consists of the nucleus accumbens (NAc), prefrontal cortex, and ventral tegmental, mediates a wide-range of behavior, simple to complex. Increasing evidence indicates that other limbic structures (non-dopaminergic), such as hippocampus (HIP) and amygdala (AMg), may modulate behavior mediated by the mesolimbic dopamine system. The present study investigated the involvement of HIP and AMg in amphetamine-induced hyperactivity. Previously, we reported that excitatory input from HIP to NAc is critical for expression of hyperactivity. Other studies indicate that AMg may provide inhibitory modulation. Thus, we hypothesized that HIP and AMg would exert opposing roles and that either excitation of HIP or inhibition of AMg would augment amphetamine-induced hyperactivity. Wistar rats were lesioned (NMDA or sham) in either HIP or AMg. After recovery, the rats' activity was monitored in an open-field before and after amphetamine (1mg/kg, i.p.). Activity was measured by distance traveled at 5 minutes intervals for 60 minutes. Following amphetamine, HIP-lesioned rats showed decreased activity, whereas AMg-lesioned rats showed increased hyperactivity, compared to the shams. Our data provides evidence that HIP and AMg, are critical in influencing the expression of amphetamine-induced behavior, and supports the hypothesis that HIP and AMg provide opposing influence on expression of hyperactivity following systemic amphetamine. Future research on the precise roles of these structures will enhance our understanding of the way addictive drugs influence the mesolimbic system to produce changes in behavior.

79. Michael Cieraszyński

University of Kentucky

Faculty Sponsor: Thomas R. Zentall

Auditory Discrimination Learning by Pigeons

We asked if pigeons were as good at tone discriminations as song birds (zebra finches). Five pigeons were trained to discriminate among 27 different tones. Nine tones between 607 Hz and 967 Hz were defined as correct, whereas nine lower frequency tones between 359 Hz and 572 Hz and nine higher frequency tones between 1025 Hz and 1633 Hz were defined as incorrect. Adjacent tones were 6% apart. Pigeons initiated a trial with a peck to a ready button. A response to a report button during a 2-sec correct tone produced 2-sec of mixed grain and another began immediately. The tones were presented in random order. A response to the report button during a 2-sec incorrect tone produced no food and resulted in a 30-sec timeout before the next trial began. Pigeons showed good discrimination of the tones, achieving a mean discrimination ratio $[\text{responses to positive tones} / (\text{responses to positive tones} + .5(\text{responses to negative tones}))]$ of .83, similar to that found with human participants but not as good as results found with song birds. Thus, pigeons (like humans) have relative pitch, whereas song birds have absolute pitch. The data suggest that absolute pitch is not a general phenomenon found in all avian (bird) species, but is probably a specifically evolved ability possessed by species for which the detection of absolute frequencies is important for them to discriminate members of their own species from members of other (perhaps closely related) species.

80. Aaron Hamlin

Northern Kentucky University

Faculty Sponsor: David Hogan

Social Facilitation of Anagram Problem Solving in College Students

The rate of solving anagram problems in test subjects was directly correlated with the solution rate of a pacer. The mean number of problems solved in a 5 minute test period was largest when the pacer solved them at a high rate, intermediate when the pacer solved them at a slower rate, and smallest in a no-pacer control condition. The results indicate that competition enhances cognitive effort.

81. Lisa Brinley, Laurel Curtis, Jennifer Hardin, Heidi Hassel, Amanda Meyer, Janette Stidham, and Jennifer Thompson

Morehead State University

Faculty Sponsor: Christine McMichael

Making the Transition: An Assessment of Distressed and Non-distressed Counties in Eastern Kentucky

One hundred and twenty-one Appalachian counties are currently classified as ‘distressed’ by the Appalachian Regional Commission. Distressed counties have higher rates of poverty and unemployment, and lower per capita income, than non-distressed counties. Currently, forty-two of Kentucky’s fifty-one Appalachian counties are classified as distressed, an increase of approximately nine percent from 1990. As a step towards understanding county-level strategies that may be used to successfully transition from distressed to non-distressed status, this study investigated a number of additional social and economic variables for a group of six currently distressed and six currently non-distressed counties in eastern Kentucky. County-level population, education, and economic data were obtained from the U.S. Census Bureau for each census period between 1970 and 2000. Graphs and maps were used to identify and analyze trends in population, education, and economic variables for each group of counties. Key differences in educational attainment levels and industrial diversity were observed between the distressed and non-distressed groups. Project results were used to develop a broad set of guidelines (an ‘action plan’) intended to assist currently distressed counties in making the transition to non-distressed status. The quality of life will improve for all the people of Appalachia as more counties make this transition successfully, and the goal of building sustainable Appalachian communities will be increasingly within reach.

82. Sheena Moran, Kimberly Mayfield, and Alexandra Carter

Eastern Kentucky University

Faculty Sponsor: Isabelle White

Finding Common Ground: Civil War Nurses Transforming Gender Roles

Despite the nineteenth-century insistence on "separate spheres" for men and women, Union nurses during the American Civil War found "common ground" with soldiers. These women used domesticity to enter the public, professional life of hospitals and even the battlefield itself, thereby contributing to expanded opportunities for women after the war.

83. Esughani Okonny

Kentucky State University

Faculty Sponsor: Carolyn M. Klinge

**Authors: Esughani Okonny, Carolyn M. Klinge, Edouard L. Noisin,
Shephali Bhatnagar, and Kelly E. Risinger**

Mechanisms of Resveratrol and Estrogen in Cardioprotective Function

The antioxidant resveratrol is a polyphenolic compound that is found in grapes, berries, and peanuts, with the highest concentration of 50-100 µg in the grapes' skin. Resveratrol induces nitric oxide synthetase (eNOS) in cultured endothelial cells, and thus plays a cardio-protective role by increasing NO levels. The mechanism for the activation of eNOS is unknown. It was hypothesized that resveratrol, like estradiol (E2), activated membrane estrogen receptor (ER), which in turn activated eNOS through the MAPK and/or PI3K signaling pathways in endothelial cells. Cell extracts of bovine aortic endothelial cells (BAEC) were treated with resveratrol, E2, and other compounds and were analyzed by Western blots probed with antibodies against MAPK and P-MAPK. Activities of eNOS were determined by an enzymatic reaction measuring the conversion of 14C-arginine to 14C-citrulline. Results indicated that resveratrol and E2 both increased MAPK activity in a concentration-dependent manner as observed by Western blot analysis. The increase in MAPK activity was abolished with the ER antagonist, ICI 182,780, suggesting that resveratrol and E2 both activate MAPK via direct interaction with ER-alpha and ER-beta. Both resveratrol and E2 induced eNOS activity in BAEC through a mechanism that involved MAPK and PI3K signaling pathways since the selective inhibitors PD 98059 and LY 294002, respectively, inhibited E2 and resveratrol-induced eNOS activity. These data provide preliminary evidence that mechanism of action of resveratrol in BAEC is similar to that of E2, is mediated by ER, and may provide better understanding on the mechanism of cardio-protection by these two ligands.

84. Michelle Meyer

Murray State University

Faculty Sponsor: Ivan Pulinkala

Burden

Women are expected to play clashing roles in today's world: mother/worker; innocent/experienced; modest/confident; intelligent/weak; sexy/shy; to name a few. To this end, what is female has become a question that cannot be clearly defined. Fighting to play all of these opposing characters in life can potentially lead to insanity both in women's own minds and a perceived insanity from the world at large that still views us as second class and incomprehensible. I believe much of what is considered insane in women is constructed from the burden of unrealistic social standards to which women attempt to conform. Once a woman learns to strive for only what would make her feel successful and ignore the pressures from society, the insanity dissipates. To portray this societal burden through movement, I will use 5 dancers: three females and two males. For props, the dance is developed surrounding three of black blocks, creating more interesting shapes. The blocks represent the confinement of societal standards. The music for the piece is Samuel Barber's mournful Adagio for Strings. Choreographically, I am working with strange space designs. Strange space pushes me out of my comfort zone and represents the insanity concept very well. I am drawing movement inspiration from my view of this issue as well as from other's opinions of insanity by reading feminist writings dealing with society's influence and control: *The Bell Jar* by Sylvia Plath, *The Feminine Mystique* by Betty Friedman, and *The Yellow Wallpaper* by Charlotte Perkins Stetson.

85. Venetta Smith, Frazier Taylor, and Samuel McNeely

University of Louisville

Faculty Sponsor: J. Christopher States

Arsenite Induced Disruption of Mitosis

Arsenite is a known carcinogen that causes skin, bladder, and liver cancer. However, the mechanism of carcinogenesis is unknown. Arsenite (AsO_2^-) delays entry into mitosis by activation of the G2 checkpoint. Arsenite also induces a mitotic delay in anaphase and is aneuploidogenic in normal diploid human cells (p53(+)). In contrast, arsenite induces mitotic arrest and apoptosis in p53 deficient cells (p53(-)). We hypothesize that arsenite, in the presence of p53, induces the inactivation of cyclinB/cdc2 by cdc2 phosphorylation, leading to the derepression of the mitotic exit network. Cdc2, cdc2-P and cyclin B levels were analyzed as the cells progressed from G2 through mitosis to determine whether the p53-dependent G2 checkpoint pathway plays a role in releasing cells from arsenite induced mitotic arrest. TR9-7 cells are a model human fibroblast line in which p53 expression is regulated exogenously in a tetracycline-off system. TR9-7 cells, expressing and not expressing p53, were synchronized in G2 and released into media containing and not containing sodium arsenite (NaAsO_2 , 5 μM). Western blot analyses were used to monitor whether there were any arsenite-induced differences in the proteins expressed and if these changes were p53 dependent. These analyses showed that arsenite stabilization of cyclin B level is p53 independent. Arsenite stabilizes the phosphorylation of Cdc2 in both p53(+) and p53(-) cells even when cyclin B has diminished. Cdc2-P levels are also stabilized early in p53(+) and p53(-) cells not treated with arsenite yet diminish after the 12th hour release from Hoechst 33342. These results are consistent with the inactivation of cyclinB/cdc2 allowing cells to exit mitosis and escape arsenite induced mitotic arrest.

86. Crystal Sparks and Jordan Hussey-Andersen

Eastern Kentucky University

Faculty Sponsor: Barbara Hussey

On Common Ground: A Union and Confederate Woman in Civil War Kentucky

This poster will present information from Civil War diaries kept by a Confederate and a Union woman living in Central Kentucky. It will compare the experiences of women on both sides of the war living in a border state. Both photographs and diary excerpts will be included.

87. Aimee Mullins, Brandy Stiltner, and Amanda Day

Morehead State University

Faculty Sponsor: Shari Kidwell

Maternal Depression and Child Adjustment Among Families in Eastern Kentucky

Maternal depression is a considerable problem for America's families, with major implications for children's development. Among low-income families with young children, 30 to 40 percent of mothers experience significant depressive symptoms. For many of them, these symptoms have a deleterious effect on their parenting capabilities, particularly affecting sensitivity and consistency. Children's adjustment is likely to be affected such that children whose mothers are depressed are at risk for a range of social, emotional, and academic problems. This study seeks to explore how maternal depression influences children's adjustment, as well as what factors predict depression levels. Importantly, this study appears to fill a gap in the empirically-based knowledge of families and children in Eastern Kentucky. Preliminary data consists of 15 families of 4 year-old children. Preschoolers were chosen because it is a key developmental transition, with increasing separations at the same time children are expected to show growing independence and competence. Sample mothers were in their late twenties on average. Data collection involved taped interviews and questionnaires completed at the University. Approximately one-third of mothers were moderately depressed. Mothers with depressive symptoms tended to be more inconsistent in discipline and their children were more likely to have behavioral problems. Additionally, mothers with higher levels of depression tended to view their own upbringing as significantly less supportive, relative to non-depressed mothers. This data appears consistent with previous findings and may elucidate how best to prevent problems among children of depressed mothers in Eastern Kentucky.

88. Tom Huesman

Northern Kentucky University

Faculty Sponsor: David Hogan

Music and Memory in Male College Students

Evidence indicates that female college students who completed at least six years of formal music training have better recall memory for verbal material than females with less training (Chan, Hoe, & Cheung, 1998). We tested males and found that the relation holds true for males, too. Specifically, male students with more than six years of music training recalled significantly more common words from a 16 item list than males with less music training. An unexpected finding in our study, however, was that females with and without extensive training did as well as males with extensive music training, which calls into question the reliability of Chan's initial report. We also found that the number of different instruments the student musicians played completely mediated the link between years of music training and verbal recall.

89. Matthew Williams

University of Kentucky

Faculty Sponsor: Keith MacAdam

Where to Sit? A Look at Frequency's Effect on Volume Distribution in the Singletary Concert Hall

The objective of this project was to find the best seat in the Concert Hall of the Singletary Center for the Arts, here at the University of Kentucky. While subjective factors often determine a patron's favorite place to sit, I decided that an objective scientific approach could prove useful when I, or anyone, next attended a concert. Using only a keyboard amplified by speakers placed at center stage and a sound level monitor, I measured separately the volume of six different frequencies (at intervals of an octave) at twelve different seats throughout the Hall. Defining the best seat as the one at which all frequencies would have the most consistent volume, I then averaged and compared the data. Somewhat to my surprise, the "best seat" turned out to be near the middle of the auditorium, with the next two being in the front and in the back. This project, although simple in nature, might provide insight into the acoustical tendencies of the Concert Hall and enable audience members to enjoy the best musical experience possible.

90. Shaunna Cornwell

Western Kentucky University

Faculty Sponsors: Chris Grove and Beth Robb

Protecting Rural Karst Drinking Water Supplies Through Education

Since 1998, the WKU Technical Assistance Center for Water Quality has been working to provide assistance to rural drinking water providers in Kentucky. To improve public health within Kentucky, the Center's Source Water Protection Program has developed an applied research program to identify strategies supporting an approach that assumes that the better the quality of source water when it reaches the treatment plant, the easier and cheaper is to treat. The roughly 50% of Kentucky underlain by karst aquifers present special challenges as these waters are especially vulnerable to contamination by agricultural land use, including bacteria, pesticides, and nutrients. Since land use is closely tied to groundwater quality in these areas, education about the functions of such systems is a powerful tool for protecting vulnerable drinking water sources. A key research area is thus to determine means to provide education to landowners, local government officials, and public about source water issues, and to determine how this compares in efficacy and cost-effectiveness when compared to other source water protection strategies. This poster describes the module "Impact of Karst on Source Water Protection" as an example. This has been designed as a workshop, but also includes printed materials and a website for wider dissemination. Subsections of the module include Concepts of Source Water Protection, Karst Landscapes and Aquifers, Karst Related Environmental Problems, Best Management Practices for Source Water Protection in Karst, GIS in Source Water Protection, and Partnerships for Source Water Protection.

91. Abraham Mekonnen

Kentucky State University

Faculty Sponsor: Kazi Javed

Cooking Methods and Duration Affects Calcium Content of Bone Soup

The importance of adequate calcium intake is well recognized for supporting bone growth in children and in preventing bone loss in postmenopausal women. Calcium requirement can be met rather easily with the consumption of calcium-rich dairy products. However, some people have difficulties eating dairy products. Soups made from pork or beef bones may serve as an alternative source of dietary calcium. Others have shown that slowly cooking bones in acidic solution enhanced calcium content of the soup. The objective of this study was to determine the effect of cooking methods and cooking duration on calcium content of bone soups prepared in small batches. Pork ribs from the one pig were used in the study. The bones were cut into 2-inch pieces and freed of all soft tissues before they were divided into six groups. Three groups of bones with total weight of 30 g, 60 g, or 90 g, were cooked with 200 ml distilled water with 5% vinegar, either in a stainless steel soup pot or in a pressure cooker. At 30, 60, 90 and 120 minutes after boiling, the volume, pH, and calcium content of the soups were measured. Calcium content of soups cooked in a pot reached 200 or more mg/L. The pH increased as cooking time increased. Increasing the total amount of bone did not increase the calcium concentration further. With the highest amount of bone, the soup calcium actually declined, possibly due to the fast evaporation of water and precipitation of calcium to the pot wall. Calcium contents of soups made in the pressure cooker were lower than those made in the pot. Our results suggest that bone soups prepared under the conditions of this study did not appear to be a good source of calcium. Adding more vinegar and optimization of water to bone ratio may be needed to make calcium-rich bone soups.

92. Anis Drira

Murray State University

Faculty Sponsor: Theodore Thiede

Development of a Rowing Scoreboard Using GPS Technology

A key feature in all popular sporting events is the display of information to the spectator on a scoreboard. Recent developments in scoreboard technology have led to cheaper and more reliable scoreboards. Rowing is a sport that is slowly growing in popularity, but to date, has gained little following as a spectator sport. In this research, a cost-effective scoreboard is being developed for rowing events using global positioning system (GPS) technology. This system involves timed sensors to transmit data from GPS transmitters to a computer system that provides input to a scoreboard. The scoreboard has been completely designed by to provide information that will enhance the spectators' appreciation for the sport. The study provides some background in the design of scoreboards and application of GPS technology, as well as specific details in the design of a prototype rowing scoreboard.

93. Kevin Price

University of Louisville

Faculty Sponsor: Michael Losavio

Computer Security for Home Users and Small Businesses for the Department of Homeland Security

The Department of Homeland Security (DHS) recognizes the importance of Internet Security and the security of computing machinery connected to the Internet. Their "National Strategy to Secure Cyberspace" briefing outlines, amongst other things, the importance of home users and small businesses keeping their systems secure and maintaining an active security stance. Unsecured systems can be used as a stepping-stone for malicious hackers to attack critical infrastructure computers. The local student chapter of the Association for Computing Machinery approached the DHS to offer to help local home users and small businesses with their security needs. We are currently working in conjunction with the Secret Service and the Department of Homeland security on this matter. The project, while constantly evolving, and involves three components:

- assembling a group of programs for use in securing computers and networks (This includes firewalls and virus protection, active & passive network security, and secure configurations for frequently used software.),
- preparing and compiling documentation regarding the securing of computers and networks (This includes making people aware of security lists such as BugTraq, and how to keep on top of the latest security issues.), and
- preparing and presenting courses on securing computing machinery (This includes topics such as proper PC protection, setting up and configuring home networks, and setting up and configuring web servers).

94. Robert Kenneth Zimmerman

Western Kentucky University

Faculty Sponsor: Sergey Marchenko

Inhomogeneous Wind of the Wolf-Rayet Star V444 Cygni

All hot, massive stars drive fast, dense winds. To understand the evolution of a massive star is to understand how the mass is lost. Recently it has been found that all massive stars produce clumpy, highly inhomogeneous winds. The eclipsing binary V444 Cygni may be considered as a "Rosetta Stone" system for the population of star galactic binaries composed of Wolf-Rayet (WR) and OB-type stars. Indeed, more than 300 publications have been devoted to this system! However, there is a lingering question: Is the WR wind of V444 Cygni clumped? Solving this problem, we have processed the near infrared and optical images of V444 Cygni obtained almost simultaneously over twelve contiguous nights. We targeted the highest possible precision, finally achieving a standard deviation (σ) of 0.01 magnitudes (or ~1%) in the IR band. In the optical, we expected $\sigma = 0.005$ mag, but obtained $\sigma = 0.01$ mag. We find that the IR light curve is broader than the optical during the secondary eclipse, when the O star companion passes in front of WR star. This result supports the conclusion of a clumped WR wind.

95. **Hermine Ngwang**

Kentucky State University

Faculty Sponsor: Myna Panemangalore

Effect of Pesticides and Diets Containing Varying Levels of Minerals on Plasma Calcium, Zinc, and Copper Concentrations in Rats

The interaction between minerals calcium (Ca), zinc (Zn), and copper (Cu) and a mixture of pesticides was determined on plasma mineral concentrations in rats. Male, Sprague Dawley rats, weighing 175-200 g, 6/grp were fed AIN 93M or the same modified to contain 500 mg Ca (Low Ca), 7 mg Zn (Low Zn), 2 mg Cu (Low Cu), 60 mg Zn (High Zn), or 12 mg Cu (High Cu) in combination: Control (CON), LCa+LZn, LCa+LZn+LCu or HZn+HCu with or without pesticides. A mixture of Endosulfan, Thiram, and Acephate at 25% of LD50 was added to the diet of pesticide exposed groups. The rats were fed for 4 weeks. Plasma Ca concentrations (mg/L) declined by about 17% in groups fed low Ca diets and by a similar amount in the HZn+HCu group; exposure to pesticides in the diet decreased plasma Ca in the CON and LCa+LZn groups by 14%, but not in the LCa+LZn+LCu and HZn+HCu groups ($P \leq 0.05$). Plasma Zn declined by more than 50% in the LCa+LZn, LCa+LZn+LCu and HZn+HCu diet groups, but pesticide exposure did not further modify plasma Zn ($P \leq 0.05$). Plasma Cu decreased by 82% in the LCa+LZn+LCu group and was similar to the control in all other groups; there was a 2.5 fold increase in plasma Cu in the pesticide exposed LCa+LZn+LCu group ($P \leq 0.05$). This suggests interaction between pesticides, Ca, Zn, and Cu at the level of absorption.

96. Three Studies Examining the Effects of Prenatal or Adolescent Exposure to Alcohol and/or Nicotine in Rats

University of Kentucky

Faculty Sponsor: Susan Barron

Kelley Morrow, Sarah Mills and Rebecca Gilbertson

The Effects of “3rd trimester” Alcohol and Nicotine Exposure on Memory in Rats

Fetal alcohol syndrome is a condition caused by chronic alcohol exposure during pregnancy that causes deficits in learning and memory function. Although there is a high co-morbidity between alcohol and tobacco use during pregnancy, little research has been done to study the interaction between these two commonly used substances. Using a rodent model, rats were given these drugs neonatally during the “brain growth spurt” which occurs primarily during the 3rd trimester of human pregnancy. Rats were treated on postnatal days 1-7 with either alcohol, nicotine, or a combination of alcohol and nicotine (and appropriate controls). Memory was examined using a standard spatial learning task (the Radial Eight Arm Maze) during adolescence. Males with previous nicotine exposure showed improved performance during the 2nd week of testing. Nicotine (not smoking) has been shown to have cognitive enhancing properties (via stimulation of cholinergic neurons) and these data suggest that neonatal nicotine exposure (at least in males) showed this effect. Of significant importance, combining nicotine with ethanol eliminated any cognitive enhancement.

Darby Schulman and Kelly Lewis

A Rodent Model to Study Adolescent Alcohol Abuse

Adolescents are at high risk for alcohol use and abuse, and the health and economic costs associated with adolescent alcohol abuse is high. Clearly, we need a better understanding of the factors that can influence adolescent drinking. We have recently developed a rat model in which rats will voluntarily drink alcohol and after being deprived of alcohol for a period of time, will show an increase in alcohol consumption when provided alcohol again. This “relapse” model has been demonstrated in adult rats but very little is known about whether rodent models would be useful to study adolescent drinking. In this study, juvenile rats showed a similar response to ethanol as adults, but adolescent rats showed a significantly higher level of alcohol consumption than either juvenile or adults and higher than would have been predicted thus suggesting differences in adolescence that may put them at increased risk for adolescent alcohol abuse.

Suzanne Sizemore, Katina Ball and Rebecca Gilbertson

The Effects of “3rd trimester” Alcohol and Nicotine Exposure on Activity Levels in Rats

Kentucky ranks among the top states in pregnant smokers. There is also a strong relationship among pregnant drinkers and heavy smoking. Surprisingly, we currently know very little about the possible interactive effects of nicotine and alcohol on the developing offspring. One of the most frequently reported findings following prenatal alcohol or nicotine exposure is changes in activity levels. Using a rodent model, this study examined the effects of alcohol and nicotine exposure on offspring activity (see Project 1 above for description of treatment groups). Activity was recorded for 20 min daily in juvenile rats (19 –21 days of age). Animals were the most active during the first 10 minutes on each test day although there were alterations in this normal activity pattern depending on treatment group and gender. Female offspring exposed to nicotine and ethanol (in combination) displayed a reduction in activity that would not have been predicted based on exposure to either drug alone.

97. Elizabeth Megan Flynn (Oral Presentation)

University of Kentucky

Faculty Sponsor: Robert L. Houtz

Mechanism of Multiple Lysine Methylation by SET Domain Enzyme Rubisco LSMT

In 2000, the SET domain was identified as a ~110 amino acid motif shared by chromatin structure and gene silencing-related proteins histone H3 ^εN-methyltransferases (HMTs) and Rubisco (Ribulose-1,5-bisphosphate carboxylase/oxygenase) Large Subunit ^εN-methyltransferases (LSMT). SET domain protein methyltransferases catalyze the transfer of methyl groups from the cofactor S-adenosylmethionine (AdoMet) to specific lysine residues of protein substrates, such as the N-terminal tails of histones H3 and H4 and the LS of the Rubisco holoenzyme complex. In 2003, a crystal structure of Rubisco LSMT with free Lysine bound to the active site was obtained. In order to determine function, I investigated the possibility of Lysine as an alternative substrate and competitive inhibitor with respect to Rubisco. Through kinetic analysis, I found that free lysine and monomethyllysine does act as a competitive inhibitor, and their K_s are 36.6 mM and 100.8 mM. Furthermore, the products of a radiometric assay with lysine, monomethyllysine, dimethyllysine as a substrate were analyzed using TLC and lysine, monomethyllysine and dimethyllysine were used as substrates. The structural data concluded that the methyl group of MeLys is bound to the enzyme via carbon-oxygen hydrogen bonds that play a key role in catalysis. The methyl donor and the acceptor are aligned in a linear geometry for S_N2 nucleophilic transfer of methyl group during catalysis. The functional data and structural data gave insight into catalytic mechanism of multiple lysine methylation and are included in a July 2003 Nature Structural Biology paper.

98. David Charles (Oral Presentation)

Morehead State University

Faculty Sponsor: Sean Reilley

Subclinical Depression Masquerading as Adult AD/HD on the Brown ADD Scales: A Preliminary Study

Pronounced attention problems, common in Attention Deficit/Hyperactivity Disorder (AD/HD), are associated with academic, occupational, and social difficulties. Self-report inventories, behavioral attention measures, and clinical interviews are frequently used in the AD/HD diagnostic process. Differentiating between primary attention problems in AD/HD and secondary attentional features of psychiatric disorders, like depression, is complicated when childhood attention and/or mood symptoms exist. A current gap and problem in the existing research literature is a lack of comparative self-report and behavioral attention data from individuals with secondary attention problems due to depression. The present study investigated whether college individuals with subclinical depression and an absence of childhood AD/HD symptoms would score significantly higher and in the AD/HD range on the Brown Attention Deficit Disorder Scales relative to a non-depressed control group without AD/HD history. Subclinical depression was defined by endorsement of moderate clinical depressive symptoms on the Beck Depression Inventory-2 and corroborated with other psychosocial history and self-report data during a 1-hour questionnaire-based study. Self-reported attention problems were assessed using the Brown ADD Scales. Consistent with expectations, the total score on the Brown ADD Scale as well as all Brown subscales were significantly higher and above AD/HD threshold for the subclinical depressed group relative to reports of college controls. Although these cross-sectional findings are preliminary, the need for appropriate comparative clinical data is underscored in that subclinical depression in this study manifested in the highly probable range for adult AD/HD on the Brown ADD Scale.

99. Natalie Bisha Krupansky (Oral Presentation)

Murray State University

Faculty Sponsor: Sonya Baker

An Investigation Into the Bel Canto Style and How Rossini Used Bel Canto Techniques While Having a Major Impact on Mezzo-soprano Roles

The term bel canto refers to a style of singing made popular in the late 18th and early 19th centuries in Italian opera. Composers and performers utilized the bel canto technique to demonstrate vocal agility and technical ability. Gioacchino Rossini (1792-1868) is thought to be one of the masters of this style. Rossini employed the use of such bel canto techniques as sostenuti, portamenti, messa di voci and melismatic passages in his operas. Rossini was an influential and crucial composer for the mezzo-soprano voice type. Rossini wrote characters for the mezzo-soprano which were the object of the leading man's affection and light-hearted. This was considered a change from preceding ideas. This paper reviews some of the techniques of bel canto singing as used by Rossini. It also discusses the vocal difficulty of performing such skills effectively. The paper also examines the shift of available roles for mezzo-sopranos in Rossini operas compared to previous opportunities. Rossini often used the voice as a technically skilled instrument rather than exploiting its dramatic ability.

100. Janice Mueller (Oral Presentation)

Northern Kentucky University

Faculty Sponsor: Tamara O'Callaghan

The Medieval Manuscript: The Production, Design, and Purpose of a Fifteenth-Century Book of Hours

The word “manuscript”, which literally means “handwritten”, is used to describe a book that is produced and written by hand. This study will examine the materials and major processes involved in the labor-intensive production of a medieval manuscript. By focusing on a fifteenth-century book of hours that is presently held by The Public Library of Cincinnati and Hamilton County in Cincinnati, I will examine the preparation of parchment, the textual layout and design of the individual folio or page, the use of scribal handwriting and ink, the artistic techniques for illumination and illustration, and the method of sewing and binding the finished manuscript. I will also discuss the importance of books of hour in medieval culture. Books of hours were commonly used for private devotions in the later Middle Ages and quickly became bestsellers, especially in northern Europe. They were commissioned and read by a diverse audience, including women, a claim that cannot be made of all types of medieval manuscripts. Consequently, such a textual artifact provides considerable insight into the early history of literacy and the book as well as allows us to understand more fully how book production today has—and has not—changed from its medieval roots.

101. Monica Nicole Hall

(Oral Presentation)

University of Louisville

Faculty Sponsor: Carolyn Klinge

The Role of COUP-TF in Tamoxifen Resistant Breast Cancer Proliferation

Lifetime exposure to estrogens is an established risk factor for developing breast cancer. Estradiol (E2) binds to estrogen receptors alpha and beta (ERalpha and ERbeta) in the cell nucleus. ER then binds to regions of DNA called Estrogen Response Elements (EREs) to increase the expression of genes that stimulate tumor growth. Drugs called antiestrogens, i.e., Tamoxifen (TAM), compete with E2 for binding ER and prevent tumor recurrence. Unfortunately, breast cancer cells become resistant to TAM. The nuclear receptor COUP-TF (Chicken Ovalbumin Upstream Promoter Transcription-Factor) interacts with TAM-occupied ERalpha and inhibits its activity. My hypothesis is the loss of COUP-TF expression plays a role in breast cancer progression and TAM-resistance. TAM-resistant LCC2 cells grew in charcoal-stripped serum whereas the parental TAM-sensitive MCF-7 cells failed to grow under the same conditions. These results indicate that the cell lines used in this study are good models of TAM-resistant tumor growth. The expression of COUP-TFI and COUP-TFII as well as the cell signaling proteins ERK1/ERK2 (MAPK) was determined in TAM-sensitive and -resistant human breast cancer cell lines. RNA was isolated and purified for use in real-time RT-PCR to examine COUP-TFI and COUP-TFII expression. Western Blots showed that TAM-resistant cell lines showed elevated basal MAPK activity. E2-induced MAPK activation in TAM-sensitive MCF-7 cells and was inhibited by the antiestrogen ICI 182,780 demonstrating that the non-genomic E2 activity is mediated by ER. Understanding the role of COUP-TF may lead to more effective antiestrogen and gene therapies to prevent and treat breast cancer.

102. Gretchen Berryman

(Oral Presentation)

Western Kentucky University

Faculty Sponsor: Cathleen Webb

Occurrence and Distribution of Mercury in Mammoth Cave National Park - Phase I

The fate and transport of mercury, a persistent neurotoxin in the aquifer system, and its bioaccumulation in organisms of Mammoth Cave National Park (MCNP) will be examined. Atmospheric deposition of mercury is the largest single source of mercury at Mammoth Cave. There are over 20 power plant applications under consideration in the Commonwealth of Kentucky, therefore significant increases in atmospheric deposition of mercury to the Park can be expected. There is little current data that can be used to predict the potential impact on MCNP and the karst ecosystem. Determination of mercury levels in MCNP and the factors that affect mercury levels and distribution is important. This multiyear project began in late summer 2002 and will continue through the end of 2006. Contaminant transport in a karst system can be quite rapid and extensive. Mercury may interact with limestone, thus impacting its mobility. Mercury's mobility in surface water and ground water are of great concern due to its toxicity and its ability to biomagnify up the food chain. Furthermore, a number of surface and subsurface organisms are endangered or declining in MCNP due to bioaccumulation of mercury. Monthly data sets from 2002-2003 were analyzed for mercury levels in Green River water and sediments. Mercury levels in water are quite low (0-20 ppt) since mercury preferentially binds to sediments and organic material. Mercury levels observed in sediments collected ranged between 0-100 ppb. Observed levels of mercury in fish and clam samples are comparable to values observed in other studies (~0.20 ppm).