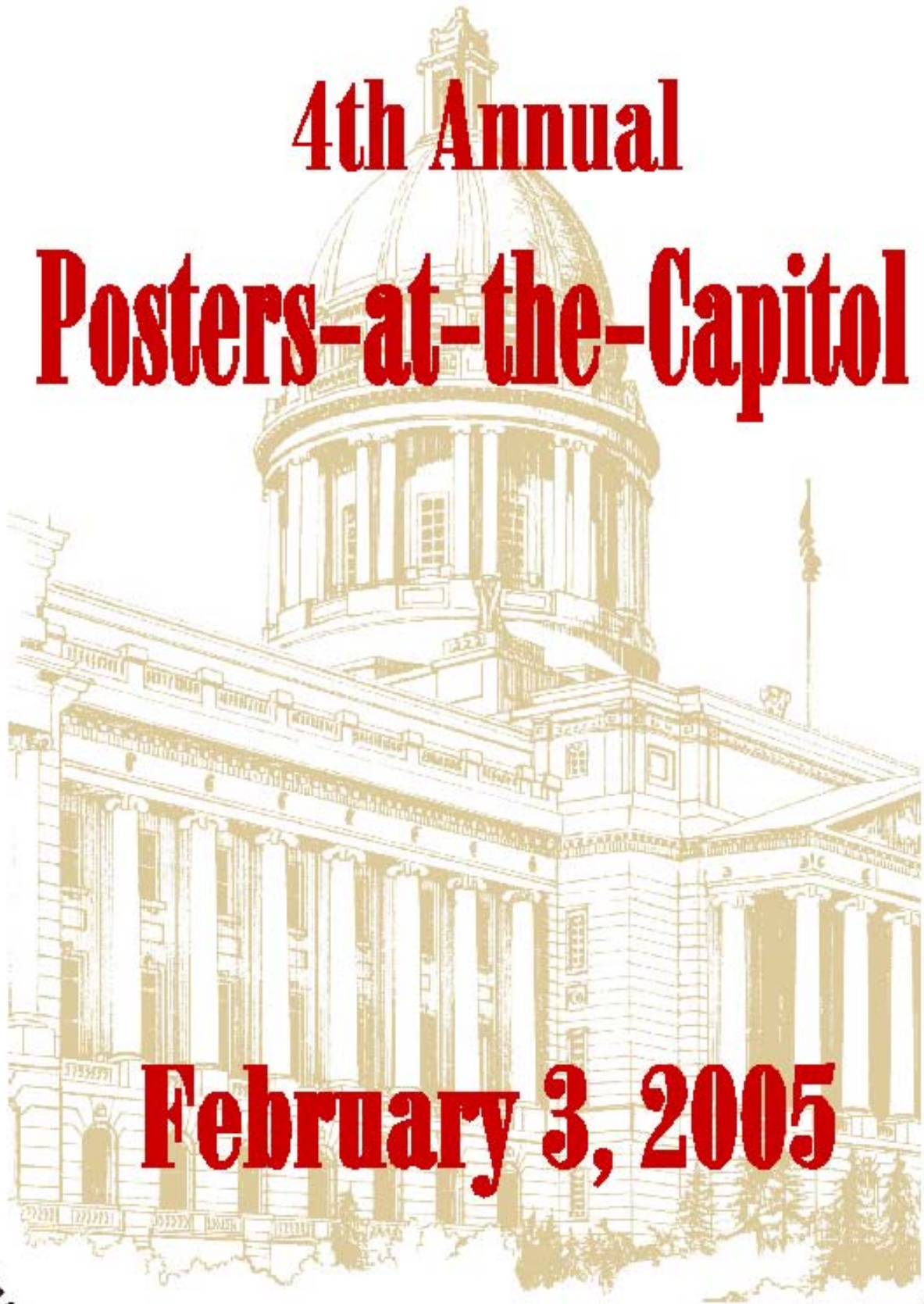


UNIVERSITY • KENTUCKY STATE UNIVERSITY • MOREHEAD STATE UNIVERSITY • MURRAY STATE UNIVERSITY • NORTHERN KENTUCKY UNIVERSITY • UNIVERSITY OF KENTUCKY • UNIVERSITY OF LOUISVILLE • WESTERN KENTUCKY UNIVERSITY • EASTERN KENTUCKY UNIVERSITY

4th Annual Posters-at-the-Capitol

February 3, 2005





Joanne K. Glasser
President

Welcome from Eastern Kentucky University:

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

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

Undergraduate research is an integral part of the teaching learning process at EKV, where students and learning come first. We are committed to providing our students with diverse educational opportunities that enhance their classroom experiences and develop habits of scholarship and intellectual curiosity. Each year, our students’ outstanding work is displayed on campus at our Undergraduate Presentation Showcase. For our entire University community, this discovery and application of new knowledge is exciting and rewarding.

I applaud 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 an exhilarating and lifelong educational journey. As I often say about Eastern Kentucky University, the best is yet to come for you. Go for it!



Mary Evans Sias
President

Welcome from Kentucky State University:

Kentucky State University is pleased to participate in the *Posters-at-the-Capitol* program. It affords our students and those at other universities the opportunity to showcase their talents and scholarly achievements.

As a 118 year old institution, KSU has a proud heritage as a historically black college. Our land grant history and unique liberal arts programs work in concert to form the basis of a strong institution. We offer quality educational programs, have excellent professors and small classes. Our unique learning environment helps KSU produce outstanding students who are capable of doing exceptional research.

The citizens of Kentucky and the legislators are afforded an opportunity during the *Posters-at-the-Capitol* program to see that KSU students are intellectually curious and well prepared. Our students and their peers at other universities will become the leaders of our community and this nation. Their posters give us a glimpse into their world and the potential they have.

Kentucky State University has worked hard through the years to prepare its students to succeed. The outstanding posters our students have done this year reflect KSU’s commitment to continued excellence. Our students and their mentors are to be congratulated. Their work is representative of the Commonwealth’s Uncommon University.

KSU: Inspiring Innovation. Growing Leaders. Advancing Kentucky.





Ronald G. Eaglin
President

Welcome from Morehead State University:

We at Morehead State University are delighted to be participating again this year in the *Posters-at-the-Capitol* event. This is a creative showcasing of the scholarly research accomplishments of our undergraduate students. A strong commitment to providing high quality research experiences to undergraduate students is a proud tradition at MSU. We believe that these research experiences comprise the core of education by providing meaningful 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 to reinforce cooperation in academic pursuits. The diversity of projects reflects the multi-disciplinary research that is needed to solve the issues facing our world. I congratulate each of the participants and wish to thank those who included Morehead State in this cooperative effort.



F. King Alexander
President

Welcome from Murray State University:

Research, scholarly, and creative work are the hallmarks of great universities. They are also the foundation upon which high-quality educational programs are built. Murray State University is proud to be engaging our undergraduates in research, scholarly, and creative experiences. One can only marvel at the high-quality faculty-mentored projects that students from Murray State are displaying at this year's *Posters-at-the-Capitol*.

As exemplified by our Undergraduate Research and Scholarly Activity (URSA) office and by our Residential Colleges, Murray State University places a high premium on programs that promote one-on-one interaction between our faculty and students. It is the personal attention of our dedicated faculty that has been and will continue to be the trademark of a Murray State education.

Murray State takes great pride in its undergraduate-focused research, scholarly, and creative initiatives. Through programs operated by the URSA office, our students have the opportunity to participate in *Posters-at-the-Capitol*; can obtain university support for their projects through our URSA Grants; can display their creative, scholarly, and research work to the Murray State community during *Scholars Week*; and can publish their work in Murray State's new undergraduate journal, *Chrysalis: The Murray State University Journal of Undergraduate Research*. These programs are seeing considerable success. Over 600 students participated in *Scholars Week 2004*!

I look forward to working with the faculty to ensure that we engage even more of our students in these important educational experiences. I invite all Kentucky citizens, legislators, and other interested groups to visit *Posters-at-the-Capitol* to see how our students are contributing ideas that are impacting our communities and our world.



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:

Research is the cornerstone of our commitment to educational excellence. The University of Louisville is proud of its many outstanding faculty researchers and scholars who mentor undergraduate students in their laboratories and classrooms. The commitment to our students' educational experience begins with enrollment, and their exposure to research comes early in their academic life.

Through the *Posters-at-the-Capitol* program, our undergraduate students exchange their ideas and discoveries with the elected leaders to whom the citizens of Kentucky have entrusted their future. Instilling a passion for creativity and new knowledge among undergraduate students is vital to economic development and quality of life success.

The *Posters-at-the-Capitol* program introduces undergraduate students to the importance of reporting scientific investigation and supporting crucial public investment in R&D.

This collaborative event among Kentucky's public universities allows talented undergraduates to demonstrate their academic achievement and the effectiveness of Kentucky's higher education system. The University of Louisville is proud of this program and its participants. We hope you will share our enthusiasm for the opportunities offered and visit with our students.



Gary Ransdell
President

Welcome from Western Kentucky University:

Western Kentucky University takes great pride in the fact that highly credentialed faculty from a wide array of academic disciplines involves students in meaningful research activities. The comprehensive university in America has as its primary responsibility the applied use of its intellectual capacity to identify and solve problems that exist in its region. The scholarly collaborations utilize the concepts learned in classrooms and laboratories thereby better preparing students for the workforce and graduate/professional schools. WKU research projects also 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 gratifying to see the number and diversity of student scholars along with their faculty mentors participating in the annual *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
- 10:45 a.m. Welcome
Dr. John Mateja, Chair, Posters-at-the-Capitol
- 10:50 a.m. Dr. Tom Layzell, President
Council on Postsecondary Education
- 11:00 a.m. to 1:00 p.m. Student Oral Presentations (Rotunda)
Dr. Rose Perrine, Session Chair
- Alisha Dobbins Eastern Kentucky University
The Impact of Perceived Risk, Victimization Experience, and School Supervision on Fear of Crime and Fear of Bullying at School among Public School Students in Kentucky
 - Daddy N. Boateng Kentucky State University
2-Tridecanone: A New Natural Product for Pest Control on Vegetables
 - Michael T. McCarty Morehead State University
The Morehead Space Tracking Antenna and Radiotelescope: Operator Program Version 1.0 and Data Imaging Using Data Reduction Automation Program Version 1.0
 - Mary Mather Murray State University
A Comparison of the Female Characters of Rodgers and Hammerstein to those of Stephen Sondheim
 - Anna Torstenson Northern Kentucky University
Raising Joey: A Mother's Journal
 - Stephanie Logsdon University of Kentucky
Differentially Regulated Pools of Synaptic Vesicles Within Motor Nerve Terminals
 - Stefanie B. Bumpus, Billy Allen, Sarah A. Andres, and
D. Alan Kerr, II University of Louisville
Laser Capture Microdissection of Normal and Neoplastic Cells for Gene and Protein Expression
 - Heather Veerkamp Western Kentucky University
Groundwater Sensitivity Mapping in Kentucky Using Geographic Information Systems
- 11:00 a.m. to 5:00 p.m. General Poster Session Viewing
- 1:45 p.m. (tentative) Group Photograph
Ernie Fletcher, Governor, Kentucky
- 3:00 p.m. to 5:00 p.m. Reception

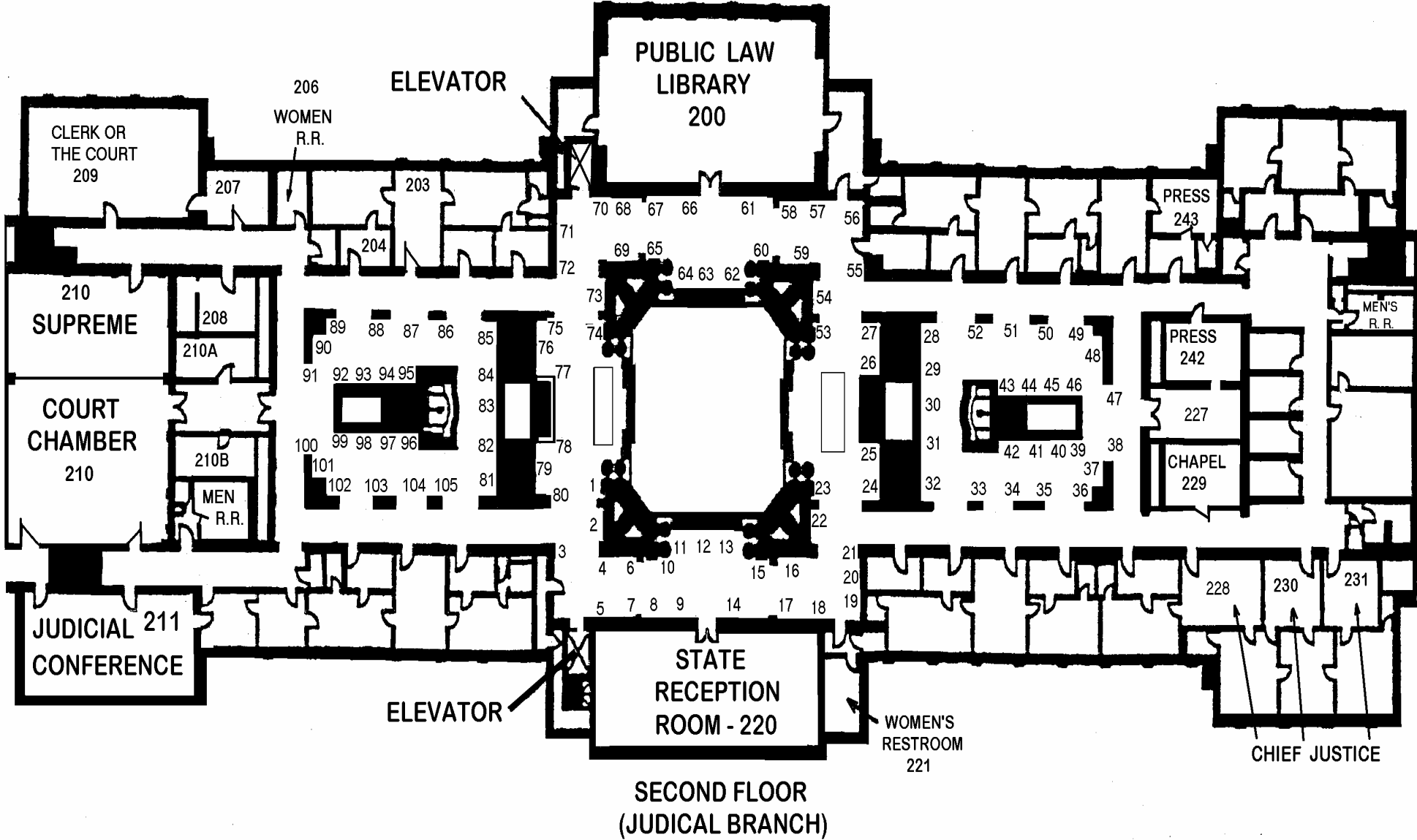
Posters-at-the-Capitol Organizing Committee

John Mateja, Chair Murray State University	Rose Perrine Eastern Kentucky University	Lucian Yates, III 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	



Poster Locations

February 3, 2005



Posters by University

Eastern Kentucky University

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03	Jesse	Galliers	Jaleh	Rezaie	02
03	Robert	Wood	Jaleh	Rezaie	03
03	David	Sexton	Jaleh	Rezaie	03
04	Ryan	Burns	Alice Jones	Don Yow	04
04	Chad	Childers	Alice	Jones	04
04	Ricardo	Hernandez	Alice Jones	Don Yow	04
04	Victor	Jenkins	Alice	Jones	04
04	Ben	Robinson	Alice	Jones	04
04	Gerald	Scott	Alice	Jones	04
04	Christopher	Taylor	Alice	Jones	04
04	Jeffrey	Minor	Don	Yow	04
04	Shane	Smith	Don	Yow	04
09	Amy	Spencer	Martin	Brock	07
09	Jacqueline	Terrell	Vickie	Sanchez	07
17	Windi	Eads	Martin	Brock	11
17	Douglas	Eggers	Martin	Brock	11
17	Mellani	Lefta	Martin	Brock	11
25	Katy	Powell	Lori Wilson	Diane Vance	15
25	Laura	Chaplinsky	Lori Wilson	Diane Vance	15
35	Leah	McQuade	Matthew	Winslow	20
35	Cullin	Weiskopf	Matthew	Winslow	20
35	Meredith	Mann	Matthew	Winslow	20
35	Amanda	McKay	Matthew	Winslow	20
35	Sean	Naylor	Matthew	Winslow	20
35	Jon	Walker	Matthew	Winslow	20
39	Samatha	Davis	Jaesook	Gilbert	22
39	Holly	Smallwood	Jaesook	Gilbert	22
39	Brenna	Camic	Jaesook	Gilbert	22
48	Stephanie	Oghia	Jon McChesney, Michelle Gerken, and Charlie Everett		26
48	Eric	Sanford	Jon McChesney, Michelle Gerken, and Charlie Everett		26
61	Stephanie	McIntosh	Robert	Mitchell	33
71	Kyle	Young	Mark	Biermann	38
71	Jeremy	Hornbeck	Mark	Biermann	38
85	Matthew	Thompson	Walter	Borowski	45
89	Neicole	Keller	Marlene	Huff	47
93	Jason	Gulley	Ralph	Ewers	49
102	Laura	Abney	Barbara	Hussey	54
102	Alexandra	Carter	Barbara	Hussey	54
102	Bonnie	Hudgin	Barbara	Hussey	54
102	Jessi	Moore	Barbara	Hussey	54
102	Mindy	Folsom	Barbara	Hussey	54
OP / 106	Alisha	Dobbins	David	May	56



Posters by University

Kentucky State University

10	Chris	Nichols	James Tidwell, David Yasharian, Shawn Coyle, and Leigh Bright	07
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43	Monique	Adams	James Tidwell, David Yasharian, Shawn Coyle, and Leigh Bright	24
66	Blakney	Gray	Avinash Tope	36
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Morehead State University

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07	Calvin	Ducan	Gary O'Dell, Thomas Kiffmeyer, and Jeffrey Hill	06
07	Lisa	Brinley	Gary O'Dell, Thomas Kiffmeyer, and Jeffrey Hill	06
12	Dawn	Voet	Philip Prater	08
20	Laura	Ashley	Darrin DeMoss	12
20	Sarah	Combs	Darrin DeMoss	12
20	Ryan	Filiatreau	Darrin DeMoss	12
20	Eric	Nickel	Darrin DeMoss	12
20	Kelli	Trent	Darrin DeMoss	12
42	Brad	Morgan	Mark Blankenbuehler	23
51	James	Armstrong	Ilsun M. White	28
51	Takehiro	Minamoto	Ilsun M. White	28
51	Joseph	Odell	Ilsun M. White	28
51	Dennis	Griffith	Ilsun M. White	28
51	Bradford	Brewer	Ilsun M. White	28
51	Gregory	Marcum	Ilsun M. White	28
51	Lisa	Barker	Ilsun M. White	28
54	Erica	Stacy	Christine McMichael	29
54	Angela	Anderson	Christine McMichael	29
54	Brian	Gay	Christine McMichael	29
54	Jesse	Lowe	Christine McMichael	29
54	Mariah	Neveau	Christine McMichael	29
54	Nicole	Utz	Christine McMichael	29
58	Doug	Ginter	C. Brent Rogers	31
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72	Jonathan	Brown II	Sean Reilley	39
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84	Ian	Smith	Wesley White	45
84	Marcus	Hundley	Wesley White	45
84	Richard	Cates	Wesley White	45
84	Clinton	Blair	Wesley White	45
84	Susan	Roy	Wesley White	45
84	Don	Patton	Wesley White	45
90	Tim	Taylor	Kent Price	48
90	Chris	Lacy	Kent Price	48
97	Amanda	Day	Shari Kidwell	51
97	Ingrid	van Rooyen	Shari Kidwell	51
97	Lisa	Hinkle	Shari Kidwell	51
99	Kara	Barnett	David Peyton	52
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Posters by University

Murray State University

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06	Kris-Ann	Kaiser	Pat	Williams	05
16	Anthony	Graves	Claire	Fuller	10
23	Tera Rica	Murdock	James R. Cox	Michael Perlin	14
23	Christopher	Sperry	James R. Cox	Michael Perlin	14
34	Alissa	Volp	Ivan	Pulinkala	19
44	Jan	DeCillo	Pamela	Brewer	24
47	Megan	Scott	David Ferguson, Tony Brannon, and Rocky Napier		26
47	Billie Dawn	Moss	David Ferguson, Tony Brannon, and Rocky Napier		26
47	Brad	Brookshire	David Ferguson, Tony Brannon, and Rocky Napier		26
47	Jessie	White	David Ferguson, Tony Brannon, and Rocky Napier		26
47	Jennifer	Pierce	David Ferguson, Tony Brannon, and Rocky Napier		26
47	Billy	Hooks	David Ferguson, Tony Brannon, and Rocky Napier		26
57	Jason	Horne	Pat	Williams	31
65	Lindsey	Donoho	Ken Bowman, Jay Morgan, and Pat Williams		35
65	Emily	Tilford	Ken Bowman, Jay Morgan, and Pat Williams		35
65	Billy	Hooks	Ken Bowman, Jay Morgan, and Pat Williams		35
65	Billie Dawn	Moss	Ken Bowman, Jay Morgan, and Pat Williams		35
65	Chris	Rogers	Ken Bowman, Jay Morgan, and Pat Williams		35
65	David	Hayden	Ken Bowman, Jay Morgan, and Pat Williams		35
65	Chadrick	Hall	Ken Bowman, Jay Morgan, and Pat Williams		35
65	Whitney	Shirley	Ken Bowman, Jay Morgan, and Pat Williams		35
74	Ross	Jones	Mark	Masthay	40
74	Patraranee	Limphong	Mark	Masthay	40
74	Jonathan	McGregor	Mark	Masthay	40
74	Ryan	Provost	Mark	Masthay	40
80	Catherine	Woglom	Jay Morgan	Brian Parr	43
83	C. Tyler	Clark	David	Canning	44
95	Brianna	Moore	George	Kipput	50
105	Kyle	Humphrey	Terry	Derting	55
105	Collin	Schaumburg	Terry	Derting	55
105	Natalie	Sutton	Terry	Derting	55
105	Holly	Strong	Terry	Derting	55
OP / 108	Mary	Mather	Sonya	Baker	57

Posters by University

Northern Kentucky University

08	Nicole	King	Keith	Walters	06
08	Amber	Shiveley	Keith	Walters	06
08	Nira	Moore	Keith	Walters	06
08	Keith	Walters	Keith	Walters	06
11	Thomas	Huesman	David	Hogan	08
19	Nick	Taylor	Hazel Barton	Janet Bertog	12
19	Michael	Kreate	Hazel Barton	Janet Bertog	12
22	Michelle	Wiggers	Dianna	McGill	13
22	Susan	Sherridl	Dianna	McGill	13
29	Timothy	Meyers	Don Krug	Andy Long	17
36	Sarah	Beetem	Keith	Walters	20
41	Bethany	Richter	Eric	Jackson	23
50	Siddharth	Munsif	Shamanthi	Fernando	27
55	Kelly	Charlton	Hazel	Barton	30
64	Travis	McDaniel	Doug	Krull	34
64	Eric	Mckibben	Doug	Krull	34
76	Heather	Foozer	Mark	Bardgett	41
76	Janet	Gowdy	Mark	Bardgett	41
76	Megan	Points	Mark	Bardgett	41
76	David	McMurray	Mark	Bardgett	41
76	Michael	Riddle	Mark	Bardgett	41
76	Molly	Griffith	Mark	Bardgett	41
91	Kristin	Koester	Roxanne	Kent-Drury	48
94	Scott	Goetz	Richard	Durtsche	50
94	Melissa	Miller	Richard	Durtsche	50
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University of Kentucky

Poster No.	Students		Faculty Sponsor		Page No.
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15	Anthony	King	Robert	Adams	10
18	Matthew	McConnell	David	Hildebrand	11
26	Rebecca	Ashby	Richard Milich	Elizabeth Lorch	15
31	Mary	Martin	Robin	Cooper	18
31	Nicolas	Badre	Robin	Cooper	18
37	David	Jones	Jack	Leifer	21
37	Britton	Wainscott	Jack	Leifer	21
37	Adam	Cook	Jack	Leifer	21
37	Chris	Thompson	Jack	Leifer	21
45	LaTasha	Williams	Chris Schardl	Martin Spiering	25
56	Lindsay B.	Core	Robin Peiter, Martha Nall, Roger Rennek, and Patricia Dyk		30
56	Tiffany	Brammell	Robin Peiter, Martha Nall, Roger Rennek, and Patricia Dyk		30
62	Steven	Walter	Jerzy Jaromczyk	Chuck Staben	33
62	Jessica	Cinnamon	Jerzy Jaromczyk	Chuck Staben	33
62	Sarah	Vessels	Jerzy Jaromczyk	Chuck Staben	33
62	Erika	Kalim	Jerzy Jaromczyk	Chuck Staben	33
69	Brandon	Sutton	Diane Snow	George Smith	37
77	Vashista	de Silva	J. Todd	Hastings	41
77	Adam	Chamberlain	J. Todd	Hastings	41
77	Raghunandan	Donipudi	J. Todd	Hastings	41
86	Chris	Thompson	Jack	Leifer	46
86	Britton	Wainscott	Jack	Leifer	46
86	David	Jones	Jack	Leifer	46
86	Adam	Cook	Jack	Leifer	46
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104	Jason	Richards	Clyde Carpenter	Karl Raitz	55
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Posters by University

University of Louisville

02	Ruth	Schmeltz	Michael	Perlin	01
02	Todd	Rickett	Michael	Perlin	01
02	Megan	Palko	Michael	Perlin	01
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40	Virginie	Achim	Scott	Whittemore	22
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53	Maymun	Nageye	Paula Bates, Simone Jueliger, Lavona Casson, and Shelia Thomas		29
53	Mark	Ball	Paula Bates, Simone Jueliger, Lavona Casson, and Shelia Thomas		29
59	Rachel	Bandy	Deborah Davis	Barbara Burns	32
59	Jonathan	Wilkerson	Deborah Davis	Barbara Burns	32
60	Alyssa	Cramer	David	Brown	32
68	Shakira	Blanton	Cynthia	Corbitt	37
75	Benjamin	Martini	David Hein	Mark Doll	40
87	Rebecca	Dean	Robert	Meyer	46
92	Mary	Kaufman	Cathy	Bays	49
100	Lindsey	Manning	Deborah Armstrong, Marianne Hutti, and Craig Ziegler		53
100	Alicia	Lewis	Deborah Armstrong, Marianne Hutti, and Craig Ziegler		53
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OP / III	Billy	Allen	James	Wittliff	58
OP / III	Sarah	Andres	James	Wittliff	58
OP / III	D. Alan	Kerr II	James	Wittliff	58

Western Kentucky University

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14	Daniel	Starnes	Shivendra V. Sahi	Nilesh C. Sharma	09
21	Aaron	Hawkins	Chris Groves	Kate Webb	13
27	Lydia	Kullman	Robin	Krimm	16
28	Natalina	Elliott	Lawrence	Alice	16
32	Jennifer	Glanzer	Frank Kersting	Barbara Brindle	18
			Mary Lloyd	JosephEtienne	
32	Alexandra	Ellis	Frank Kersting	Barbara Brindle	18
			Mary Lloyd	JosephEtienne	
32	Alison	McFarland	Frank Kersting	Barbara Brindle	18
			Mary Lloyd	JosephEtienne	
32	Jaime	Krause	Frank Kersting	Barbara Brindle	18
			Mary Lloyd	JosephEtienne	
32	Kathyn	Behm	Frank Kersting	Barbara Brindle	18
			Mary Lloyd	JosephEtienne	
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49	Lindsay	Robertson	John	All	27
49	Crystal	Johnson	John	All	27
63	Justin	Grieves	Bruce	Kessler	34
63	Matt	Dawson	Bruce	Kessler	34
70	Chelsea	Campbell	Cathleen	Webb	38
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88	Amanda	King	W. Pitt	Derryberry	47
88	Mike	Vendetti	W. Pitt	Derryberry	47
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			Pat Kambesis		
101	Jennifer	Burns	Cris Groves	John Andersland	53

01. **A. Brooke Polen**

Western Kentucky University

Faculty Sponsor: Jeffrey Marcus

PiRaTe-PYG: A New Genetic Construct for Studying Gene Expression in Butterflies

We are constructing a DNA construct to inject into butterflies. This construct will integrate into the DNA of the butterfly, creating mutations, and allow us to study how butterflies make color patterns on their wings. This construct can also be used in other insects to study a variety of genetic processes. The construct contains several elements. First, it contains the inverse repeats of the transposable element piggyBac, a “jumping-gene” that moves from place to place in the genome of an organism. Second, it contains two traceable markers—green fluorescent protein and red fluorescent protein, which allow the researcher to trace the construct once it is introduced into the animal. Third, it contains a gene that encodes the transposase enzyme that allows the construct to integrate into the DNA of the animal. The construct is designed to break apart after it is introduced into the animal to produce two useful halves for further research. Finally, it contains a gene that allows the construct to “borrow” regulatory elements from a nearby butterfly gene, so that green fluorescence is expressed under the same conditions as the nearby butterfly gene. This will allow us to visualize using fluorescent microscopy the changing patterns of gene expression associated with color pattern development as the wing develops in real time. This will allow us to study butterfly wings as a general model for cell growth and differentiation.

02. **Ruth Schmeltz, Todd Rickett, and Megan Palko**

University of Louisville

Faculty Sponsor: Michael Perlin

Gene Disruptions to Examine Interactions in Fungal Signal Transduction Pathways

The fungus, *Ustilago maydis*, is a pathogen of corn and an excellent model system for analyzing the interactions between host and pathogen. It is also useful for study of signal transduction pathways leading to development and differentiation of fungi. We have been examining two parallel pathways whereby externally-provided signals result in morphological changes, including the ability to cause disease on corn. The purpose of this project is to investigate how combinations of mutations in these pathways will affect the fungus in its development and interactions with its host. One pathway involves the MAPK protein kinase cascade, where successive phosphorylation of proteins leads to an alteration of gene expression. We found that both fungal mating and subsequent filamentation to penetrate host tissue require this pathway, which includes two necessary related kinases, Smu1 and Cla4. However, it is unknown how defects in both genes simultaneously would affect the fungus. The cAMP-dependent protein kinase A (PKA) pathway is a second route required for development. It appears linked to a program that senses available nitrogen and triggers a change in cell growth. Again, we want to generate mutations simultaneously in both parts of the pathway to assess how the components act in concert. We have employed a unique systematic approach to generate complete deletions of each gene alone or in combination with another player in the pathways we investigate. These studies will allow a clearer picture to emerge of the interplay between varied cellular proteins in fungal development leading to pathogenesis.



03. *Five Studies Showing the Trend and Affects of Technology and Its Advancements on Different Aspects of Human Lives*

Eastern Kentucky University
Faculty Sponsor: Jaleh Rezaie

Adam Friend

The Effectiveness of Technology in the Classroom

This poster presentation will examine the effectiveness of computers/technology in schools. More specifically, we will look at the schools within the Madison County district. Interviews will be conducted with teachers to find out the many ways they are now using computers/technology as an extension of learning. Also, Mike Caudill, superintendent of the school system, and Chuck Bryant, Director of Technology for Madison County School System, will be interviewed to get more insight as to what direction technology will take in the education of Madison County students in the future. The results of this research will be compared with the opinion of experts such as Frederick Bennett who proposes productive ways to use computers in education in his book *Computers as Tutors: Solving the Crisis in Education*.

Katherine Hukill

Technology and the Environment

Rapid transformations in the technology have and continue to change the environment around us for both good and bad. Earth holds sustainable life for humans, and all other living things; but now humans have created technology that will harm as well as serve and protect earth's environment. Technology's state-of-the-art tools and advancements have come with their own set of consequences. In this poster presentation, we will examine the level of harm to the environment caused first by building, and then by discarding the hardware involved in these technologies. We will also look at different technological methods used to overcome the damage caused by building and wasting technology.

Jesse Galliers

Blogging into the Future

This poster explores the ever important role of weblogs. Blogs are quickly changing the way people share information by allowing more voices to be heard by a larger more diverse audience. The usefulness of this new medium is examined from both an individual and social perspective. Some of the following questions are addressed: While increasing the scope and availability of information, how reliable or relevant is the information blogs offer? Who reads blogs and why? What is the ultimate effect of this deluge of information? The role of blogs in recent events such as the Iraq war and the presidential election are analyzed, along with the history of blogs and their precursors. Also included are interviews with a psychologist and a sociologist discussing the effects blogs have on people and society.

Robert Wood

The Information Revolution - Change Beyond Imagination

If you were to graph the progress of civilization, you might be surprised to find that 99.99% of human history was spent with a total lack of advanced technology. 99% of technology has been developed in the 300 years since the industrial revolution, which completely changed our entire civilization in the last .01% of our history. As dramatic as this change was, bringing our species to dominance over every corner of the globe in the blink of an eye in historical terms, it will be minor compared to the changes that will develop from the information revolution. The advances in communications, data gathering, and data processing which have been developing over the last 40 or 50 years are accelerating human advancement in ways we have yet to understand. The rate of change, as dramatic as it was during the industrial revolution, is increasing exponentially and getting faster every day. This poster presentation will explore the various changes brought about by emerging technologies. Major changes and advancements arising from technology will be presented. We will examine major shifts in our culture and organization by looking at their effects locally, here on the campus of Eastern Kentucky University, hoping to shed some light on a subject that many fail to notice, perhaps discovering how we might better take advantage of the technologies under consideration.

David Sexton

New Technology Used in Tracking Home Incarcerations

Before the turn of this century, at-home incarceration was handled by a “black box,” attached to a person’s phone line, which monitored signals from his or her ankle bracelet. This ensured compliance with the person’s confinement by forcing them to stay within range of the box. The downside of this system is presented when he or she is allowed to work. From the time the person leaves home until he or she is back, the police have no sure way of knowing where the person has been. Now, with advances in technology, there is an answer to this loophole. In this presentation, I will examine a new system called “Cell Track” which uses GPS technology built into a cellular phone carried by the perpetrator. His or her ankle bracelet “talks” to the phone using Bluetooth technology to ensure there is no tampering, and the phone sends the person’s current location through the nearest cellular tower to the Cell Track system. For a flat fee, the convening authority can use this package on a predetermined number of inmates and keep constant watch on his or her whereabouts through a web page provided.

04. *Current Applications of Geographic Analysis*

**Ryan Burns, Chad Childers, Ricardo Hernandez,
Victor Jenkins, Ben Robinson, Gerald Scott, and
Christopher Taylor**

Eastern Kentucky University

Faculty Sponsor: Alice Jones

Community Readiness for Growth and Development Along the I-75 Corridor

**Ryan Burns, Jeffrey Minor, Ricardo Hernandez, and
Shane Smith**

Eastern Kentucky University

Faculty Sponsor: Don Yow

*How Effective Are Deforestation Mitigation Strategies? Case Studies in Three
Rain Forests*

The diverse applications of geographic analysis to modern issues is highlighted in two projects at different scales – one focusing on small communities, the other at the scale of the world’s rainforests. The first compares the “growth readiness” of five communities along Kentucky’s I-75 corridor using Committed Lands Analysis” – a technique developed specifically to help small towns make long-range planning decisions at relatively low costs. The communities of Georgetown, Richmond, Berea, London, and Corbin are different in many respects, including size, physical and economic characteristics, and sources of their growth demands. The study will determine whether committed lands analysis can be used in all small Kentucky towns, or if it is appropriate only for communities with particular growth patterns or socioeconomic or demographic characteristics. The second study compares the mitigation strategies currently employed in several nations to combat tropical rainforest deforestation. Deforestation is widely recognized as a hindrance to scientific progress, a hazard to natural ecosystems, and a potential contributor to global warming. But while the dangers are widely known, deforestation continues – often for very logical social and economic reasons, including stabilizing agricultural and timber industries in many countries, and providing much-needed income for their citizens. The mitigation strategies of nations in Amazonia, Indonesia, and the Congo River Basin will be compared. The researchers will identify the policies that appear to be strongest and most effective, but will also examine the social, economic and political factors that may explain why some nations’ policies are weaker than others.

05. *Alex Meece*

University of Kentucky

Faculty Sponsor: Ingrid St. Omer

Patterning and Assembly of Nano-Devices Using Chemical Markers

With the ubiquitous demand for speed and performance in the electronics industry, integrated circuit manufacturers have pushed the limits of traditional fabrication methods. In the quest to develop viable alternatives, researchers are exploring the use of carbon nanotubes for device applications. To fabricate device structures it is imperative to develop a controllable placement methodology. This poster presentation expands on a patterning technique developed by Rao et. al. at Florida State University. Guided assembly of commercially available SWNTs is accomplished using e-beam lithography, and surface functionalization. Further development of this technique is one of the projects currently being pursued by the Nano-Device Fabrication Lab research group.

06. *Marketing Feasibility Studies of Different Substrate Mixes for Residential Use*

**Murray State University
Faculty Sponsor: Pat Williams**

Anne Rothenburger

A Comparison of Retail-Available Growing Mixes for Residential Bedding Plant Production

Three different retail-available growing mixes were tested for germination rates, leaf chlorophyll levels and root:shoot ratios. Ferry-Morse Seed Company is preparing a marketing campaign for these substrates and wanted to know how the mixes would perform for the home gardener. *Zinnia elegans* 'Giant Cactus' seeds were planted in six-pack (806s) cell trays. The trays were placed on bottom heat for 10 days. Next, the trays were moved to a growing bench and germination percentages were calculated. Significant differences were found in germination percentages for the following mixes: Ferry-Morse Seed Starter Mix 79.2%, Jiffy Professional Seed Starter Mix 85.4% and Jiffy Professional Seed Starter Mix Plus 43.8%. Chlorophyll level readings were taken randomly from the top leaves of ten plants from each mix. Though no significant differences were shown, visual chlorosis on Ferry-Morse Seed Starter Mix treatment would not be favorable for consumer quality ratings. No significant differences were found between fresh and dry shoot and root weights. When assessing visual consumer quality, Jiffy Professional Seed Starter Mix had the most vigorous plants and the most blooms of any treatment. Ferry-Morse Seed Starter Mix, besides being chlorotic, also had the shortest plants with only a few blooms. Based on the results of the three treatments, a recommendation to Ferry-Morse Seed Company was to promote the use of Jiffy Professional Seed Starter Mix.

Kris-Ann Kaiser

The Effects of Worm Castings in a Substrate for Houseplants and Home Gardening

Ferry-Morse Seed Company is trying to market worm castings to their customers. MSU was asked to compare different percentages of worm castings for use with both bedding plants/vegetables and houseplants. Recommended application rates for worm castings was not to exceed 30%. Two plants were chosen to represent the plant categories deemed important to the consumer: tomato (*Lycopersicon esculentum* 'Early Girl') and spider plant (*Chlorophytum comosum*). Treatment percentages for worm castings were 0% for a control and 10%, 20% and 30% were incorporated into a soilless media substrate. Treatment one consisted of worm castings/soilless media alone and treatment two consisted of worm castings/soilless media with the addition of Peters Professional All-Purpose 20-20-20 fertilizer at 100 ppm nitrogen. Tomatoes were grown from seed and the spider plants propagules were harvested from greenhouse stock plants and sized into small, medium and large depending on existing air roots. Plants were harvested at six weeks. All tomatoes in treatment one had poor visual consumer quality. Visual quality for treatment two tomatoes was best in 20% and 30%. No significant differences were found in treatment one regarding shoot and root weights. There were visual quality differences with spider plants and also significant differences in shoot and root weights between control and percentages of worm castings in treatment two. Based on plant performances, a recommendation to Ferry-Morse Seed Company was to market worm castings in conjunction with a regular fertilizer schedule for maximum plant quality.

07. Jonathon Lewis, Calvin Duncan, and Lisa Brinley

Morehead State University

Faculty Sponsors: Gary A. O'Dell, Thomas J. Kiffmeyer, and Jeffrey J. Hill

Student Production of the Documentary Film "Buried Treasure: Kentucky's Saltpeter Mines in the War of 1812"

The multi-disciplinary course, Frontier Industry in Kentucky, was designed to give students a comprehensive understanding of American industrial development prior to 1840. Faculty from the disciplines of History, Geography, and Communications provided expertise in the learning environment. In addition to readings and discussion of the social, political, and economic context, as a case study the class engaged in the production of a professional-quality documentary film concerning the mining of nitrates from Kentucky caves and cliff lines and their manufacture into gunpowder. The mining of nitrates (saltpeter) and gunpowder production occupied a brief but important phase in Kentucky history, primarily during the War of 1812 period. Most of the filming took place on location at key mining sites including the Red River Gorge area and several saltpeter caves across the state, including the well-known Mammoth Cave. In addition, filming took place at the former site, in Lexington, of the largest gunpowder mill ever to operate in the state. Each student played an active role in production, ranging from research and scriptwriting, production of graphic stills, logistics and liaison, to interviewing and narration; technical production expertise was provided by three Communications students. At the former mine sites, students were able to view historic artifacts and to film interviews with a collection of experts upon the history and archaeology of the industry. Students in this class invested considerable time to gain an understanding of early American industries and to produce an educational film representing the vital role played by a specific Kentucky industry in a time of war.

08. Nicole King, Amber Shiveley, Nira Moore, and Keith A. Walters

Northern Kentucky University

Faculty Sponsor: Keith Walters

Synthesis of a Fullerene/Transition Metal Supramolecular System

Fullerenes (C₆₀), commonly referred to as “buckyballs,” are of great photochemical interest due to their ability to accept multiple electrons and due to their large absorption cross areas. The objective of this research project is to link a C₆₀ to a bipyridine ligand where a transition metal is attached. Previous attempts do not provide a rigid structure to link the two components. The goal is to provide a rigid, conjugated link between the two components to enhance the ability of charge to flow from the metal to the fullerene and vice-versa. To date, this link is about two-thirds complete. After accomplishing this goal, various spectroscopic techniques can be applied to the fullerene-based ligand to observe the electronic transitions within the molecule. Supramolecular systems, like this one, potentially have applications in solar cell development, molecular devices, and computers.

09. *Trends in Health Care in Appalachia*

Amy Spencer

Eastern Kentucky University

Faculty Sponsor: Martin Brock

A Comparative Study of Urban and Rural Health Care in Eastern Kentucky

Access and attitudes toward health care options among the rural and urban poor in Kentucky show both similarities and differences. Populations of individuals seeking health care in the poorest districts of Lexington and around Hazard were assessed with respect to quality, availability, and perceptions of equitability. Historical patterns do not seem to correlate with current attitudes in many instances. While urban health care access remains limited in the poorer districts, patterns of health care delivery in rural areas of the state are changing. Attitudes about health care access in rural Kentucky are more positive than in previous generations and more positive than in urban areas.

Jacqueline A. Terrell

Eastern Kentucky University

Faculty Sponsor: Vickie Sanchez

Who Gets Early Prenatal Care and Why or Why Not?

The purpose of this paper is to identify barriers to early prenatal care of Kentuckians. These barriers will be identified through a survey of mothers who did or did not receive early prenatal care. It is hypothesized that not only lack of insurance, but also perception of risk, lack of education, means, availability, and knowledge of birth defects will be identified as barriers to care. Furthermore, this study will suggest agencies and other possibilities to prevent mothers from omitting early prenatal care.

10. **Chris Nichols**

Kentucky State University

**Faculty Sponsor / Staff: James Tidwell, Shawn D. Coyle, Leigh Anne Bright,
and David Yasharian**

***A Comparison of Production Characteristics of Freshwater Prawn,
Macrobrachium rosenbergii, Stocked as 30 and 60 Day Nursed Juveniles***

In temperate regions, prawns are typically stocked as nursed juveniles, which have been grown to advanced sizes over a 60 day nursery period prior to pond stocking. This allows the prawns to reach market size within the 110-150 day period of suitable pond temperature. However, the cost of the juveniles is directly related to the duration of the nursery period. If prawn juveniles could be nursed for only 30 days, this would greatly reduce their cost to the grow-out farmer. A 110-day pond study was conducted to evaluate the growth and survival rates of juvenile prawn stocked as 30 day nursed juveniles (0.1 g) and as 60 day nursed juveniles (0.8 g). Prawn were stocked at a rate of 62,000/ha into each of six 0.04 ha ponds. There were 3 replicate ponds per treatment. Prawns were fed a sinking shrimp feed (45% protein, 15% fat) 2 times daily. At harvest, prawns stocked as 60 day juveniles had significantly higher ($P < 0.05$) average harvest weight (37 g), survival (96%) and production (2,497 kg/ha) than juveniles stocked as 30 day juveniles, which averaged 24 g average weight, 74% survival, and 1,272 kg/ha total production. These data indicate that 30 day nursed juveniles do not perform as well as those nursed for 60 days.

11. Thomas Huesman

Northern Kentucky University

Faculty Sponsor: David E. Hogan

The Effect of Music Training on College Students' Memory Capacity and Recall Strategy for a List of Common Words

Recent evidence indicates that female college students with at least six years of formal music training before the age of 12 have better recall memory for verbal material than females with no music training (Chan, Hoe, & Cheung, 1998). Huesman and Hogan (2004) confirmed and extended the facilitating effect of music training on verbal memory of males. We will report the results of our follow-up research concerning the effect of music training on working memory capacity and recall strategy.

12. Dawn Voet

Morehead State University

Faculty Sponsor: Philip Prater

Evaluation of Frame Score and Pelvic Area in Yearling Beef Heifers

Calving difficulty in beef heifers increases a number of problems for the heifer and the producer. These include: calf death loss, dam death loss, delayed return of the heifer to estrus and lower conception rates. The producer, in turn, incurs increased labor and veterinary costs, as well as reduced weaning weights and lower market value. Nationwide, economic loss due to calving difficulty is approximately \$750 million dollars annually. This project evaluated management efforts to increase pelvic area while concurrently decreasing frame score of beef heifers, which will allow producers to have heifers that calve with less difficulty and maintain body condition with less feed and better efficiency. We will also discuss the importance of using pelvic measurements in heifers and how this is related to the success of a cow/calf or replacement heifer operation. This project demonstrates the importance of using frame scores in heifers and how a very small or a very large frame score can be detrimental to heifer reproduction. We also evaluated how body condition relates to frame score, and the role both play in the maintenance of a pregnancy and lactation. Seven hundred (700) heifers were evaluated for frame score, pelvic area, and yearling weight on a Kentucky beef cattle farm from 1998-2003. The results of the data demonstrate how effective heifer production teams (owner, herd manager, veterinarian, university extension) have used genetic selection and intensive management to breed and produce heifers with larger pelvic area and lower frame scores.

13. Ashley D. Skaggs

University of Louisville

Faculty Sponsor: Tracy K'Meyer

Three Men of Jefferson County: A Historical Examination of Isaac, Jacob, and Samuel Sneed Hite

The Hite family, beginning with the venerable patriarch Abraham Hite, a Virginia colonel, was one of the most influential families in establishing early Kentucky history, and especially, Jefferson County history. Beginning with Isaac Hite, and continuing with his son Jacob Hite and his grandson Samuel Sneed Hite, this historical examination was initiated during the summer of 2004 for the only surviving relative, Edith Henchey. The Hites were instrumental in surveying Kentucky lands, establishing both Boonesboro and Harrodsburg, and serving on the original Kentucky Assembly. Isaac Hite is recorded in history as an enemy of the great Kentucky hero, George Rogers Clark. His son Jacob was a premier landowner in Jefferson County and a staunch abolitionist. Samuel Sneed Hite became one of the most influential businessmen in turn of the century Louisville, holding offices even at the Kentucky National Bank Building. Yet, the Hites have not received the attention afforded other Kentucky pioneers, and little was compiled concerning their history. Primary source documentation, handed down through the family, enabled a close, personal observation of these men who lived and died spanning more than a century, an era paramount to the formation of Kentucky as a sovereign commonwealth. The Hites were privy to countless mentions in the autobiographies of other men, but not afforded their own treatment, when contrasted with the personal letters and journals provided an interesting dichotomy of public vs. private sectors in a historical milieu. The Hites were a fascinating family, and thus deserve to live in the memory of Kentucky.

14. Daniel Lee Starnes

Western Kentucky University

Faculty Sponsors: Shivendra V. Sahi and Nilesh C. Sharma

Development of *Lolium multiflorum* Cell Lines Capable of High Phosphate Accumulation

Non-point source of phosphorus (P) pollution causes an environmental concern and thus remedial measures are being currently investigated. In the search for a suitable plant system for P phytoremediation, *Lolium multiflorum* cultivars (Marshall and Gulf ryegrass) were tested for their phosphate removal capacity in hydroponics and pots. These grasses accumulated > 2% (dry weight) P in their shoots from P-enriched solution. When grown in pots containing P-contaminated soil, their P accumulation reached to near 1% (shoot dry weight) under a specific cultural condition. To further manipulate the P removal efficiency of these grasses, cell cultures were established using seed explants, on Murashige and Skoog medium supplemented with increasing concentrations (125-5000 mg/L) of KH_2PO_4 . Callus developed and proliferated vigorously in presence of P at a concentration of 5000 mg/L. Plants will be regenerated from P-habituated callus or cell cultures and clones will be screened for the variation in P uptake and accumulation.

15. **Anthony King**

University of Kentucky

Faculty Sponsor: Robert Adams

New Image Compression Algorithm for Fast Electromagnetic Simulations

Many electromagnetic related problems are too complex to solve using traditional analytical methods. Computational methods have been developed that transform the differential or integral equations that describe the problem to a set of linear equations. This set of equations can then be solved using well known linear algebraic techniques. Computer simulation of real-world electromagnetic problems involving large objects positioned in three spatial dimensions often require prohibitive amounts of computer resources in terms of memory and processor time. For most systems it is required to simplify the problem by using a coarse surface sample density or by reducing the problem to one or two dimensions. In this project we demonstrate that the required computational resources can be reduced by employing an image compression algorithm. The compression algorithm we have developed is built around a formulation of the scattering problem obtained via Green's theorem as a field propagator. Singular value decompositions are applied to the resulting angular-space matrix in a novel way in order to form and separate radiating modes and to form beams which radiate to specific angular regions in the far field. A multiresolution version of the compression algorithm is obtained by forming beams that radiate to successively larger angular regions. Finally, the resulting beam transforms are used to determine a sparse matrix representation of the electromagnetic problem. Preliminary work with two dimensional geometries shows that an increase of problem size of two orders of magnitude is possible by using this image compression technique.

16. **Anthony Graves**

Murray State University

Faculty Sponsor: Claire Fuller

The Effects of Light Exposure on Immunity in Wax Moth Caterpillars

The environment in which an animal lives may affect its immune system, and these effects can have far-reaching consequences. For example, animals living in poor quality habitats may have reduced immunity, presumably due to stress, and be more susceptible to disease. We are examining the impact of one environmental factor, light level, on the immune system of wax moth (*Galleria mellonella*) caterpillars. Caterpillars were reared in 24 hours light exposure or 24 hours dark exposure. Because wax moth caterpillars live inside beehives in their natural environment, we predicted that animals reared in a dark environment would be less stressed and have greater immunity. We examined two measures of immunity: levels of phenyloxidase (PO) – an enzyme important in invertebrate immune systems - and overall protein levels. Both of these parameters were measured in hemolymph (blood). We also measured animal size (head width and total length). We found that, per unit of hemolymph, both PO activity and protein levels increased with animal size. In addition, animals reared in light were significantly smaller, pupated at a smaller size and weighed less as newly emerged moths than animals reared in dark environments. These findings suggest that animals reared in light had reduced immunity compared to animals reared in more natural (i.e., higher quality) environments.

17. *Thermophilic Enzyme Stability*

Eastern Kentucky University

Faculty Sponsor: Martin Brock

Windi Eads and Douglas Eggers

Turning Up the Heat on Thermophilic Enzymes

We investigated the thermostability of the enzyme glucose-6-phosphate dehydrogenase from the thermophilic bacterium, *Bacillus stearothermophilus*. Enzymes from this organism are known for being much more stable at high temperatures than analogous enzymes from organisms thriving at more normal temperatures. Heat stable enzymes, such as the DNA polymerase used in PCR analysis by forensic scientists, have been shown to have great commercial value, and more research on the reasons for thermostability is needed.

Mellani Lefta

Investigating the Stability of Alcohol Dehydrogenase in

Bacillus Stearothermophilus

Alcohol dehydrogenases (ADH) are a group of enzymes occurring in many organisms that facilitate the conversion between alcohols and aldehydes or ketones. In humans, they serve to detoxify alcohols. Understanding the mechanisms of enzyme action continues to be an active field of research. Enzymes from thermophiles (organisms thriving at high temperatures) are stable under conditions destroying enzymes from mesophiles (organisms such as ourselves living at more normal temperatures). While several studies have been done in order to determine the nature of thermophilic enzyme stability, I have extended our understanding of this molecule. I have followed the activity of thermophilic ADH as a function of temperature changes and levels of denaturants, showing its stability relative to homologous enzymes from mesophiles. This work will help us to understand and control inherent instability in enzymes for therapeutic and industrial work.

18. *Matthew McConnell*

University of Kentucky

Faculty Sponsor: David F. Hildebrand

A New Non-Antibiotic Selection System for Plants

There is a need for additional non-antibiotic selection systems for plant genetic engineering. Many effective herbicides are amino acid biosynthetic inhibitors. Studies with lysine and threonine synthesis inhibitors suggest that they might be useful in this regard. Normal plant aspartate kinase (AK) is feed-back inhibited by moderate levels of lysine + threonine, starving the cells of methionine. Plant dihydrodipicolinate synthase (DHPS) is inhibited by the lysine analog S-(2-aminoethyl)-L-cysteine (AEC) killing cells and tissues by blocking lysine synthesis. Natural forms of AK and DHPS are known in bacteria that are resistant to levels of AEC and lysine + threonine that inhibit the corresponding plant enzymes. In order to assess whether AEC and lysine + threonine selection of plants is possible, leaf dip transformation using *Agrobacterium tumefaciens* was performed. The transformation was confirmed using PCR analysis and staining for a marker gene introduced together with the AK or DHPS. It was found that transgenic samples containing the introduced DHPS were resistant to AEC and samples containing the introduced aspartate kinase were resistant to lysine + threonine. This research not only provides alternative non-antibiotic selection systems for plants but selective agents that are all natural molecules rather than synthetic chemicals.

19. Nick Taylor and Michael Kreate

Northern Kentucky University

Faculty Sponsors: Hazel A. Barton and Janet Bertog

Geomicrobial Formation of Clays on Dolomitic Surfaces

A comparative analysis of rock surfaces for microbial activity under differential organic load was made in Carlsbad Caverns, New Mexico. Scanning electron microscopy (SEM) revealed a significant difference in the community structure present on the rock surfaces, with the subsequent formation of a red-patina in the organic rich environment. X-ray powder diffractometry in association with SEM-coupled energy dispersive spectroscopy suggests that this patina represents a layer of unconsolidated clays. By comparing the geochemistry of this environment with areas of lower inorganic load, and the metabolic activity of the organisms present, it is possible to speculate on the geomicrobial activities responsible for the formation of similar clays on dolomitic surfaces.

20. Laura A. Ashley, Sarah G. Combs, Ryan P. Filiatreau, Eric Nickel, and Kelli D. Trent

Morehead State University

Faculty Sponsor: Darrin Lee DeMoss

Effects of Various Calcium Channel Antagonist on Estrogen-Regulated Bone Resorption

Bone metabolism is invariably correlated with calcium transport. Therefore, calcium channels are a potential point of regulation for skeletal remodeling. Calcium channel antagonists are utilized therapeutically and experimentally to decrease the influx of calcium into cells by blocking voltage-regulated L-type calcium channels. In order to evaluate the positive or negative impact of estrogen and various calcium channel antagonists on bone loss, bone resorption parameters were compared between normal females, estrogen-deficient females, females receiving hormone replacement therapy, and females receiving calcium channel antagonists (Diltiazem, Nifedipine, Verapamil) or females receiving a combination of the two agents. The experimentation utilized female Brown Norway Rats six months of age to compare the effects of estrogen and the antagonists on calcium flux in both the amorphous and calcified compartments. The model utilized to study bone resorption involved a pharmacokinetic study of 3H-tetracycline, a compound deposited in the active mineralization front. Experimental evidence suggests that calcium antagonists decrease osteoblastic activity, thus decreasing the activity of the bone forming cells at a time when bone formation is already exceeded by bone resorption, thus exacerbating the situation. It is also known that there is a ten-year lag in the age-related rise in cardiovascular mortality in women compared to men. Therefore, the established principle of decreasing bone formation resulting in increased bone resorption following the attainment of peak bone mass illustrates the need for a more comprehensive understanding of the action of these drugs and an improved understanding of the protective action estrogen appears to have on skeletal mass.

21. **Aaron Hawkins**

Western Kentucky University

Faculty Sponsors: Chris Groves and Kate Webb

Organic Carbon Cycling Within the Mammoth Cave Karst Aquifer

Inorganic and organic carbon exist in a wide variety of solid, aqueous, and gas phases within karst landscape/aquifer systems. Quantitative relationships coupling equilibrium chemistry, reaction kinetics, and other properties of carbon in natural and anthropogenically influenced waters make it possible to derive models that reveal fine detail about the behavior and partitioning of carbon within karst systems, and to use such models to better understand the impact of these processes on the global carbon cycle at human-influenced timescales. With funding from the National Science Foundation Program Research Experiences for Undergraduates, this summer we began to study the mass fluxes of organic carbon within the south central Kentucky karst aquifer in and around Mammoth Cave National Park in order to better understand the sources and volume of these fluxes and the geobiochemical mechanisms responsible for the partitioning of organic carbon as it moves into and through the karst aquifer. The specific research goal is to identify the forms and quantity of organic carbon species flowing through the south central Kentucky karst area in order to better understand the roles of this carbon within the overall carbon cycle. This summer is the first of three on the project and focused on development of, and student training in, the sampling and analytical methods. During the summer we studied new methods of analysis recently developed for excitation-emission matrix scanning of carbon with spectrofluorometry and organic carbon analysis using a Total Carbon Analyzer. Preliminary samples from a variety of sampling locations in and around Mammoth Cave National Park have been analyzed.

22. **Michelle E. Wiggers and Susan Sherritt**

Northern Kentucky University

Faculty Sponsor: Dianna McGill

Attempts at Constructing Novel Na, K ATPase/H, K ATPase Expression Vectors

The Na, K ATPase and the H, K ATPase are two medically important ion transport membrane proteins. Their amino acid sequences are found to be very similar, but exact structures are not yet known. These two proteins are of interest to scientists because, although similar in sequence, they react to different classes of drugs and pump different ions. In order to determine something about the portion of the protein responsible for functional differences, three chimeras have been constructed containing a portion of each ion transporter. Attempts have been made to force expression of these chimeras in HeLa cells using ouabain selection, but so far only one has worked. Another approach is being undertaken to allow expression of the other two chimeras in HeLa. Instead of using ouabain selection, as mentioned above, a second approach will be implemented using puromycin/neomycin resistance. Attempts are being made to construct plasmids containing both the chimera cDNA as well as a puro/neo resistance gene on a polycistronic DNA segment. In theory, both proteins will be expressed from the single mRNA via internal ribosomal entry sites. In order for this to be accomplished the chimeric cDNA must first be inserted into another vector, circumventing the need for a blunt end ligation, before it can be ligated into the expression vector. Once this construct is completed, it can be transfected into HeLa cells and ion transporter function can be studied.

23. **Tera Rica Murdock and Christopher Sperry**

Murray State University

Faculty Sponsors: James R. Cox - Murray State University

Michael H. Perlin - University of Louisville

A New Class of Inhibitors of an Aminoglycoside Antibiotic Kinase

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. Several nucleosides, aromatic, and heteroaromatic compounds, distinct from the adenine ring, have been tested as inhibitors of APH(3')-IIa and APH(3')-IIIa, two of the most prevalent aminoglycoside kinases. Compounds that contain guanine-type ring systems do not block the entry of ATP into the active site of the IIa or IIIa enzyme. 3-amino-5-nitrobenzisothiazole is one of the more potent inhibitors identified to date with an inhibitory constant of 1 μ M. Kinetic experiments with four isoquinoline derivatives have also identified potent inhibitors. Although some compounds tested were not potent inhibitors they have provided valuable information on the molecular determinants needed for adenine recognition in the enzyme. Overall, the data suggests that there are strict electrostatic requirements for recognition in the adenine-binding region of these kinases and that contacts may be exploited to design inhibitors of these antibiotic resistance enzymes.

24. **Adesuwa Osunde**

Kentucky State University

Faculty Sponsor: Avinash M. Tope

Glutathione Peroxidase Activity in the Erythrocytes from the Blood of Farm Workers During the Growing Season

The exposure of farm workers to pesticides is increasing with time, which emphasizes the need to identify endpoints of exposure in the blood. In animal models, pesticides have been shown to produce oxidative stress. Glutathione peroxidase (GPX) is an enzyme found in cells that catalyzes the conversion of hydrogen peroxide to water, thereby preventing the accumulation of this toxic molecule as it can result in the development of oxidative stress. The objective of this study was to determine changes in GPX activity in the erythrocytes from the blood of farm workers. Farm workers and urban controls were recruited from local counties for this 3 year longitudinal study; farm workers, n = 16 and unexposed urban controls, n = 8. Blood samples were collected once every month during the six month growing season and every alternate month in the off season. Blood was drawn in Vacutainer tubes and brought to the lab on ice. The samples were centrifuged to separate erythrocytes, lymphocytes and plasma. Aliquots of all samples were stored frozen at -80° C. The activity of GPX was determined using NADPH and t-butyl hydroperoxide as substrate by a standard method. The initial results indicate a 24% increase in erythrocyte GPX activity in the blood of farm workers. This suggests an higher oxidative environment in the erythrocytes of farm workers.

25. Katy Powell and Laura Chaplinsky

Eastern Kentucky University

Faculty Sponsors: Lori Wilson and Diane Vance

Trace-Fiber Color Discrimination by HPLC-DAD Using Both Ion-Suppression and Ion-Pairing Reagents

Analytical separation techniques play an important role in forensic science. Fiber evidence can be analyzed in many ways including microspectrophotometry, thin layer chromatography (TLC) and high performance liquid chromatography (HPLC). TLC is a destructive method which is easy to carry out but lacks information about the ratios of the different dyes that are present. HPLC has been employed to a limited extent in forensic labs for dye analysis. While also destructive, it has been used successfully to separate and quantitate acid, disperse and basic textile dyes. To assist the Kentucky State Police Crime Lab in Frankfort, Kentucky, we have developed a method for separating dyes using HPLC with Diode Array Detection. Extraction of the dyes from nylon fabric was accomplished using a pyridine/water mixture at 150°C. The pyridine was removed under pressure and the extract was re-dissolved in 50% methanol/water. A TLC separation of this extract showed three distinct bands of red, yellow, and blue. HPLC separation using isocratic methanol/water mobile phase exhibited significant peak tailing and poor resolution. Improvement in the separation was found with a 1% acetic acid methanol/water mobile phase suggesting suppression of an ionic form of the dyes. The best separation was obtained upon addition of 5mM dodecane sulfonate to the 1% acetic acid/methanol/water mobile phase using gradient elution. Future work will focus on reducing the sample size needed to increase the forensic value of this type of analysis.

26. Rebecca Ashby

University of Kentucky

Faculty Sponsors: Richard Milich and Elizabeth Lorch

Developmental Changes in Media Use in ADHD and Comparison Children

Many parents and professionals are confronting the challenges of children with attention deficit hyperactivity disorder (ADHD). The role of media habits of these children is particularly controversial. Parents report that television is one of the few activities that can sustain their children's attention, but some experts postulate that the rapid pace of television may worsen, if not cause, ADHD symptomatology. Although media habits may pose a significant concern, little empirical research on this subject exists. This study concentrates on a few central questions. First, are the media habits of children with ADHD significantly different from those of comparison children? For instance, does television viewing replace reading among children with ADHD? Second, do parental beliefs about reading and television differ between these groups and if so are those beliefs manifested in their children's media use? Third, are the media habits of children with ADHD and non-referred children different across age groups? In addition to examining these questions, the longitudinal design of this study also allows us to investigate the ways in which media habits change and develop in specific groups over time. Participants were families of 95 children diagnosed with ADHD and families of 150 comparison children. Parents completed a media-habits questionnaire at two points in time, approximately 18 months apart. The study compares developmental changes in media habits between the two groups. Results suggest that children with ADHD have greater access to and involvement with television, whereas the comparison children have greater access to and involvement with reading material.

27. **Lydia N. Kullman**

Western Kentucky University

Faculty Sponsor: **Robin F. Krimm**

The Removal of the p75 Receptor Effects Taste Bud Number and Size Without Influencing Gustatory Neurons

Neuronal targets, such as taste buds, produce protein factors called neurotrophins that regulate the development of their innervating neurons. The pan-neurotrophin receptor, p75, is one of several receptors used by neurons to interact with the neurotrophins. There is evidence that p75 is important for retrograde axonal transport of neurotrophins, specifically, brain derived neurotrophic factor (BDNF) and neurotrophic factor 4 (NT4), to the cell body. Hence, p75 may also be important to regulation and development of the taste system. Our experiment centers on the effects observed on the neurons of the geniculate ganglia, fungiform papillae, and taste buds in mice that lack p75. We hypothesized a reduction of fungiform papillae, taste buds, and neuron numbers in p75 knockout mice. Sections from the tongue and geniculate neurons of four wild type and four mutant (p75 $-/-$) mice were evaluated for ganglion neuron number, taste bud number, volumes, and location. The tongues were divided into five regions where the taste buds were counted. The taste bud reduction is concentrated in the ventral tip and mid-region of the tongue ($p < .02$ and $p < .05$, respectively). In conclusion, the effect from loss of the p75 receptor in the taste system was observed as a reduction in the number of taste buds, but an increase in the volume of those taste buds without interfering with neuron count.

28. **Natalina E Elliott**

Western Kentucky University

Faculty Sponsor: **Lawrence A. Alice**

Testing Hypotheses of Hybridization in *Mentha spicata* and *M. canadensis* Using Molecular Data

Due to frequent hybridization and polyploidy in *Mentha*, an understanding of the evolutionary histories of *M. canadensis* and *M. spicata* (spearmint) has been difficult to ascertain. The goal of this study was to test hypotheses regarding the allopolyploid origins of these two species. DNA sequences of two non-coding chloroplast regions, the nuclear ribosomal internal transcribed spacer (ITS) region and the granule-bound starch synthase (GBSSI) gene were analyzed. ITS data show that some of the *M. canadensis* 171 clones cluster with one of its putative parents, *M. longifolia*; the others form a clade with *M. arvensis*. However, *M. canadensis* ITS clones from three other individuals cluster exclusively with *M. arvensis*. GBSSI data support the ITS results as *M. canadensis* clones group with clones of *M. arvensis*, also a putative allopolyploid. Chloroplast data imply that *M. arvensis* is the maternal ancestor of *M. canadensis*. ITS clones of three *M. spicata* samples form a clade with both of its putative parents, *M. longifolia* and *M. suaveolens*, whereas GBSSI data place *M. spicata* with *M. longifolia*. Chloroplast data indicate that *M. longifolia* is the maternal parent of *M. spicata*.

29. Timothy Meyers

Northern Kentucky University

Faculty Sponsors: Don Krug and Andy Long

Generating 3-D Images from Microscopic Photography

In fields such as crime forensics, it has been established that clear photography of microscopic objects is invaluable. For example, the specific shape of a fly's genitalia is directly related to its age. In turn, this information can be used to determine the approximate time of death for the cadaver from which the fly would have been born. However, a microscope can focus on only a small part of a three dimensional object at a time. In previous work, our group has adapted the freeware program ImageJ so that a clear composite picture can be generated from a stack of images of varying focus. The purpose in this project is to enhance the program, so that a 3-D composite can be derived from this image. This can be done through the calculation of the distance of each pixel from the microscope, and then re-formatting the original picture into a 3-D environment. This will allow non-experts, such as forensic scientists, to be able to better identify the flies of interest to them by giving them an accurate model to which they can compare their microscopic images.

30. Morgan Mitchell

University of Louisville

Faculty Sponsor: Denis Kinane

Variable TLR Expression in Unstimulated Gingival Fibroblasts and Epithelial Cells

Objectives: Toll-like receptors (TLRs) play a critical role in the detection of microbial insult. Inter-subject susceptibility of periodontal disease varies. This variation may result from different profiles of TLRs expression between subjects. To address how expression patterns of TLRs differ among subjects, the present study examined the mRNA expression of TLR-1 to 10 among cultured human gingival epithelial cells and fibroblasts derived from different subjects. **Methods:** Human gingival epithelial cells (HGEC-1, -2 and -3) were prepared from three healthy gingival tissues obtained from three subjects in a protocol approved by the IRB at the University of Louisville and maintained separately. Human gingival fibroblasts (HGF-1 and -2) prepared separately from the same gingival tissues and immortalized human gingival epithelial cell line (OBA-9), kindly provided by Dr. Shinya Murakami (Osaka University, Japan) were used for comparison with HGECs. The mRNA levels of TLR-1 to TLR-10 were examined by Real-time PCR. **Results:** Nine human TLRs mRNAs with the exception of TLR-8 mRNA are expressed in HGEC-1, -2, and -3 and HGF-1 and -2, albeit that some are at low copy numbers. On the other hand, all ten TLRs were detected in OBA-9. HGECs and OBA-9 showed less mRNA expression of TLR-1 than HGFs. HGECs showed much less mRNA expressions of TLR-4 than HGFs and OBA-9. Furthermore, each cell had their own individual expression pattern of TLRs. **Conclusion:** TLR-1 and -4 mRNA expression in HGECs are markedly different from those in HGFs and we consistently found that all unstimulated cells had unique TLR expression patterns. This variation in TLR expression may be a crucial element of inter-subject variation in periodontal disease susceptibility.

31. Mary E. Martin and Nicolas H. Badre

University of Kentucky

Faculty Sponsor: Robin Cooper

The Effects of CO₂ on Drosophila Larvae: Possible Neural Components

Adult insects have been shown to have sensory structures that detect carbon dioxide (CO₂) which can direct insects toward food sources. However, too high CO₂ is anesthetic to insects. No prior studies have reported carbon dioxide sensory neurons in *Drosophila* larva. Previous experiments supposed that carbon dioxide affected larvae in the same way that it affects humans: an increase in body fluid acidity causing different behaviors, including anesthesia. We show that cardiac activity, body wall locomotion and mouth hook movement cease in less than a minute and recovery in less than a minute. A pure N₂ environment does not elicit these responses even over 10 minutes. Such rapid changes caused by CO₂ strongly suggesting a neural response. We are now examining where the potential CO₂ receptors are located on the animal. The objective of this current research is to find sensory neurons on the larvae capable of detecting the CO₂. Various sensory nerve roots are being monitored in a semi-intact preparations for electrical activity induced by CO₂ exposure.

**32. Jennifer Glanzer, Alexandra Ellis, Alison McFarland,
Jaime Krause, and Kathryn Behm**

Western Kentucky University

**Faculty Sponsors: Frank Kersting, Mary Lloyd Moore, Joseph Etienne,
and Barbara Brindle**

Effects of the Quality Enhancement Program on Undergraduate's Community Involvement

The Communication Disorders Department is particularly proud of its innovative program to truly engage undergraduates in a community program, which also gives them experience in their major. The program involves placing undergraduate pre-professional students in a school setting to provide English as a Second Language instruction to bilingual students in the Bowling Green School System. Currently the Bowling Green school system has students from over 18 different countries; such diversity presents a challenge to a school system. Through the partnership of WKU's Communication Disorders' faculty and the school system, enhanced service delivery is provided so that bilingual students in grade school and middle school can learn English. The second initiative is undergraduate placement in an Adult Day Care facility to provide communication enrichment activities. At this facility students learn how to interact with the aging population who may or may not have a communication disorder. This direct student engagement addresses the university Quality Enhancement Program which fosters student community engagement. For a research project, the undergraduate students conducted pre-post survey of attitudes and perceptions of both bilingual students and the aging population. Documentation of the viability of such a student engagement project is through the survey results and the Reflective Essays written at the conclusion of these experiences. The poster session will present a detailed description of the ESL school program and the activities the student organization provides to the Hispanic family as well as data from the pre-post surveys and Reflective Essays.

33. Jesse Robinson

Kentucky State University

Faculty Sponsors: Richard J. Onders, Steven D. Mims, and Barb Wilhelm

Growth and Survival of Juvenile Paddlefish, *Polyodon spathula*, Fed Two Diets with Different Proteins and Fat Levels

Paddlefish, *Polyodon spathula*, is receiving increasing attention as a food fish for aquaculture. In addition, several states of the US that are within the native range of paddlefish propagate them for mitigation and sport fishing programs. There is little published information on intensive culture of juvenile paddlefish. Developing a culture method that require feed training with prepared diets should provide more consistent production and sufficient numbers of juveniles to support aquaculture. In this study, we compared survival and production of juvenile paddlefish fed two commercially available diets: a 45% protein, 16% fat trout diet (TD) and a 32% protein, 4.5% fat catfish diet (CD). There were no significant differences ($P > 0.05$) in survival (96% TD vs. 95% CD) and net production (1032 kg/ha TD vs. 1071 kg/ha CD). Cost analysis indicates that using CD would be more cost effective than using TD for feeding juvenile paddlefish. Therefore, CD provided the needed nutrition for high survival and production of juvenile paddlefish at a lower cost than TD.

34. Alissa Volp

Murray State University

Faculty Sponsor: Ivan Pulinkala

Discovery

John Locke advocated the theory of tabula rosa. Each human is born with a clean slate. Every experience a person encounters in life leaves markings on the slate. The experience of life is the seed of inspiration behind my choreography. My discoveries during the past years at Murray State University have developed me into a unique person. These years of independence have reminded me that the past is what created me. My friend recently had a baby named Ethan, which allowed me to study the actions and discoveries of someone new. Ethan was very animated, kicking, stretching, and reaching. The opening movement of the dancers is abstracted from this gentle moving of a baby. When a child is young, he radiates outwardly, continuing his journey of intrapersonal and interpersonal exploration. As he grows and interacts, he becomes more curious about the world. To show this discovery, I used movement reaching from inside to extend through the limbs. Exploration results with an experience, contributing to his development. This outward growth counteracts to inward growth as he experiences pain or disappointment. His life is not new, but tarnished with the trials life heaved on him during his journey of discovery. My choreography interprets this through sharp, retracting motions that carry it through an exploration of the circular growth pattern. While thinking of Locke's tabula rosa and a life embarking on its journey, I continue to develop my choreography. I hope others can draw on my interpretations and discover their own understanding of life.

**35. Leah McQuade, Cullin Weiskopf, Meredith Mann,
Amanda McKay, Sean Naylor, and Jon Walker**

Eastern Kentucky University

Faculty Sponsor: Matthew P. Winslow

***Eastern Kentucky University Students' Perceptions of the United State's Place
in the World***

Patriotism can be a healthy and beneficial attitude for citizens of any country. However, when citizens become so blinded by patriotic zeal that they lose touch with the reality of their country's place in the world, patriotism can turn into nationalism and unilateralism. We believe that Americans have a distorted perception of the place of the United States in comparison to other countries. We have collected international rankings on 11 important dimensions (prisoners per capita, infant mortality rate, taxes on income and profits, homicide rate, gross domestic product per capita, population below poverty line, oil consumption, health care coverage, voter turnout, economic aid per person, military spending per person) from reputable sources such as the U. S. Central Intelligence Agency. We have also asked (N = 151) EKU students for their perceptions of the United States' place in the rankings on these dimensions. On 10 of 11 questions, at least 1/3 of respondents got the answer wrong. We believe that it is important for American citizens to have an accurate view of our place in the world so that we can address our weaknesses and take pride in our strengths.

36. Sarah Beetem

Northern Kentucky University

Faculty Sponsor: Keith Walters

Synthesis of a New Ligand to Facilitate Multi-metallic Chains

The objective of the research project is to synthesize a ligand that consists of several building blocks. When constructed, this ligand will allow the creation of linear multimetallic systems by substituting a transition metal directly into the backbone of the ligand. Following synthesis, this ligand will then be analyzed by spectroscopy to identify its photophysical and photochemical properties.

**37. David Jones, Britton Wainscott, Adam Cook, and
Chris Thompson**

University of Kentucky

Faculty Sponsor: Jack Leifer

***Rippling of Tensioned, Singly-Curved Membrane for Orbiting Precipitation Radar
in Zero- and One-g***

The application of gossamer (ultra-lightweight) structures to space systems has been under consideration for the past decade. Although gossamer structures offer the advantage of compact launch volume and high volume to mass ratio, their mechanical compliance makes precision control of their shape challenging, and requires good models of their dynamic behavior. One application incorporating gossamer elements currently under consideration is a precipitation radar antenna, a 25 square meter membrane with a tensioned, singly-curved parabolic structure. In order to perform its mission, the surface of this orbiting antenna must be maintained within 0.17 mm of its design profile. Tests performed on the ground and aboard the KC-135 during the summer 2003 student flight campaign on a truncated model of the precipitation radar antenna indicate that gravity, as well as membrane support conditions, play a role in the surface ripple configuration. The test was performed by precisely setting and recording the border configuration of the membrane, taking simultaneous high-resolution digital photographs of the membrane surface, and using the photos as input to photogrammetry software that automatically reconstructed the surface contour of the membrane. A follow-up flight was conducted in 2004 to obtain better quantitative data. Ideally, detailed data on how surface geometry changes as a function of membrane support conditions, tension, gravity, and material parameters will be used to verify computational models for the membrane, which will in turn be used to optimize the design of the gossamer antenna and support structure to minimize rippling.

38. Matthew Bennett

Western Kentucky University

Faculty Sponsor: John All

Karst Sinkhole Management, Warren County, Kentucky

In karst areas, the sinkhole problem is unique because the ground is literally falling out from beneath roads and buildings. During construction, special care and planning must be taken to plan for the local geological conditions and to ensure that any problems already present are managed and controlled in such a way that they have little or marginal impact on the local area. The formation of sinkholes in the Warren County area is the result of the underlying karst geology. A karst area is usually typified in the presence of several layers of limestone, often capped by a layer of sandstone or other sedimentary rock. Limestone is eroded into caves and vegetation can help stabilize the area or if tree roots puncture the limestone, it can lead to sandstone cap collapse, causing all of the overlying rocks, dirt, and buildings to fall into the void beneath the ground, thus forming a sinkhole. This study examined vegetation management that could stabilize sinkholes and limit collapses.

39. Samantha Davis, Holly Smallwood, and Brenna Camic

Eastern Kentucky University

Faculty Sponsor: Jaesook Gilbert

Three Undergraduate Students' Journey of Learning "What It Takes to Create and Administer Quality Early Childhood Programs"

This poster will describe three undergraduate students' journey as they learned about different aspects of administering an early childhood program. Individually, the students concentrated on the areas of financial management and enrollment. Before these students could generate their final products, budgets and enrollment packets, they engaged in "hands-on" research by surveying and interviewing relevant subjects as well as conducting on-line (literature) research, in order to answer a question like, "How much does the tuition have to be to support a model program that is self-supporting?"

40. Virginie Achim

University of Louisville

Faculty Sponsor: Scott D. Whittemore

Adult Oligodendrocyte Precursor Cells Differentiate Into Schwann Cells Following Transplantation Into Ethidium Bromide-Induced Demyelination in the Adult Rat Spinal Cord

Experimental models of spinal cord demyelination in which astrocytes are lost are primarily remyelinated by Schwann cells (SC). The source of remyelinating SCs in astrocyte-ablated spinal cord lesions has been attributed to invasion from peripheral nerve roots and peripherally innervated spinal vasculature. Recent studies, however, have demonstrated potential for postnatal CNS-derived precursors to differentiate into SCs. Moreover, we recently demonstrated adult oligodendrocyte precursor cell (OPC) recruitment in areas which eventually undergo SC remyelination after ethidium bromide (EB)-induced demyelination. To determine if adult OPCs are capable of mediating SC remyelination, purified OPCs from spinal cords of adult human-placental alkaline phosphatase (hPAP) expressing rats were obtained by immunopanning with the A2B5 antibody. FACS analysis of OPCs revealed that most cells expressed A2B5 (98%), O4 (81%), and NG2 (93%). No cells expressed the SC marker p75 indicating a lack of Schwann cell lineage contamination. OPCs were transplanted acutely (3 dpi) into EB-lesioned rat spinal cords. Immunohistochemistry for hPAP demonstrated survival and integration of transplanted OPCs within EB lesions five weeks after injury. Characteristic ring-like patterns of hPAP⁺ processes ensheathing NF⁺ axons were observed. Engrafted cells did not express markers for OPCs or astrocytes. Interestingly a significant proportion of hPAP⁺ processes co-labeled with the Schwann cell-specific myelin protein P0. Electron microscopic immunohistochemistry demonstrated transplanted cells ensheathing axons with a characteristic Schwann cell morphology. Present data suggest that the macroglial-free environment of acute EB lesions promotes Schwann cell-like differentiation of adult OPCs and elucidates a surprising potential for these cells.

41. **Bethany Richter**

Northern Kentucky University

Faculty Sponsor: Eric Jackson

Researching the Underground Railroad in Kentucky

The Underground Railroad is an important part of United States history. Many scholars, such as Prince Brown, Spencer Crew, and J. Blaine Hudson, have described this incredible period of our country's history as the first multi-racial and multi-class human rights movement of this nation. Mostly led by free and fugitive African-Americans, this crusade impacted the lives of thousands of black and white Americans for numerous decades during the antebellum period. For those who live in the tri-state region of southern Indiana, southwestern Ohio and northern Kentucky, the stories of various individuals involved in this venture are legendary. It seems that wherever you turn, one discovers a narrative about a person (or persons), neighborhood or community that was at one time connected to the origin and development of the Underground Railroad. Recently there has been a plethora of books and articles published about the history and legacy of the Underground Railroad, with particular focus on Cincinnati, Louisville, and various parts of southern Indiana. However, most of these works have overlooked the important role that Kentuckians of both races have played in the Underground Railroad. Perhaps this omission can be explained by the lack of available sources on the activities in the Bluegrass State. Nevertheless, the goal of this presentation is to solve this dilemma by discussing how one can meticulously research the history, development and impact of the Underground Railroad in Kentucky. More specifically, I will illustrate the process of looking for sources from the Internet, libraries, bibliographies and databases to show that clearly Kentucky was an important part of the Underground Railroad.

42. **Brad P. Morgan**

Morehead State University

Faculty Sponsor: Mark Blankenbuehler

A Study on Ring Closure of Hydroxyfulvenes Using Hydrazines

The purpose of this experiment is the synthesis of symmetric cyclopeanta[d]-pyridazines via a hydroxyfulvene intermediate product. The experiment is done using inert atmosphere using a Schlenk line under Argon. The hydroxyfulvene product is made by combining cyclopentadiene and n-butyl lithium, then adding an acyl halide in order to add the symmetric side groups to the cyclopentadienide anion. After an acid workup the product is extracted with ether, and finally this hydroxyfulvene derivative is combined with a hydrazine benzenesulfonamide to close the ring into the fused pyridazine ring. The hydroxyfulvene and the benzenesulfonamide are both characterized using ¹H-NMR, IR spectroscopy, and melting points. The overall purpose of this experiment is the potential synthesis of a useful cyclooxygenase inhibitor, in essence an analog of Celebrex®.

43. Monique Adams

Kentucky State University

**Faculty Sponsor / Staff: James Tidwell, Shawn D. Coyle, Leigh Anne Bright,
and David Yasharian**

A Comparison of Polyculture Production of Freshwater Prawn (*Macrobrachium rosenbergii*) with Nile Tilapia (*Oreochromis niloticus*) Stocked as “Free Range” and Confined Cages

Stocking tilapia in cages into freshwater prawn ponds has been shown to increase prawn production as well as increase overall pond production. Tilapia growth may be increased if they were not confined. However, their direct interaction with prawns has not been evaluated. Prawns were stocked in nine 0.04 ha ponds at 62,000/ha. Three ponds received no tilapia (control). Six ponds received tilapia at 44,000/ha. In three ponds the tilapia were evenly divided into two 1 m³ cages, in the other they were stocked unconfined. At harvest, prawns stocked with free range tilapia had significantly lower ($P < 0.05$) average harvest weight (26 g) and production (1625 kg/ha) than prawns stocked with tilapia in cages (38 g and 2465 kg/ha, respectively). There were no significant differences ($P > 0.05$) in tilapia stocked free range or in cages among average harvest weight (484.4 g) and production (2293 kg/ha). Tilapia stocked in cages had a significantly higher ($P < 0.05$) survival rate (99 %) than tilapia stocked free range (90 %). Based on these data, it appears that both the prawns and tilapia perform better when the tilapias are confined, probably due to reduced interaction and competition for food.

44. Jan DeCillo

Murray State University

Faculty Sponsor: Pamela E. Brewer

Socio-economic Impacts of Rising Medical Malpractice Premiums: Investigation of the Causes and Legislative Efforts Toward Stabilization

My research attempts to discover why medical malpractice insurance premiums have escalated to a threshold that is causing some hospitals (recently two here in Kentucky) to close their obstetrics departments, and forcing physicians to either relocate or simply stop practicing medicine. In addition to loss of services, negative socio-economic impacts include restricted choice, loss of jobs, and higher health insurance costs. What legislative efforts are being proposed toward regulations that would alleviate current and future crisis? I initially hypothesized a correlation between lobbyist spending by the insurance industry and votes against regulatory legislation. Opinions published on the websites of numerous organizations like the American Medical Association, Congressional Budget Office, National Association of Medical Insurance Carriers, attorneys, advocacy groups, and legislators point to skyrocketing jury awards as a primary cause for the medical malpractice insurance crisis. My investigation when testing the jury awards theory, revealed a study by Americans for Insurance Reform (AIR: a non-profit, non-partisan project of the Center for Justice and Democracy) that indicates no evidence of surging jury awards. AIR's findings demonstrate a direct correlation between the rise and fall of medical malpractice premiums and the insurance industry's economic cycle. The Congressional Budget Office also recognizes this as one of several forces impacting premiums. A representative from Senator Bunning's Washington, D.C. office did not know if the Senator knew of AIR's findings but confirmed that H.R. 4280, containing various reliefs including caps on awards, recently passed the House but would not even be debated in the Senate.

45. LaTasha S. Williams

University of Kentucky

Faculty Sponsors: Christopher L Schardl and Martin J. Spiering

Phylogenetic Analysis of the lolC Gene, Required for Production of Insecticidal Loline Alkaloids, in Neotyphodium/Epichloë Grass Endophytes

The objectives of this project were (i) to isolate by polymerase chain reaction (PCR) a selected region of the lolC gene (a gene required for production of loline alkaloids by fungal grass endophytes of the genus Epichloë/Neotyphodium) from different fungal species/isolates, and (ii) to establish the phylogenetic relationships between lolC gene alleles in these species/isolates. With PCR on fungal genomic DNA and lolC allele-specific primers, DNA fragments were amplified from ten isolates of eight Epichloë/Neotyphodium species. The DNA fragments obtained were purified and sequenced with high-throughput sequencing technology at UK's Advanced Genetics Technology Center (AGTC). Eleven DNA fragments containing lolC sequence from eight endophyte species were obtained by PCR, and all eleven were nearly completely sequenced (the average length of the DNA fragments was 1.8 kb). All intron sequences (lolC has five introns) were used in phylogenetic analysis. The intron sequences were aligned with each other in the MacClade Program, and the alignment exported into the PAUP 4.0 Program for construction of phylogenetic trees. Maximum parsimony and bootstrap analysis of phylogenetic trees indicated relationships between the lolC alleles in the different species/isolates very similar to relationships previously found for three housekeeping genes, suggesting that lolC was solely vertically transmitted (i.e., by meiotic events or hybridization between different endophyte species) during its evolution in the Epichloë/Neotyphodium endophytes.

46. Casie Skaggs

University of Louisville

Faculty Sponsor: Barbara Burns

Maternal Anxiety and Its Relationship to Scaffolding Behaviors in a Parent-child Task: A Study of Low-income Families.

We examined the impact of maternal anxiety on maternal scaffolding behaviors and children's subsequent development of attention regulation. Maternal mental health is considered a risk factor for children, as mental illness affects the type of interaction between parent and child. Mental health problems in the mother have been linked with less responsiveness toward the child and a more insecure attachment. Research has shown that anxiety disorders have an impact on the development of attention in children and in adults. This issue of mental health is even more imperative to this community, due to the elevated risk of anxiety and depression in people living in poverty. Furthermore, previous research has shown that poverty is a risk factor for children's growth and is also a risk factor for good parenting techniques. Seventy-four 4- and 5-year-old children and their mothers, enrolled in local Head Start Programs participated in this study. Children completed a puzzle-matching task with their mothers and independently. Also, mothers completed a Beck Anxiety Inventory. Parent-child interactions from the puzzle-matching task were videotaped and will be coded to identify the type of scaffolding behaviors employed by the mothers. The goal of this study is to determine how maternal anxiety influences the nature of parent-child interactions in impoverished families. We expect to find that mothers with elevated levels of anxiety instruct children differently in the parent-child puzzle matching task. These findings will shed some light on the development of new intervention methods to supports successful mother-child interaction in cognitive tasks in low-income families.

**47. Megan Scott, Billie Dawn Moss, Brad Brookshire,
Jessie White, Jennifer Pierce, and Billy Hooks**

Murray State University

Faculty Sponsors: David Ferguson, Tony Brannon, and Rocky Napier

Fungicide Trial on Soybeans Using Two Nozzle Types

An experiment was conducted to test two strobilurin fungicides on soybeans with two different commonly used nozzle types. Azoxystrobin is currently being used to improve soybean productivity. Pyraclostrobin is experimental, but registration is expected in the near future. These fungicides were tested with both a flat-fan and air-induction nozzle type on separate plots. Garst 4888RR was planted on 25 May 2004 with 30-inch row width and 35 feet long plots. The treatments were applied with a CO₂ charged hand boom sprayer applying 15 gallon per acre. The treatments were: a) 0.0979 lbs. a.i. per acre of pyraclostrobin with 0.25% non-ionic surfactant with air-induction nozzle; b) 0.0979 lbs. a.i. per acre of pyraclostrobin with 0.25% non-ionic surfactant with flat-fan nozzle; c) 0.0975 lbs a.i. of azoxystrobin per acre with air-induction nozzle; d) 0.0975 lbs a.i. of azoxystrobin per acre with flat-fan nozzle; and e) as a unsprayed control treatment. These treatments were applied at the R3 stage. The plots were harvested 7 – 8 October 2004. The yields were calculated for the different treatments and statistical analysis will be conducted on the results.

48. Stephanie Oghia and Eric Sanford

Eastern Kentucky University

Faculty Sponsors: Jon McChesney, Michelle Gerken, and Charlie Everett

Recreation Program Delivery in a Housing Authority: Students Tell Their Story

Two ECU students served as recreation directors for a federally funded housing authority in northern Kentucky during the 2004 summer. This job entailed living onsite with the tenants and planning and delivering recreation programs through the week while supervising a staff of eight. Dynamics of this experience included the racial mix of the students and participants, educational level, and socio-economic factors. The Director of the program was a Caucasian woman completing a senior internship, while the Assistant Director was an African-American male, older and a graduate student at the University. Recreational facilities were a program limitation, hot summer temperatures an issue, staff conflicts arose as did issues with both participants and parents. This qualitative study focused on journals kept by these two student program administrators. An interdisciplinary team approach using the Consensual Qualitative Research Model was employed for data analysis. The student experience is captured by the following statement of one of these students. "It definitely was a valuable learning experience and one I'll never forget. The vision I had of working in the housing projects was wrong. This experience has taught me many things not only as a professional but as an individual. Being a recreation professional I believe means caring for the patron and I can honestly say I cared for those children. I often catch myself thinking about particular children and wonder how they're doing. I hope that I at least was able to help one child and if I did then I did do my job."

49. Lindsay Robertson and Crystal Johnson

Western Kentucky University

Faculty Sponsor: John All

Mapping Caves for Environmental Planning

Within a karst region it is difficult to correlate surface land features to subsurface features. By-Pass Cave is a sinking point for storm water that drains a major urban/commercial area in Bowling Green, Kentucky. The cave is hydrologically connected to Lost River Cave network, which is a significant subterranean conduit that drains much of the city of Bowling Green and ultimately empties into the Barren River, the water source for Bowling Green. A detailed survey of other infeeders that enter the cave system has been conducted in order to identify smaller conduits that bring water into the cave system and other sources of contamination. It is possible, through a variety of interconnecting methods, to create spatially accurate portrayals of all geomorphic features within areas of such complicated land features. A combination of field methods and computer software has provided the high-resolution geographic data needed for this analysis. Lost River Cave in Bowling Green, KY has been studied for many years, but current maps used by the city and county for planning do not have cave passage locations correctly marked due to the difficulty in extrapolating from cave entrances. The use of cave radio and accurate GPS units provide increased accuracy in projecting cave maps onto surface maps. This creates a comprehensible and adaptable map that can be used as a basis for informed resource management and environmental planning.

50. Siddharth Munsif

Northern Kentucky University

Faculty Sponsor: Shamanthi Fernando

Gravitational Lensing in Brane World Models.

This bending of light rays by large scale structures such as black holes, galaxies and stars are called gravitational lensing. Gravitational lensing has become a powerful tool in understanding the structure of the Universe. One of the major issues unsolved in theoretical physics is a model for a consistent theory of quantum gravity. There are several models proposed for “quantum theory of gravity”. One of the proposals that has caught much interest among researches is the “Brane World Model”. The Brane World scenario leads to the fascinating possibility of the existence of large extra spatial dimensions for our universe. Here, our universe which is considered to be 4-dimensional (3 space + 1 time) is a brane embedded in a five dimensional world. In this model the standard model fields are confined to the brane, while gravity can propagate along the extra dimensions. In such a model the gravitational lensing properties differ from the properties observed in usual 4-dimensional models. In this work we present all lensing properties of Brane World model space-times such as image positions, apparent brightness, image distortions etc.

**51. James Armstrong, Takehiro Minamoto, Joseph Odell,
Dennis B. Griffith, Bradford Brewer, Gregory Marcum,
and Lisa Barker**

Morehead State University

Faculty Sponsor: Ilsun M. White

Short-Term and Long-Term Effects of Psychostimulants on Social Behavior and Spontaneous Locomotion

Behavioral excitation is an acute effect of psychostimulants, such as methamphetamine (METH) and 3,4-methylenedioxy-methamphetamine (MDMA or 'ecstasy'). Phencyclidine (PCP) also produces similar excitation. These drugs, however, work on different neurotransmitter systems: PCP via the glutamatergic system, MDMA via the serotonergic system, and METH via the dopaminergic and serotonergic systems. The present study examined acute and long-term effects of these drugs on social interaction and locomotion in rats. METH, MDMA, or PCP was administered twice a day at 12-hour intervals for 2 consecutive days. Rats were placed in open-field arenas and locomotor activity and social initiation was measured for a 60-minute period to examine the acute (immediately after 1st and 3rd injection) and long-term (3, 7, and 14 days after 3rd injection) drug effects on behavior. During the acute state, MDMA and METH produced a distinctive pattern in adult rats: MDMA injections produced hyperactivity, whereas only the first METH injection produced hyperactivity. Neither METH nor MDMA produced long-term effects on locomotion. In contrast, acute METH and PCP treatments abolished social interaction in juvenile rats, and this drug-induced decrease in social interaction continued throughout the 14-day withdrawal interval. In light of evidence that METH, MDMA, and PCP produce neurological damage, the long-lasting decrease in social interaction observed after METH and PCP treatments may reflect drug-induced changes in brain. Further, these findings suggest that locomotor activity may not be a sensitive measure of the long-term effects of these drugs.

52. Brian LaBore

University of Louisville

Faculty Sponsor: Margaret M. Carreiro

Louisville Metro Herpetofauna

Recently, increasing attention has been paid to the study of urban areas as ecosystems, and to the apparent worldwide decline of amphibians. The study of urban ecology examines the interaction between organisms and the modified, fragmented landscape mosaic created by urbanization. Since most amphibians have aquatic and terrestrial life-phases they make excellent bioindicators of ecosystem health and chemical and physical changes to ecological systems. Their restricted ability to move across a heterogeneous urban landscape makes them useful models for studying the effects of reproductive isolation on native species populations. This study has determined the identity and number of amphibian species in twenty-two green spaces in Jefferson County, KY. These sites have included, but were not limited to, parks in the Metro Parks and State Nature Preserve systems. The data have been analyzed to determine if species richness is more attributable to habitat size and distance from rural, undisturbed areas of each location, or to effects of land use surrounding the study sites. From those twenty-two sites, five species of frog (with three more species unconfirmed) and five species of salamander have been observed. It is hoped that this study can improve knowledge for the management of natural areas, as well as indicate what areas in and around Louisville, Kentucky, could maintain amphibian populations with minimal management effort. This study also provides the possibility for these sites to be revisited years from now to determine how amphibian populations might be changing in and around a growing metropolitan area.

53. Ashley Dickinson, Maymun Nageye and Mark Ball

University of Louisville

Faculty Sponsors: Paula Bates, Simone Jueliger, Lavona Casson, and Shelia Thomas

Investigating the Mechanism of AGRO100, a Novel Anti-Cancer Agent

AGRO100 is a synthetic DNA oligonucleotide that has recently entered Phase I clinical trials for the treatment of advanced cancer. AGRO100 binds to specific cellular proteins and its major target has been identified as nucleolin. However, the mechanism by which binding of AGRO100 to nucleolin inhibits cancer cell proliferation is unclear at present, in part, because the role of nucleolin in cancer biology is poorly understood. In the current study, three experiments were undertaken to further analyze the mechanism and activity of AGRO100. To elucidate the role of nucleolin in cancer cell biology, murine fibroblasts that had been transfected with human nucleolin were characterized in terms of their proliferation, invasiveness and response to chemotherapy agents. In addition, the phosphorylation status of nucleolin in untreated and AGRO100-treated cells was examined by immunoprecipitating nucleolin followed by western blotting with phospho-specific antibodies. Finally, the effect of AGRO100 treatment on NFkB signaling, which is inhibited by AGRO100 in some cell types, was assessed in prostate cancer cells. The preliminary results indicate that the nucleolin-overexpressing cells have a more aggressive phenotype than the parental cell line, that nucleolin is heavily phosphorylated but phosphorylation is not affected by AGRO100, and that AGRO100 can inhibit NFkB activity in prostate cancer cells.

54. Erica Stacy, Angela Anderson, Brian Gay, Jesse Lowe, Mariah Neveau, and Nicole Utz

Morehead State University

Faculty Sponsor: Christine McMichael

Socio-economic Impacts of Major Transportation Corridors in Eastern Kentucky: A Comparison of 'Corridor' and 'Non-corridor' Counties over Five Decades

There is an ongoing debate in the Appalachian region regarding the social and economic impacts of major roadway (corridor) construction. For example, some research indicates that constructing major transportation corridors improves the economic conditions in surrounding counties, while other studies suggest that such corridors actually serve to weaken local and regional economic development. In an attempt to shed additional light on this issue, we examined changes in a number of key socio-economic variables over five decades for three groups of eastern Kentucky counties: (1) counties traversed by an interstate corridor, (2) counties traversed by a parkway corridor, and (3) counties lacking a major transportation corridor. County-level socio-economic data were obtained from the U.S. Census Bureau for 12 counties (4 counties in each group) for each census period between 1960 (pre-construction) and 2000. Graphical analysis was used to identify and analyze trends in income, population, home ownership, travel time, employment, and industrial diversity for each group of counties. Results obtained by comparing trends between the three groups of counties were evaluated in the context of this ongoing debate, and are being used to develop a set of recommendations that will be shared with Kentucky transportation planners in the hopes of enhancing future transportation projects within the eastern Kentucky and Appalachian regions.

55. Kelly Charlton

Northern Kentucky University

Faculty Sponsor: Hazel A. Barton

The Effect of Stress Response Systems on the Resuscitation of Salmonella typhimurium from the Viable But Non-Culturable State

Salmonella is an important human pathogen, responsible for millions of infections each year. Once shed from an infected patient, it was thought that Salmonella can only survive for a short period of time in the environment, before it is ingested by a new host. By standard culturing methods, we can only cultivate Salmonella that are actively growing. However, due to genetic structures that differentiate Salmonella from its next closest relative, E. coli, we propose in the natural environment Salmonella can enter a state of viable but non-culturable (VBNC). When ingested by a new host, the pathogen restores its growing capabilities and can establish a new infection. We are attempting to develop a new protocol for detecting Salmonella that is in the VBNC state. To do this, we are creating conditions in the laboratory that cause Salmonella to enter into, and be resuscitated from the VBNC state. Subsequently, we created a seawater microcosm in which we starve Salmonella so it will no grow using standard cultivation techniques, but appear to be viable using fluorescence microscopy. We are then testing the effects of temperature and protein synthesis on the resuscitation of these organisms back to a culturable state, while comparing morphological changes between Salmonella in the VBNC state or growing in rich conditions.

56. Lindsay Brooke Core and Tiffany Brammell

University of Kentucky

Faculty Sponsors: Robin Peiter, Martha Nall, Roger Rennek, and Patricia Dyk

Leadership Activities for Rural Youth

The National Future Farmers of America (FFA) Organization funded a national research project to describe and "map" the leadership activities of rural youth who are members of FFA. Through this project we hope to gain an understanding of leadership in action. FFA activities will be tracked into a two dimensional matrix, capturing the role young people play in leadership and the context in which the activity is performed. A questionnaire was developed for the purpose of collecting data regarding youth participation in leadership activities. Reliability and validity were established by an expert panel and field testing of a 64 item survey. Three states in each of the four national FFA regions were randomly selected. Thirty schools participated with over 1000 FFA members completing the questionnaire. Descriptive statistics will be generated for all quantitative data using SPSS. Results of this study will determine the context in which leadership activities are performed, the role of the student and teacher in identifying and implementing FFA activities, and the students' perception of barriers for participation in activities.

57. Jason Horne

Murray State University

Faculty Sponsor: Pat Williams

Criterion Development for Delivering Web-based Plant Identification Courses at Murray State University

Murray State University is developing an on-line delivery for the four plant identification courses offered in the horticulture option program. Reasons for developing this are to provide more efficient use of limited faculty time, to utilize new technologies in the delivering of courses, and to provide an interactive teaching assistance to students outside of class. The American Society for Horticultural Sciences (ASHS) was contacted for a listing of universities in the United States that offered horticulture programs. E-mails were sent to 109 universities and 44 surveys were received for a 40.4% return rate. None of the responding universities were using new technologies in the form proposed by MSU. Of the respondents, 27.3% were interested in a course of this type and thought it was a good idea to pursue whereas 11.4% were not interested in developing a course and 15.9% said a course of this kind would not have applications in their universities. Currently 25% are using computer-aided delivery for their horticulture courses. Macromedia Dreamweaver MX is being used for its versatile and accessible format over current Blackboard PowerPoint options. Key features will include search engines by botanical or common name, tutorials on identifying plant features, plus detailed photographs of the plant in all four seasons with bud, fruit, leaf, bark and flower close-ups. An additional feature will utilize streaming video self-guided campus tours. Murray State University has an optimistic view after corresponding with instructors from around the country that this endeavor will improve the teaching quality for these selected courses.

58. Doug Ginter

Morehead State University

Faculty Sponsor: C. Brent Rogers

Screening for Glyphosate (N-(phosphonomethyl) glycine) Resistance in Horseweed (Conyza canadensis) Populations

Glyphosate (N-(phosphonomethyl) glycine) is a broad spectrum, non-selective weed killer that is used globally, and has been in use since the mid-to-late seventies. Increased and exclusive use of glyphosate with the adoption of Roundup Ready technology in crops such as corn and soybeans has led to cases of resistance among multiple weeds globally. A remarkably sudden appearance of glyphosate resistance has occurred in horseweed (*Conyza canadensis*) in the Eastern United States. Glyphosate resistant horseweed has been reported in several states including Delaware, Pennsylvania, Kentucky, Tennessee, Ohio, Indiana, and Arkansas. Seeds were collected from horseweed plants in Preble and Clark counties in western Ohio that were suspected of being glyphosate resistant. The suspect seeds were germinated in the Morehead State University Department of Agricultural and Human Sciences greenhouse and transplanted into 2 inch x 2 inch cell pack trays. A CO₂ pressurized sprayer was used to apply Roundup Weathermax[®] at rates of 1,2,4,8, and 16 qts/acre when the plants had matured to cover the 2 x 2 cells. The plants were observed and photographed over the next 30 days and injury data was collected. Resistance was found in the plants from Preble County with two plants surviving the 16 qt/acre rate and showing regrowth at 20 days after treatment. Numerous Preble County plants survived at lower application rates. No resistance was detected in Clark County horseweed selections.

59. Rachel Bandy and Jonathan Wilkerson

University of Louisville

Faculty Sponsors: Deborah Davis and Barbara Burns

Visual Perceptual Skills Problems in Children Born Prematurely

Even in the absence of major disabilities, children born prematurely have been reported to have problems in school across multiple domains. It is uncertain why these children with average IQ scores require a disproportionate number of special education services. Visual perceptual difficulties could affect success at school, but few studies have been conducted and more data are needed. The purpose of this exploratory study was to identify performance patterns of specific visual perceptual skills. The sample consisted of eighty-six 4- and 5-year-old-children all born with very low birth weights (VLBW; < 1500 grams). The Test of Visual Perceptual Skills (non-motor)-Revised (TVPS-R) was used. The TVPS-R consists of seven subscales: Visual Discrimination, Visual Memory, Visual Spatial Relationships, Visual Form-Constancy, Visual Sequential Memory, Visual Figure Ground, and Visual Closure. In addition, the Kaufman Brief Intelligence Test (K-BIT) was administered to assess general cognitive abilities. The K-BIT consists of two subscales (Vocabulary and Matrices) and an overall composite score. Generally, the children performed poorly on all subscales of the TVPS-R. Across the seven subscales, 60.5% to 74.4% of the children performed below their age-equivalent level. Six of the seven subscales were correlated with Matrix IQ scores ($p < .05$). The findings suggest these children have significant impairments in multiple areas of visual perception. More data are needed to determine how these deficits relate to specific cognitive skills and academic performance. Screening instruments are needed to assist clinicians in identifying children with visual perceptual deficits prior to school entry.

60. Alyssa Cramer

University of Louisville

Faculty Sponsor: David N. Brown

Measurement of Jet-Finding Efficiencies

In electron-antielectron annihilation interactions, the production of a quark-antiquark pair results in the formation of jets of matter. Using jet-finding software developed for the BaBar Experiment at the Stanford Linear Accelerator Center and a fast, standalone Monte Carlo program written at the University of Louisville, we have tested the efficiency for finding 3-jet events. We characterize the efficiency as a function of the energy of the leading jet and examine how this efficiency is affected by jet opening angle, momentum resolution, and detector acceptance. We find 3-jet efficiencies typically between 60 and 80 percent. We also find that as a function of leading jet energy, the efficiency can be characterized as a plateau for low energy and a linear drop-off at higher energy. Understanding jet-finding performance is essential to correct interpretation of measurements of Quantum Chromodynamic processes.

61. Stephanie M. McIntosh

Eastern Kentucky University

Faculty Sponsor: Robert W. Mitchell

Do Bonobos (Pan paniscus) Enact Self-directed Behavior While Looking in the Mirror?

Various studies have investigated mirror-self-recognition in animals. At least some apes of each species (chimpanzees, bonobos, orangutans, and gorillas) exhibit behavioral evidence that they recognize their own mirror image, including self-exploration and responding to surreptitiously placed marks on their face. In the present study, a group of four bonobos (*Pan paniscus*), one male and three females (age range from 3 to 20 years) residing at the Cincinnati Zoo, were videotaped for 30 one-hour sessions during which a mirror was placed outside their cage, with the non-reflective and reflective sides of the mirror alternately shown across sessions. Videotapes were analyzed each second for behaviors relevant to self-recognition: looking at the mirror, performing jerky movements, making contingent body or facial movements, and exploring parts of their body they could not see without the mirror. For this presentation, only the first four and last four sessions were evaluated. The total time spent in and the frequency of each behavior within each session was examined for each participant. Although at least one bonobo engaged in each behavior, all behaviors were infrequent or rare except for looking at the mirror. Not surprisingly, the bonobos looked at the mirror more frequently in the first few sessions than in the last. The data were inconclusive to provide any evidence for mirror-self-recognition.

62. Steven Walter, Jessica Cinnamon, Sarah Vessels, and Erika Kalim

University of Kentucky

Faculty Sponsors: Jerzy Jaromczyk and Chuck Staben

Research Experience in Bioinformatics for Undergraduates

The Basic Local Alignment Search Tool (BLAST) is a sequence comparison algorithm used to search sequence databases for alignments of some portion of nucleic acid or protein sequences. This is a compute-intensive operation that can take from several minutes to hours depending on the computer that runs it. During the summer of 2004, as a part of the Research Experience in Bioinformatics for Undergraduates at UK, we participated in extending and testing the software for BooleanBlast. While BLAST allows for a search of only a single sequence, BooleanBlast adds the functionality to use queries of arbitrary complexity. For example it can process queries such as, "find sequence A AND sequence B OR sequence C, BUT NOT sequence D," et cetera. With the BooleanBlast, it is possible to create and use expressive BLAST queries based on Boolean combinations. Our group of Bioinformatics for Undergraduates focused on testing and providing user friendly graphical interfaces (GUIs). We developed and implemented for BooleanBlast two complete user interfaces, one similar to a traditional search engine, the other giving the user a more guided experience. In the process of adding these interfaces, the internal code of BooleanBlast was significantly tested and improved. As a result of the Summer Bioinformatics Program for Undergraduates, BooleanBlast offers a search tool with an intuitive GUI that is both flexible and powerful.

63. Justin Grieves and Matt Dawson

Western Kentucky University

Faculty Sponsor: Bruce Kessler

Wavelets and the Mathematics of Image Compression

One of the most often-used but likely least-appreciated applications of mathematics is in the science of image compression. We like for web pages filled with digital images to download quickly -- this does not happen unless the raw data sets from the original images are replaced with equivalent sets of a smaller file size. Our digital cameras and internet browsers encode and decode images for us automatically, using the JPEG format, the current industry standard. However, there is serious mathematics going on in the background. In our poster, we will show a brief summary of the mathematical ideas at work in the JPEG algorithm, and then show how we are getting comparable image compression results using ideas from a branch of mathematics called wavelet theory. The idea is to get smoother and smoother approximations of the original image, keeping track of the error at each step, hopefully generating an equivalent signal with a lot of one character (zeroes). The current JPEG algorithm uses a particular wavelet basis to do this, and we have been working with Dr. Bruce Kessler, Western Kentucky University, to test new multiwavelet bases on digital images.

64. Travis McDaniel and Eric Mckibben

Northern Kentucky University

Faculty Sponsor: Doug Krull

Religious Self-Concept and Word Recall

Research suggests that memory is enhanced for material that pertains to the self-concept. We hypothesized that this same effect would emerge for material that pertains to the religious concept. Participants viewed a set of 20 religious words. Some words were associated with a particular religious faith (Buddha, Bar Mitzvah, and Cross). Other words were more ambiguous and could be associated with several religious faiths (Worship, Spirit, and Prayer). For each word, participants answered a religious reference question (Does this word pertain to your religious view?). Participants then completed basic demographic questions, which served as a delay task. After this, all participants were given a surprise recall test for the 20 religious words shown to them earlier. Finally, participants completed several religious scales (Intrinsic/Extrinsic Religious Orientation, Quest, and Fundamentalism). Results indicated that participants recalled a significantly greater proportion of words that pertained to their religious concept ($M = 0.65$) than that did not pertain to their religious concept ($M = 0.43$), $F(1, 51) = 45.90$, $p = .001$. The size of this religious reference effect was not related to any of the religious scales.

**65. Lindsey Donoho, Emily Tilford, Billy Hooks,
Billie Dawn Moss, Chris Rodgers, David Hayden,
Chadrick Hall, and Whitney Shirley**

Murray State University

MSU Faculty Sponsors: Ken Bowman, Jay Morgan, and Patrick Williams

Additional Sponsors: Andy Bailey, Tim Lax, Robert A. Hill, and Robert Miller
***Three Studies of the Effectiveness of Sulfonylurea Herbicides Applied to Nutsedge
and Broadleaf Weed Species in Dark Fired Tobacco Production***

In the *Donoho, Tilford, Hooks and Bowman* study, the effectiveness of two different herbicide applications that are not currently labeled for tobacco were evaluated. Two separate experiments were conducted to evaluate the potential for the use of two sulfonylurea herbicides, CGA362622 (Trifloxysulfuron-sodium) and halosulfuron-methyl, in dark tobacco. Currently sulfonylurea herbicides are applied post emergence over-the-top in corn and soybeans to control broadleaf weeds. Sulfonylurea herbicides controls a wide variety of weeds at low rates, exhibit crop/weed selectivity, have low environmental persistence, and low mammalian toxicity. Each herbicide was applied either post emergence over-the-top on month after setting or post emergence directed eight weeks after planting. Herbicides were planted at rates of 0.07 or 0.10 oz/A for trifloxysulfuron and 0.07 or 1.0 oz/A for halosulfuron-methyl. Applications were made with a CO₂-pressurized backpack plot sprayer calibrated to deliver twenty gallons per acre with flat fan spray nozzles. Over-the-top applications were made with a 4-nozzle spray boom with twenty-inch spacing. In the *Moss, Rogers, Hayden, and Morgan* study, replicated trials were conducted to compare the advantages and disadvantages of current commercial dark tobacco varieties during the 2004 season. Varieties tested include DF 911, DT 538, DT 518, KY 171, TN D950, VA 359, VA 309, Little Crittenden, TR Madole, and Narrow-leaf Madole. SN 2108 is a black shank resistant variety tested that will be available in the market next year. The layout of the test plots was a randomized complete block design with four replications. The following herbicides were applied: 1.1 pounds of pendimethalin per acre and 4 ounces of sulfentrazone per acre. The plots were transplanted in the field on June 9, 2004 and no irrigation was applied. Plants were detopped on July 28, 2004. Suckers were controlled by applying a butralin and fatty alcohol mix to each plant. The plants were harvested between the dates of September 20th through 22nd. The overall yields, yield of each leaf grade, and the quality of the leaves from each variety will be reported. Statistical analyses will be conducted to determine differences between the varieties. *Hall, Swiney, and Williams* hoped to better enable dark-fired tobacco producers to select the best varieties of tobacco. They conducted replicated trials to compare the advantages and disadvantages of current commercial dark tobacco varieties during the 2003 season. The layout of the test plots was a randomized complete block design with four replications. Each plot was 300 ft², with 4,900 plants per acre. The amount of fertilizer applied was 300 lbs N, 30 lbs P₂O₅, and 80 lbs of K₂O per acre, respectively. Post emergent herbicides used were Prowl at a rate of 1 and 1/3 qt/acre and Spartan (liquid form) at a rate of 12 oz/acre. The plots were transplanted into the field on June 9th. On August 4-7 the plants were detopped. Applying Butralin and a fatty alcohol mix to each plant controlled suckers. Plants were harvested, or housed in the barn on September 15-19. We will be reporting the overall yields, yield of each leaf grade, and the overall average income per acre of each variety. Statistical analyses were conducted to determine differences between the varieties.

66. Blakney Gray

Kentucky State University

Faculty Sponsor: Avinash M. Tope

Evaluation of DNA Damage in Blood Lymphocytes of Farm Workers During the Growing Season

Chronic low level exposure to pesticides has been shown to cause many health conditions such as induction of oxidative stress, cytogenetic damage, and increased susceptibility to cancers in humans. DNA damage can be determined and quantified by Single Cell Gel Electrophoresis, also called Comet Assay. The objective of this study was to determine DNA damage in lymphocytes of farm workers who are continuously exposed to low levels of pesticides. Blood was collected once a month for six months, from June 2004 to November 2004 from farmers (n = 11) and unexposed controls (n = 8). Lymphocytes were separated on histopaque by centrifugation. An appropriate aliquot of washed lymphocytes were mixed with low melting agarose and coated on microscope slides. Cells were lysed, followed with lysis of DNA by treatment with NaOH (pH > 13.2). The fragmented DNA was electrophoresed at 40° C, at 300 milliamps, for 20 minutes, at pH > 13.2. The slides were stained with the fluorescent dye SYBR green and using LOATS software, DNA damage was determined. The initial data indicated no significant difference in tail lengths of comets from farm workers and control group.

67. Grant Sorrell

Morehead State University

Faculty Sponsor: Gary A. O'Dell

Erosion Control and Hurricane Protection: The Isabel Experience at Virginia Beach

Morehead State University Senior Grant Sorrell undertook to study at first-hand the erosional impact of hurricanes, comparing shorelines where significant investment has been made in preventative engineering, against those where such investment has not been made. The Erosion Control and Hurricane Prevention Project at Virginia Beach, Virginia, represents an investment of more than \$120 million and was completed in 2002. Major features of this project were construction of a concrete-capped seawall/boardwalk and replenishment of the shoreline with sand sediments obtained offshore. The landfall of Hurricane Isabel on September 18, 2003, at a point on the Outer Banks 180 kilometers south of the city provided a test of the effectiveness of this project, and Sorrell was on hand during the hurricane to assess damage. According to COE estimates, the project prevented about \$82 million in damages. Little damage was done to the beach by the hurricane, although severe erosion was experienced at unprotected shorelines throughout the region, including those farther from the storm than Virginia Beach. The Virginia Beach case study indicates that significant short-term benefits may be derived from large shoreline engineering projects of this nature.

68. **Shakira Blanton**

University of Louisville

Faculty Sponsor: Cynthia Corbitt

Do Pharmacological Doses of Phytoestrogens Exert a Negative Effect on Motor Coordination in Aging Brains?

Age-related deterioration in cognition and motor control is caused in part by age-related neuroendocrine adjustments, menopause being the most prevalent of these adjustments. The loss of estrogen is accompanied by symptoms such as hot flashes, vaginal dryness, sleep deprivation, and bone thinning. Hormone replacement therapy (HRT) has served as a method of relief, but due to increased risks of cancer and cardiovascular disease with HRT, phytoestrogen supplements are becoming popular alternatives. Phytoestrogens are plant products that mimic the effects of estrogen. Currently, there is no regulation of these chemicals by the Food and Drug Administration and little research has been focused on their effects on the brain. We investigated the effects of phytoestrogens on motor coordination with the hypothesis that pharmacological doses would be neurotoxic to the aging brain. Twelve-month old female Sprague-Dawley rats were separated into two groups (n=12). The control group received a diet absent of any phytoestrogens while the experimental group was given a large dose of phytoestrogens (1,500 mg/1,800 calorie diet equivalent), about 10x the dose women using phytoestrogen supplements should consume. After two weeks, rats were tested in an inclined plane test to observe their posture and muscle control. We found that the control group was able to remain on the inclined plane at angles that were an average of 0.37 degrees larger than the experimental group. Closer examination of brain tissue from these animals will reveal if any neurological marker for brain damage such as extensive gliosis is predominantly found among the experimental treatment.

69. **Brandon Sutton**

University of Kentucky

Faculty Sponsors: Diane Snow and George Smith

Localized Gene Expression of Guidance Molecules in a Co-Culture Model to Direct Axonal Growth

Axonal growth cones are guided to their respective target locations by contact-dependent mechanisms or by diffusible long-range chemotropic factors. The identification of chemo-attractive and chemorepulsive guidance molecules is essential for promoting axon regeneration following neuronal injury *in vivo*. Three dimensional collagen gel assays are commonly used to study axon guidance by diffusible factors. Alternatively, contact dependent axon guidance is routinely tested by monitoring growth cone responses to substratum-adsorbed molecules. Here we have developed two, novel, more physiologically relevant methods *in vitro* to create patterned gene expression of guidance molecules in a complex cellular environment with the goal of more closely mimicking axon outgrowth *in vivo*. To examine the usefulness of these techniques for axon guidance, the growth response of axons from chicken dorsal root ganglia explants was studied in both culture systems. These paradigms demonstrated regulation of neurite outgrowth in response to the cell surface, inhibitory chondroitin sulfate proteoglycan, Brevican, and to a secreted repulsive glycoprotein, Sema 3A. From analyses of neurite behavior, we conclude that the two methods can be used to generate expression patterns of growth-regulatory proteins in a complex cellular environment. Further, we validated that not only cell surface molecules can be accurately presented, but also soluble glycoproteins, by maintaining the cultures in Matrigel® to limit diffusion away from the infected cells. The ultimate goal of such assays will be to develop pharmacotherapeutic strategies to facilitate growth and regeneration of nerve cells in order to promote regeneration and recovery of function in the injured adult.

70. 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 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 a novel remediation technology that has shown the ability to reduce arsenic in drinking water at the source, with the 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 less than 5 ppb. Various common drinking water contaminants such as chloride, nitrate, iron, and sulfate were studied to determine the impact on the removal efficiency of arsenic. Typically, little interference was found. The temperature dependence of the removal surface morphology of the limestone base and the waste product was also studied. Surface exchange was done to observe whether magnesium has a better capacity to removal efficiency of arsenic.

71. Kyle Young and Jeremy Hornbeck

Eastern Kentucky University

Faculty Sponsor: Mark L. Biermann

Exploring "Afternoon Sun:" A Microclimate Study of Localized Solar Heating

Microclimates can exist on scales of millimeters to kilometers. In this study we are concerned with microclimates on the meter scale that are created by buildings. Specifically, we are concerned with the creation of microclimates due to possible differential solar heating on the east and west sides of buildings. By using dense data collection, we are collecting temperature data on the east and west facing sides of a building to determine if distinct temperature microclimates exist on the two sides of such a building. Data loggers were used to record 720 temperatures a day at three locations, one each in the sun on the east and west sides of the building, and one in the shade, over a period of several months. Preliminary data analysis indicates that there is a small, but measurable, average temperature difference between the sunny areas on the two sides of the building. The west-facing side of the building, the side that receives afternoon sun, is warmer on average. Average daytime and nighttime temperatures are also being considered, along with nighttime cooling rates at the various locations. The difference in heat energy associated with the different temperature regions is being considered as a means of quantifying the distinct microclimate results. Finally, the affect of the seasonal variation of the position of the sun in the sky on these microclimate results is being determined. Results of this study can be used as an aid in making landscaping decisions, and in other decisions related to local temperature.

72. Jessica Crisp, Jonathan Brown, II, and Joshua Sheets

Morehead State University

Faculty Sponsor: Sean P. Reilley

The Differential Contributions of Depression and Anxiety Symptoms to Misdiagnosis of AD/HD on the Brown ADD Scales

Attention rating scales are frequently used in the AD/HD diagnostic process. Differentiating between primary attention problems in AD/HD and secondary attentional features of psychiatric disorders has been largely ignored for these measures. This is important to address from a clinical perspective because initial work has shown that depressive symptoms in the absence of AD/HD are sufficient to yield scores in the highly probably AD/HD range on the Brown ADD Scales. The present study attempted to extend these findings using a quasi-experimental design with groups of college individuals with AD/HD (n=19), those with either subclinical or clinical depression without AD/HD (n=20), groups high (n=20) and low (n=20) in trait anxiety without significant depressive symptoms or AD/HD, and a control group (n=19). As expected, the depressive group scored 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. In addition, the mean Brown ADD Scale scores from the high anxiety group would be classified in the AD/HD range and were significantly higher than those associated with the low anxiety and the control groups. Interestingly, the Brown ADD Scale scores between the high anxiety and depressive groups did not differ, despite both groups scoring significantly lower than the AD/HD group. Although these findings are preliminary, the need for appropriate comparative clinical data is underscored for the Brown ADD Scales. In addition, evidence is beginning to accumulate to suggest a re-examination of the clinical cut scores on the Brown ADD Scales.

73. Tiffany Danielle Williams

Kentucky State University

Faculty Sponsors: Tejinder Kochhar, Irwin H. Gelman, and Yongzhong Liu

Cellular Effect of RNAi-Mediated Knockdown of the Metastasis Suppressor Gene, SSeCKS

The purpose of this project is to observe cell behavior before and after the SSeCKS (Src Suppressed C Kinase Substrate) levels are knocked-down. The process of RNA interference (RNAi) is used to down regulate the levels of SSeCKS in normal mouse embryo fibroblast (MEF) or in MEF deficient for FAK /focal adhesion kinase). The latter cells are used, because they typically have 5-10 times more SSeCKS. Five evaluations are performed in order to obtain the various ways the cells may respond to SSeCKS RNAi. A proliferation assay is used in which the cells are grown over a four-day period and everyday an absorbance reading is taken on the plates. From the absorbance readings a growth curve is produced showing whether or not SSeCKS levels may have any affect on the rate of cell growth. Counting the cells after they are confluent for two days will produce a saturation density graph. The morphology of the cell is observed by using a process called immunostaining. Immunostaining is the technique used to stain for the proteins, in our case Vinculin and F-Actin, two cytoskeleton proteins. In addition to looking for the proteins, the shape changes in the cells are to be observed. The wound scratch assay is used to see if SSeCKS levels played a role in cell movement. Lastly, the clonogenic assay is used to test for cell survival after growing for eight days.

**74. Ross E. Jones, Pattraranee Limphong,
Jonathan B. McGregor, and Ryan J. Provost**

Murray State University

Faculty Sponsor: Mark B. Masthay

Two-Photon-Induced Electron Transfer between β -Carotene and Carbon Tetrachloride.

β -carotene (β C) is the plant pigment responsible for the orange color of carrots, oranges and other “yellow” fruits and vegetables. It is also present in green leaves, where it serves to protect plants from light-induced damage during photosynthesis. Because plants lacking β C die upon exposure to light, some “light-activated herbicides” are designed to mediate their toxicity by destroying this pigment via a β C-to-herbicide “photoinduced electron transfer” (PET) process. In similar fashion, we find that solutions of β C in chloromethane solvents are stable upon exposure to diffuse visible light, but rapidly turn colorless upon exposure to intense, green laser pulses. The rate of color loss depends on the square of the laser intensity, suggesting that either β C or solvent molecules absorb two photons and subsequently generate free radicals which degrade β C. To specify whether β C or solvent molecules absorb two photons, we have characterized the yield of chlorine radicals (\bullet Cl) and chloride (Cl⁻) ions by placing β C-chloromethane solutions in contact with pure water and aqueous potassium iodide and silver nitrate. We find that two photons are absorbed and Cl⁻ and \bullet Cl are generated only when β C is present. Accordingly, we propose a “two-photon β C to-solvent” PET mechanism which is consistent with our results and discuss the implications of this mechanism for herbicide design and development.

75. Benjamin D. Martini

University of Louisville

Faculty Sponsors: David W. Hein and Mark A. Doll

Development of a Computer Program for Translation of Human N-acetyltransferase-1 and -2 SNP Data into Genotype and Phenotype: Applications to Cancer Risk Assessment

Many carcinogenic chemicals may require activation and inactivation by enzymes. Genetic polymorphisms in these enzymes may infer genetic predisposition to cancer following exposure to environmental factors. N-acetyltransferase-1 (NAT1) and -2 (NAT2) are important enzymes in the metabolism of aromatic amines. NAT1 and NAT2 exhibit genetic polymorphism (over 25 human alleles for both NAT1 and NAT2 have been identified) in human populations primarily due to presence of single nucleotide polymorphisms (SNPs). New high throughput methods to assess the presence of these SNPs in the human NAT1 and NAT2 genes have been developed recently and have facilitated much larger molecular epidemiological studies to assess the role of NAT1 and/or NAT2 phenotype on cancer risk following exposure to environmental factors. However, interpretation of the large data sets generated through these high throughput methods has been hindered by genotype misclassifications and human errors inherent in manually translating SNP data to genotype and phenotype in large data sets. For example, there are over 6500 and 2100 possibilities for NAT1 and NAT2, respectively. To resolve this problem, Microsoft Visual Basic for Applications was used to develop a computer program that processes SNP data directly from Microsoft Excel. The program easily and rapidly converts the NAT1 and NAT2 SNP data into alleles, genotypes, and phenotypes and is quite useful in assessing the modifying effects of NAT1 and/or NAT2 genotype on cancer risk. The new program results in substantial decreases in time and human error.

**76. Heather Foozer, Janet Gowdy, Megan Points,
David McMurray, Michael Riddle, and Molly Griffith**

Northern Kentucky University

Faculty Sponsor: Mark E. Bardgett

Identifying New Treatments For Memory Disorders: From Mice To Men

The population of older Americans will expand greatly in the next 20 years and, as a consequence, disorders of aging, such as Alzheimer's disease, will become more prevalent. Drug treatments for Alzheimer's disease currently exist, however they are either ineffective for some people or cause significant side effects. These drugs were developed to correct imbalances in brain chemistry, which may or may not exist early in the disease. However, a brain abnormality that clearly appears early in the course of Alzheimer's disease is neuronal injury and/or loss in the hippocampus and related medial temporal lobe structures of the brain. The purpose of our research has been to experimentally produce a similar condition of neuronal loss in laboratory animals and to use these animals to test the efficacy of potential new treatments for Alzheimer's disease. Animals (rats and mice) with neuronal loss in the hippocampus exhibit changes in activity that may be relevant to the agitation observed in Alzheimer's disease. Moreover, such animals demonstrate profound memory deficits, especially in the area of spatial memory. Our research to date has shown that drugs that are currently used in the treatment of Alzheimer's disease are ineffective in improving memory in animals with hippocampal neuronal loss. However, some antipsychotic drugs that are prescribed for agitation in Alzheimer's disease also seem to slightly improve memory in animals with hippocampal neuronal loss. This research should enhance our understanding of the biological basis of memory and offer new insights into improving treatment for memory disorders.

**77. Vashista de Silva, Adam Chamberlain, and
Raghunandan Kumar Donipudi**

University of Kentucky

Faculty Sponsor: J. Todd Hastings

Surface-Plasmon Waveguide Devices for Optical Communications

The overall goal of this project is to determine the suitability of surface-plasmon waveguides for routing and manipulating light on an optical chip. Surface-plasmons are electromagnetic waves that propagate along the interface between dielectrics and certain metals with negative real parts of their dielectric constants. Metal stripes several nanometers thick and a few microns wide can serve as surface-plasmon waveguides. These waveguides are relatively simple to fabricate, can carry both optical and electrical signals, and are predicted to have low loss for communications wavelengths ($\lambda \approx 1550$ nm). As a result, surface-plasmon waveguides offer an interesting alternative to dielectric waveguides for miniaturizing and integrating optical components for faster, less expensive and more robust data communications. We have developed a method to fabricate polymer-clad surface-plasmon waveguides with gold cores as small as 20 nm x 3 μ m. The waveguides are fabricated on silicon substrates with a benzocyclobutene (BCB) polymer (Cyclotene[®], Dow Chemical) serving as the cladding. We define the waveguide pattern in photoresist using optical lithography and a special procedure to produce an undercut resist profile. Next, we electron-beam evaporate gold over the entire substrate, and we "lift-off" the excess gold when removing the photoresist. Finally, we spin-coat another layer of BCB over the waveguides to form the top cladding. We are now in the process of fabricating a wide range of surface-plasmon waveguides and characterizing their absorption, scattering, and bending losses.

78. **Daddy N. Boateng** (Oral and Poster Presentation)

Kentucky State University

Faculty Sponsors: **George F. Antonious and Tejinder S. Kochhar**

2-Tridecanone: A New Natural Product for Pest Control on Vegetables

Health hazards and potential ecological damage created by widespread synthetic pesticide use have become a great public concern. Alternatives to synthetic insecticides are urgently needed to control vegetable insects. The use of natural products for insect control may impart a selective advantage to plants by inhibiting, repulsing, and even killing non-adapted organisms that feed upon or compete with the plant. Developing efficient natural products with low mammalian toxicity and little or no impact on environmental quality for use against vegetable insects is needed. 2-Tridecanone (hendecyl methylketone) extract was prepared from the leaves of *Lycopersicon hirsutum f. glabratum* Mull (accession PI 134417), an accession that contains a significant amount of 2-tridecanone. The extract was used for spraying 45 day old pepper (*Capsicum annum*), squash (*Cucurbita maxima*), radish (*Raphanus sativus*), tomato (*Lycopersicon esculentum*), broccoli (*Brassica oleracea*), Swiss chard (*Beta vulgaris*), and watermelon (*Citrullus lanatus*) seedlings. No phytotoxicity was observed on the leaves following spraying with 2-tridecanone extract. 2-tridecanone residues on the leaves of the seven sprayed vegetables was identified and quantified using a GC/MSD. The initial deposits of 2-tridecanone were highest on pepper leaves and lowest on broccoli leaves. Decline of 2-tridecanone residues on the leaves as a function of time indicated that half-life ($T_{1/2}$) values of 2-tridecanone ranged from 1.3 hrs on squash to 4.0 hrs on broccoli leaves. 2-Tridecanone has been shown to be potent agent against a variety of insects and spider mites and could be a potential substitute for many synthetic pesticides used on vegetables.

79. **Hubert Rojas**

Morehead State University

Faculty Sponsor: **Jennifer Birriel**

Raman-Scattered He II at 6545 Å in Symbiotic Star and Planetary Nebulae

Many old stars are associated with gaseous nebulae. These nebulae are the results of mass loss from the star, via winds and ejection events, as the stars evolve. Nebulae produce emission lines that can be used to determine both the composition and dynamics of the gas. We report the detection of weak emission lines at approximately 6545 Å due to Raman scattering of He II in several symbiotic stars and planetary nebulae. Raman scattering is non-elastic scattering of He II photons in the ground state of neutral hydrogen. Van Groningen first identified Raman scattering of He II as weak emission features at about 4332 Å and 4851 Å. He identified the above lines as resulting from the inelastic scattering of far-ultraviolet 949 Å and 972 Å photons on the ground state of neutral hydrogen. Raman scattering of He II lines at about 6545 Å have been identified more recently in the spectrum of RR Tel, He 2-106, and V1016 Cyg symbiotic stars and the planetary nebulae M2-9. We will discuss the implications of the identification of Raman scattered He II of HM Sge and NGC 7027.

80. Catherine Woglom

Murray State University

Faculty Sponsors: Jay Morgan and Brian Parr

A Comparison of CATS Test Scores Between High School Career and Technical Education Students and the Kentucky Standards

Throughout the history of education, assessment has been a crucial part of the teaching process. In Kentucky, the Board of Education designed the Commonwealth Accountability Testing System to assess its school programs. Each school has its own performance goal for every two-year period, ending in 2014. By 2014, the Board hopes every school will receive a score of at least 100 out of 140. While scores can be evaluated by grade, they can also be evaluated by academic program. Scores in various areas can vary greatly depending on the student's curriculum choice. For example, students enrolled in an agriculture program may fare differently than those enrolled in communication classes in the areas of science, reading, or mathematics. A study of these varying scores will not only improve student interest in certain educational programs, but also spotlight programs that may need assistance in reformatting curriculum or teaching styles. Through a look at the CATS scores of Kentucky's high schools in 2003, the overall scores of agriculture students compared to those of non-agriculture students can determine the effect agricultural education has on the CATS test. By evaluating these scores by educational program, the CATS tests can be used to evaluate not just the curriculum of the subjects being tested over, but also the programs that contribute to learning these subjects. Through this evaluation, Kentucky's standardized tests can be used to their fullest potential by assessing curriculum and teaching styles, and in turn aiding in the advancement of education.

81. Russell Neal

Kentucky State University

Faculty Sponsor / Staff: James Tidwell, Shawn D. Coyle, Leigh Anne Bright, and David Yasharian

*Evaluation of Different Plant and Animal Source Proteins for Replacement of Fish Meal in Diets for the Largemouth Bass, *Micropterus salmoides**

Two feeding trials were conducted with juvenile largemouth bass to evaluate alternative proteins to replace fish meal. The first trial identified promising candidates and the second trial determined the level of replacement possible. Juvenile largemouth bass were stocked into eighteen 113.6-l glass aquaria at 25 fish per aquarium and fed one of six diets (38% protein and 10% lipid). The control diet (CTL) contained 30% fish meal. Diets 2-6 contained 15% fish meal with the remainder of the protein from either meat or bone meal (MBM), soybean meal (SBM), poultry by-product meal (PBM), a mixture of blood meal and corn gluten meal (BM/CG), or a mixture of feather meal and soybean meal (FM/SBM). After 12 weeks, only fish fed the PBM and BM/CG diets had weights and feed conversion efficiencies not significantly different ($P > 0.05$) from the control diet. In Study 2, the CTL diet remained the same and PBM and BM/CG replaced 75 or 100% of the fish meal. After 11 weeks, fish fed diets containing BM/CG were significantly smaller. Fish fed diets with PBM replacing 100% of fish meal performed as well as those fed the control diet.

82. Francis O. Ajie

Kentucky State University

Faculty Sponsor: George F. Antonious

Impact of Soil Organic Matter on Pesticides Mobility in the Environment

The extensive use of pesticides in agriculture has produced benefits that reduce pest infestations and crop loss, but also have various nontarget impacts, such as the occurrence of pesticides in groundwater and surface water used for drinking water supplies. Bioactivity, mobility and fate of pesticides in the environment depend mainly on their adsorption to soil particles. Adsorption may reduce the concentration of pesticides in the soil solution, decrease their bioavailability, increase their rates of chemical degradation by soil microorganisms, or decrease their mobility into runoff and infiltration water. EPA estimates that million tons of yard waste and sewage sludge are discarded annually in the U.S. Application of these materials to agricultural soils helps minimize landfill disposal and provides an organic amendment useful for improving soil nutrient status. The objectives of this investigation were 1) to study the impact of mixing soil with sewage sludge and yard waste compost on the adsorption of pesticide residues and 2) to study the impact of humic and fulvic acids in sludge and yard waste compost on the mobility of three pesticides (trifluralin, napropamide, and azadirachtin). Mobility of these three pesticides were tested by a reverse-phase thin layer chromatographic technique. Humic and fulvic acids were extracted from soil amended with sewage sludge and soil amended with yard waste compost and their impact on pesticide movement in soil were investigated. Results indicated that the R_f values of azadirachtin decreased as the amount of humic acid and fulvic acid in soil increased.

83. C. Tyler Clark

Murray State University

Faculty Sponsor: David Canning

Quantification of Genetic Variances in Functionally Reactive Astrocytes

Gliosis is the term used to describe the response of the Central Nervous System to trauma (such as Alzheimer's and blunt trauma to the Central Nervous System). One class of cells in the gliotic response are astrocytes which produce local inflammation and, more importantly, produce molecular inhibitors that negate neural regeneration. The deposition of chondroitin sulfate is believed to be the main neural inhibitor produced by astrocytes. The presence of chondroitin sulfate inhibits cells of the nervous system from forming new neural connections leading to permanent neurological damage. The changes that occur in functionally reactive astrocytes are genetic in origin and quantification of these changes at the transcriptive level of genetic expression would be advantageous to seeking a reversal of trauma induced paralysis. Our goal in this project is to identify, and quantify, the genetic expression profiles that lead to the induction of the reactive astrocyte phenotype. To date, we have identified a small cluster of genes whose expression profiles closely mimic the induction of reactive astrogliosis.

84. Ian Smith, Marcus Hundley, Richard Cates, Clinton Blair, Susan Roy, and Don Patton

Morehead State University

Faculty Sponsor: Wesley White

Behavioral Measures Provide Further Evidence for an Amphetamine-Induced Acute Withdrawal State

Twenty hours after receiving a moderate dose of the psycho-stimulant amphetamine, rats appear to be in an acute withdrawal state. Our studies used different behavioral procedures to seek further evidence for this phenomenon. Study 1 employed a conditioned place procedure. Twenty hours after saline treatment, animals were placed for 45 min in one distinctive context, and 20 hours after amphetamine treatment they were placed in a second. Following this training phase, animals were allowed free access to both contexts, and the amount of time they spent in each was quantified. Rats exhibited an aversion for the context that had been preceded by amphetamine administration, suggesting that the amphetamine-induced state present at hour 20 post-treatment had aversive characteristics. Study 2 employed a progressive ratio procedure. In this procedure, the number of responses required to receive successive small rewards is increased after each reward. The response was pressing a lever, and the reward was sugar solution. The highest number of lever presses the animal is willing to make to procure the reward is called the “breakpoint.” Progressive ratio breakpoint was assessed at different times following saline or amphetamine administration. Breakpoint was lower around hour 20 post-amphetamine treatment, suggesting that the amphetamine-induced state present at that time rendered animals less willing to work for reward. Amphetamine elicits multiple indicators of acute withdrawal. Different indicators seem to have a similar time course, raising the possibility that they may be mediated by a similar mechanism. Understanding the nature of acute withdrawal should aid the effort to prevent and treat the adverse effects produced by psycho-stimulants.

85. Matthew Thompson

Eastern Kentucky University

Faculty Sponsor: Walter Borowski

Sulfide Mineralization Within Modern, Deep-sea Marine Sediments and Oxygenation of the Early Earth

The Earth’s atmosphere and oceans have not always been oxygenated. The exact pathway and timing of the oxygenation of the Earth’s early oceans is poorly constrained, although it appears that oxygenation was essentially complete by the beginning of the Cambrian (545 million years ago). Indeed, the appearance and diversification of the first animals may have been dependent on threshold levels of oxygen. Eventually we intend to use the sulfur isotopic composition of sulfide minerals (iron monosulfides and pyrite) present in sedimentary rocks to reconstruct the oxygenation of Proterozoic oceans, but first must strive to understand sulfide mineral formation in the modern ocean – specifically with reference to certain deep-sea environments. We examine the sediments of two piston cores collected over the Blake Ridge gas hydrate deposits (offshore southeastern North America) by extracting total sedimentary sulfide using chromium reduction. We use an improved titration procedure to assay for sulfide sulfur concentration that involves addition of an excess amount of potassium iodate/potassium iodide (KIO₃/KI) solution in order to completely oxidize dissolved sulfide to elemental sulfur. Our results show that authigenic sulfide sulfur generally increases in concentration downcore from ~ 0.05 to peak concentrations approaching 0.4 weight per cent sulfur. These results are consistent with localized sulfide production at about 13 meters and rapid sulfide mineral formation there. We will further test the hypothesis by examining δ³⁴S values of authigenic sulfide minerals, expecting to see enrichments in δ³⁴S where peak sulfide concentrations occur.

86. Chris Thompson, Britton Wainscott, David Jones, and Adam Cook

University of Kentucky

Faculty Sponsor: Jack Leifer

Deployment Behavior of Roll-Stowed, Doubly Curved Membrane Shells in Zero-g

The implementation of roll-stowed, doubly-curved membrane shells in future space systems is of great interest to the space research community. These shells have inherent characteristics that will enable the design and construction of larger, yet lighter apparatuses than ever before. Chiefly, these shells offer the advantages of compact stowage, dynamic self-deployment, low density, low mass, and large surface area. All of these characteristics are primary concerns in today's evolving space technology. One of the most applicable uses of this type of gossamer structure is in optic lenses. These shells have the ability to help overcome the limitations that currently exist when building space lenses because of their unique characteristics. In order to implement these structures in future space systems, a clear understanding of their behavior in the zero-gravity environment of space is necessary. The primary focus in understanding these shells is verification of deployment in zero-g. The characteristics that are most important to quantify during the deployment process is the time of deployment, and the shape characteristics of the shell during this period. Although testing of these shells has been performed in earth's one-g environment, currently no shells have been tested in zero-g. We propose to test these structures in a zero-gravity environment in order to verify one-g testing and also to validate computer model simulations. This will be achieved by using videogrammetry techniques in order to capture the deployment behavior of the shells.

87. Rebecca M. Dean

University of Louisville

Faculty Sponsor: Robert Meyer

Competence to Stand Trial: Analysis of Cognitive Capacities as Measured by the Wechsler Abbreviated Test of Intelligence and the Role of Age

Within the field of forensic psychology competency to stand trial is one of the most widely researched areas. The WAIS is one of several intelligence scales that is used in a forensic population to assess competency to stand trial but the WASI, an abbreviated version of the WAIS, has not yet been tested in the forensic population. This study examined the utility of the WAIS in the forensic setting and also examined whether age was a factor in determining competency to stand trial. It was predicted that age and IQ (as judged by the WASI) would be a better predictor for competency than either age or IQ scores alone. Data was collected from subjects remanded for pre-trial competency to stand trial screenings. All subjects were at least 18 years of age with at least one felony charge with a sample of approximately 100 subjects. Results will be discussed upon presentation of the poster but it is expected that the results will find the WASI to be a reliable test for competency to stand trial. It is also expected that age will influence competency and that the variables together will be a better predictor than either predictor alone.

88. Grace Livingstone, Amanda King, and Mike Vendetti

Western Kentucky University

Faculty Sponsor: W. Pitt Derryberry

Moral Developmental Consistency? Investigating the Role of Major

Previous study has supported that those in education majors routinely score lower on assessments of moral development than do those in other majors. However, prior study has overlooked some important factors associated with moral development. The purpose of the current study is to further investigate the degree to which moral developmental differences exist by accounting for these oversights of previous study. In the current study, separate samples of college students in education, psychology, and other majors are addressed in terms of their moral judgment development, moral sensitivity, and areas relevant to micromoral functioning. The data collection is still ongoing, but current analyses indicate that moral judgment differences are not as ominous as previous study has portended, and no consistent trends are denoted in terms of moral sensitivity and micromoral functioning. Though there is not support for much moral developmental disparity among majors, the present study does acknowledge that there is room for improvement in all of the considered areas and suggests that efforts to facilitate change in these areas for education majors is worth pursuing.

89. Neicole Keller

Eastern Kentucky University

Faculty Sponsor: Marlene Huff

The Multi-dimensional Nature of the Spiritual Development of Social Work Students Working with Dying Clients

Social workers have been described as the hub of interdisciplinary efforts to provide comprehensive medical support services to dying clients (Blackman, 1995). In fact, social workers are the only healthcare professionals that focus solely on the psychosocial aspects of death and dying (Sheldon, 1993; Loscalzo & Zabora, 1996). Yet, social workers rarely receive formalized death education. Many students reported (Huff, Weisenfluh, & Murphy, 2002) that they would not undertake a field experience involving dying clients even with increased amounts of content based education because of their perception that spiritual changes within their own developing professional identities would overwhelm them. The goal of this project is to develop and implement a social work field curriculum designed to better prepare undergraduate social work students that are working with dying clients while in their perspective field experiences. The curriculum will be based on focus group data and the results of the Daily Spiritual Experience Scale for 350 social work students that are participating in field experiences across the Commonwealth. The curriculum will be implemented in third and fourth year social work internship classes during the 2004-2005 academic year.

90. Tim Taylor and Chris Lacy

Morehead State University

Faculty Sponsor: Kent Price

Electroluminescence Apparatus

Solar cells provide clean renewable energy. The goal of our research is to advance our understanding of the efficiencies of solar cells. We work with cadmium telluride (CdTe) solar cells, which are a viable low-cost alternative to standard silicon cells, due to their lower manufacturing costs. In order to work toward Kentucky's goal of a new economy, we must move forward to newer, cleaner technologies such as these. The intent of this presentation is to show the experimental setup and preliminary data from the apparatus we constructed to measure the electroluminescence (EL) from the solar cells. Electroluminescence is the property of a substance to emit light when current is passed through it. CdTe solar cells exhibit EL. We have examined the link between the solar cells EL and energy conversion efficiency; these results aid in the understanding of CdTe solar cell behavior.

91. Kristin Koester

Northern Kentucky University

Faculty Sponsor: Roxanne Kent-Drury

Online Edition of 17th & 18th Century Women's Poetry: Aphra Behn's "City of Discretion"

Scholars and teachers of 17th and 18th century women's literature across academia are constantly in search of in-print anthologies of women's poetry for their courses and research. Unfortunately, however, such anthologies frequently go out of print. The student research project represented by this poster presentation is an online critical edition of a long out of print 18th century anthology of women's poetry, most of it unavailable outside of archives inaccessible to most students. Students accept responsibility for one of the works in the anthology; research editions of the work and the life of the author; write a headnote, footnotes, and glosses for the poem; and publish their work on the internet as part of an evolving online edition. When complete, the anthology will reside upon a permanent site, Renaissance, which is maintained by Richard Bear, a reference librarian at the University of Oregon. This student fully researched her contribution, researching the publication history and traveling to rare book archives to consult and photograph the 1st edition of her contribution.

92. **Mary Kelly Kaufman**

University of Louisville

Faculty Sponsor: Cathy Bays

Baccalaureate Nursing Student's Evaluation of Patient Simulator Experiences to Reinforce Cardiovascular Content

Purpose: The purpose of this research is to analyze student evaluations of patient simulator experiences at 4 different points. These evaluations are a component of a pilot study designed to evaluate the effect of curriculum using the patient simulator on nursing students' mastery of cardiovascular content over four semesters during their baccalaureate nursing clinical courses. **Theoretical/conceptual framework:** The theoretical framework is based on Malcolm Knowles (1980) Principles of Adult Learning. Knowles theorizes that adults need to participate in the learning process that actively engages the learner with multi-sensory strategies. Additionally, a critical review of the literature on use of patient simulators is used to create 11 annotated bibliographies. The trends and concepts of these findings will be presented in the poster.

Subjects: A cohort of baccalaureate nursing students forms both the experimental and control group. Twelve subjects were randomly selected from volunteers in the class and comprise the experimental group. The remaining 31 subjects who volunteered for the study formed the control group. **Methods:** The experimental subjects completed a "cardiovascular patient simulator" evaluation after four different sessions with the patient simulator. The evaluation has two sections: one with 8 statements that subjects rate on a 5-point Likert type scale, and the other two questions that subjects provide a written response. **Analysis:** The analyses include descriptive statistics for each of the 8 statements (mean, range), a trending of average responses on each of the 8 statements over 4 time periods, and theme analysis for the 2 open responses on each of the 8 statements over the 4 time periods, and theme analysis for the two open response functions.

93. **Jason Gulley**

Eastern Kentucky University

Faculty Sponsor: Ralph Ewers

Radiomagnetic Mapping of an Abandoned and Inundated Lead Mine

Undocumented abandoned mines pose a serious hazard to miners in nearby active mines. Maps of abandoned works can be inaccurate or absent. Since most traditional surface geophysical methods lack the penetration necessary to detect deeper mine works, drilling is often the only method available for map verification. An alternative means of abandoned mine map verification was implemented at the now flooded Offsets mine in Mine LaMotte, MO. Mine Lamotte, an abandoned lead mine, offers the ability to detect flooded mine works ranging from 100 to 150 feet below ground surface. Specially trained and equipped cave divers set underwater survey stations at 100 foot intervals along one of the mine's main haul roads. At each station, divers placed a radiomagnetic beacon operating at 3496 Hz and measured cross sections with a fiberglass tape and depth with a digital depth gauge calibrated in one foot increments. A surveyor on the surface using a vertically positioned receiver loop tuned to the beacon antenna located the divers' position relative to the surface using measurements of the strength of the radiomagnetic field. The surface points were surveyed in using traditional land survey methods and combined with the divers' data to create an accurate 3 dimensional map of the haul road and a topographic overlay. Divers were also able to document the structural stability of the mine with still photography and video.

94. Scott Goetz and Melissa A. Miller

Northern Kentucky University

Faculty Sponsor: Richard D. Durtsche

The Effects of a Mixed Diet in Anuran Larvae

Anuran larvae (tadpoles) are often found to consume a range of foods. Previous studies in our lab have documented tadpoles of frogs in the family Hylidae as having a mixed diet consisting of detritus, invertebrates, and algae. Previous diet mixing studies on other species of ectotherms (e.g., turtles) have demonstrated that the nutritional benefit of certain food combinations can be greater than the sum of their parts. Upland Chorus frogs (*Pseudacris triseriata*) in the family Hylidae, are a wide ranging anuran species found throughout much of southern and western Kentucky. In an attempt to assess the impact on tadpoles of consuming a mixed versus a specific single diet, we examined the dietary effects of combinations of algal, detritus and shrimp diets to these foods as single-food diets in the larvae of *P. triseriata*. In feeding trials each of the aforementioned foods were presented in a “tadpole jello” individually and in combinations of each other to larvae. Various nutritional components of the diet were measured based on the fecal matter of the larval study groups. We analyzed energy content with bomb calorimetry, crude protein following Kjeldal’s technique, percent organic matter from ash-free dry weight, and various macrominerals (including: Ca, P, and Mg) with color spectrophotometry. Food passage rate were also measured both at the commencement and at the conclusion of the trials using fluorescent dye markers mixed into the jello. Ammonia levels were also monitored throughout the study to maintain optimal water quality.

95. 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 factors that contribute to a growing reservoir environment as well as documenting the growth rate of such an environment. 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. Such a database does not exist for the Kentucky Lakes region currently. Research methods include stratigraphy analysis, mapping of the mudflat using GPS technology and ArcMap software, and ground and aerial photograph analysis. Aerial photograph analysis will play a large part in helping to determine the factors that influence the changes in the mudflat, as well as set the foundation for a comprehensive database about reservoir embayments.

96. Heather Veerkamp (Oral and Poster Presentation)

Western Kentucky University

Faculty Sponsors: Chris Groves, Andrea Croskrey, and Pat Kambesis

Groundwater Sensitivity Mapping in KY Using Geographic Information Systems

Groundwater sensitivity refers to the inherent ease with which groundwater resources can be impacted in the presence of uncontrolled release of contaminants in the environment. Within Kentucky these sources include not only point releases of chemicals, but widespread non-point source contaminants associated with agricultural land use. The major purpose of this research is to develop methods for digital mapping to better define areas of varying groundwater sensitivity within Kentucky at a scale of 1:100,000. In this project the 1:100,000 Beaver Dam and Campbellsville maps were analyzed--previously the most detailed such maps available are at 1:500,000 scale. In the analysis digital Tagged Vector Contours elevation data at a scale of 1:24,000 were combined with Digital Vectorized Geologic Quadrangles. These are computer maps that show detailed geology of an area (rock types, rock structures and landscape forms) in a form that can be used to do sophisticated analyses using Geographic Information Systems software. Regions were classified into one of five units depending on how easily the groundwater would be expected to be impacted in the presence of a contaminant spill, for example, based on rock type, permeability, fractures, and other considerations. Polygons of the areas with less sensitive rock that drained into areas assigned to the highest sensitivity level were drawn and added to a combined region entitled "Sensitive Drainage". Land included in Sensitive Drainage may have well-protected groundwater when vertical infiltration is considered but in most cases overland flow eventually drains into the most sensitive groundwater regions.

97. Amanda Day, Ingrid van Rooyen, and Lisa Hinkle

Morehead State University

Faculty Sponsor: Shari L. Kidwell

Parenting and Attachment among Families in Eastern Kentucky

Attachment is considered to be a "state of mind" about close relationships, including rules that guide parenting. Parents' attachment has been found to predict parenting behaviors such as warmth and sensitivity, influencing the likelihood their children will become securely attached themselves. The objective of the current study is to examine how parental attachment influences parenting among families in Eastern Kentucky. Thirty-eight low-income parents and their preschoolers have participated. Parenting was measured with questionnaires and ratings of behavior during two parent-child interaction tasks. Parental attachment was assessed via an interview in which parents discussed their childhood relationships with their own parents, including how they were disciplined, how they were responded to when upset, and the effects these relationships have had on them. Parents were classified as securely attached if their responses were consistent, detailed, coherent, mostly positive in content, and insightful, as well as responsive, highly engaged, and primarily positive in mood. Findings favored parents who were classified as secure, relative to those who were insecure. Secure parents perceived their own parenting behaviors as more nurturing and consistent, and ratings of parenting behaviors suggested that they were more warm, empathic, and encouraging with their children. Additional interview data is being rated that involves parent's perceptions of the quality of relationships they have with their children. The current results have important implications for the timing and type of interventions that are needed to prevent the "handing down" of insecure attachments from parent to child.

98. **Kim Delaney**

University of Kentucky

Faculty Sponsor: Arthur Hunt

RNA Binding by the 30 kDa Subunit of Cleavage and Polyadenylation Stimulation Factor of Arabidopsis thaliana

The Arabidopsis thaliana homolog of mammalian Cleavage and Polyadenylation Specificity Factor, 30 kDa (CPSF 30) is an active part of the Arabidopsis polyadenylation complex. In plants there are three conserved polyadenylation signals: 1) the cleavage sites which is the point where precursor RNA is cleaved and adenosine residues are added, 2) the NUE (near upstream element, 6-10 base pairs long, situated 10-40 bases 5' of the cleavage site), an A-rich signaling element thought to possibly function similarly to the highly conserved AAUAAA sequence in mammals, and 3) the FUE (far upstream element, that can be as large as 100 nucleotides and lie anywhere from 13 to 100 nucleotides 5' of the NUE), a U-rich region with multiple UG motifs. CPSF 30 showed binding of relatively equal strength to wild type RNA (containing all polyadenylation signals) and RNA with no effective NUE; however, CPSF 30 displays decreased binding to RNA containing no active signals. This suggests CPSF 30 preferentially binds the FUE region of mRNA. RNA binding was also examined in the presence of polynucleotide competitors. CPSF 30 showed little to no binding to wild type RNA in the presence of Poly G and Poly U and reduced binding in the presence of Poly A, indicating the protein has an affinity for these poly nucleotides over any of the polyadenylation signals. The preference for Poly G and Poly U further supports the hypothesis that CPSF 30 binds at the FUE region of mRNA.

99. **Kara Barnett**

Morehead State University

Faculty Sponsor: David Peyton

Phylogeny of Esocids Based on Beta-actin and a Minisatellite in the Growth Hormone Gene

The phylogeny of Esociformes (pikes, pickerels, and mudminnows) has recently been examined at the molecular level to establish the validity of morphological classification schemes. Mitochondrial and nuclear genes have been examined by other groups to arrive at a consensus for the evolution of this somewhat problematic group. We have approached this question using molecular data from two nuclear genes: cytoplasmic beta-actin and growth hormone. Beta-actin is highly conserved at the amino acid level among all vertebrates, and was cloned by polymerase chain reaction from each of the five esocids using consensus primers that correspond to the first and last nine codons of the gene. The amino acid coding sequences and intron junctions were deduced from the complementary DNA of beta-actin from E. masquinongy. In addition, a minisatellite sequence of 33 nucleotides was discovered in the fourth intron of the growth hormone gene in each of the five esocids. This 33 nucleotide sequence is present in multiple copies in each esocid, but only occurs once in the salmonids. The minisatellite does not show variability within species, and may provide another tool to establish the relatedness of the esocids to other taxa.

100. Lindsey Manning and Alicia Lewis

University of Louisville

Faculty Sponsors: Deborah S. Armstrong, Marianne Hutti, and Craig Ziegler
Father's Emotional Response to Subsequent Pregnancy After Perinatal Loss

Examine father's emotional response during subsequent pregnancy after previous perinatal loss as well as after the birth of healthy baby in comparison to fathers in first pregnancy. Pregnancies following perinatal loss can be powerful stressors for expectant fathers. They feel apprehension about the outcome of subsequent pregnancy may lead to significant and prolonged levels of depressive symptoms and anxiety. It is unclear the duration of psychological distress after birth of healthy infant, or other long-term consequences of history of perinatal loss on father's developing attitudes toward themselves as parents and concerns about well-being of new infant.

101. Jennifer Burns

Western Kentucky University

Faculty Sponsors: Chris Groves and John Andersland

Lichens and Weathering of Kentucky Limestones

Lichens are complex plantlike organisms showing no differentiation into stem, root, or leaf and are composed of a fungus and alga growing in a symbiotic relationship on a solid surface. While it is well established that lichens are intimately involved in the initial decomposition of rocks by various physical and chemical means, questions remain about conditions under which lichens can accelerate or retard the weathering of the rocks they grow upon. Generally it is believed lichens enhance rock weathering in humid climates and retard weathering processes in arid regions. Limestone composes a large percentage of the surface landscape of Kentucky, and thus the weathering of limestone is of particular importance in understanding the Commonwealth's landscapes. For this project a variety of lichen species residing on limestone in the Warren County, Kentucky area have been located and identified. While many species of lichens reside in the area, a list was constructed of only endolithic lichens observed and sampled (including foliose species *Anaptychia palmulata* and crustose species *Fuscidea recensa*). Samples of limestone with and without lichen cover, and of varying lichen coverings, were collected and analyzed under a scanning electron microscope. Samples of the limestone surfaces directly under the lichen were compared to lichen free surface samples as well as samples of unweathered surfaces. Using this information, detailed descriptions of each particular lichen type's influence on the weathering of the limestone samples are being developed for each species sampled.

**102. Laura Abney, Alexandra Carter, Bonnie Hudgin,
Jessi Moore, and Mindy Folsom**

Eastern Kentucky University

Faculty Sponsor: Barbara Hussey

Unconventional Redheads in Art, History, Literature, and Popular Culture

This poster will present research analyzing the highly symbolic value of redheads in visual art, adolescent literature, and contemporary cartoons. It will give background information on the unique genetics of redheads along with popular stereotypes and prejudices. It will also consider the characteristics that actual redheads throughout history are believed to represent.

103. Beth Whittle

Northern Kentucky University

Faculty Sponsor: Steve Wilkinson

nkuGeometry, an Interactive Website

During the Summer of 2004, a website, called nkuGeometry, was compiled that interactively illustrates concepts of both Euclidean and equiaffine differential geometry (<http://webmath.nku.edu/~nkuGeometry>). The purpose of our website is to assist students, or those who are otherwise interested and have a knowledge of calculus and analytic geometry, in understanding fundamental concepts pertaining to differential geometry. This website allows students to look at graphs and understand what concepts like arc length and curvature really mean with respect to a defined function and its graph. The interactivity of the website allows students to look at multiple and perhaps personally frustrating graphs, far surpassing any amount of visuals and/or examples that could be provided in a textbook. The website is also geared towards those who are already proficient in advanced geometrical topics; our website gives an easy and accessible way to explore and investigate varied and more nuanced functions. Our poster will describe many of the features of the nkuGeometry website, as well as set nkuGeometry apart as a unique and diverse differential geometry resource. Our poster will show specifically what types of calculations can be made (arc length, curvature, etc.). Finally, it will illustrate the vast array of things that can be done with the web Mathematica software package, which is what we used to generate the interactive graphs and other such outputs.

104. Jason Richards

University of Kentucky

Faculty Sponsors: Clyde Carpenter and Karl Raitz

Reassigning Values: Stone Fences and the Cultural Landscape of Kentucky

The built environment of Central Kentucky is comprised of many elements that together define the landscape symbol vocabulary of the Bluegrass. One of the most endearing (yet quickly diminishing) symbols of this region is the rock fence, particularly the dry stone masonry fences of the horse farms of Kentucky. Though much scholarly research has been devoted to these fences as historic artifacts, very little study has examined their value as popular icons of the area's regional identity. The subject of my research then is a case study of the changing values that have transformed the stone fence from a utilitarian object to a regional symbol used in civic and commercial architecture. These recreations of nineteenth century historic stone walls have been termed the post facto walls of the Bluegrass for distinction. The stone fence became a cultural artifact of the Bluegrass through the region's unique geographical and social features. Though originally a functional element of the agrarian landscape, new technologies and changing economic conditions forced poorer farmers to tear their fences down. Wealthy Bluegrass estates began erecting the first post facto stone fences as a symbol of the Bluegrass way of life. Post facto stone fences entered the realm of commercial architecture as a result of urban expansion in the 1960s and 1970s that threatened the rural estates of the region. The use of stone, liberated from traditional methods of fence construction, is increasingly used in civic and commercial spaces in Central Kentucky as a symbol of the region's heritage and uniqueness.

105. Kyle Humphrey, Collin Schaumburg, Natalie Sutton, and Holly Strong

Murray State University

Faculty Sponsor: Terry L. Derting

Effects of Dietary Fiber and Protein on Immunocompetence in White-footed Mice (Peromyscus leucopus)

Diet quality is known to have an effect on immune responsiveness. To determine what aspects of diet affect immunity and what aspects of the immune system are most vulnerable, we tested the null hypothesis that diet quality has no effect on immunocompetence and stress levels in the adult male white-footed mouse (*Peromyscus leucopus*). Adult males were trapped live from random patches of forest in western Kentucky. The mice were put on four diets of differing levels of protein and fiber. Health was assessed through measurement of daily metabolic rate, white blood cell counts, hematocrit, serum corticosterone level, and body organ masses. Differences in the four diets were confirmed by differences in the masses of the gastrointestinal organs, kidneys, and liver. Protein was more influential on organ masses than fiber. Despite differences in digestive efficiencies, final daily metabolic rates on all four diets were similar, confirming that all mice used similar amounts of metabolic energy per day. The differences in diet quality among groups were not associated with differences in immunocompetence. Our results indicated that differences in diet quality, which mimicked variation that occurs seasonally in the field, did not have a direct effect on immunocompetence. We propose that the relationships between diet quality and immunocompetence that occurred in a previous field study were simply correlative and not causal. Alternatively, immunocompetence may be more influenced by environmental stressors that are directly or indirectly correlated with diet quality such as predation, parasitism, or habitat quality, than by dietary factors alone.

106. Alisha Dobbins

(Oral Presentation)

Eastern Kentucky University

Faculty Sponsor: David May

The Impact of Perceived Risk, Victimization Experience, and School Supervision on Fear of Crime and Fear of Bullying at School among Public School Students in Kentucky

For many years, researchers have sought to unravel the relationship between perceptions of risk, victimization, and fear of criminal victimization among adolescents at school. No studies, however, have examined the antecedents of fear of bullying at school. Using data from over 3,000 middle and high school students from eight public schools in Kentucky, I attempt to unravel the relationship between these factors. Thus, I use multivariate linear regression to examine the relationship between fear of bullying at school and race, gender, grade level, perceptions of risk, victimization experience, and the student's perception of communication with adults at school. The results from this study indicate that females, Whites, students from lower grades, those students who feel most comfortable talking with an adult at school, students who have been teased or called names, and students who perceive themselves most likely to be victimized by crime are significantly more fearful of bullying than their counterparts. Implications of these findings for school safety and perceptions of bullying at school are also discussed.

107. Michael T. McCarty

(Oral Presentation)

Morehead State University

Faculty Sponsors: Ben Malphrus and Michael Combs

The Morehead Space Tracking Antenna and Radiotelescope: Operator Program Version 1.0 and Data Imaging Using Data Reduction Automation Program (DRAP) Version 1.0

M-STAR is a 21-meter diameter research instrument built for undergraduates, graduates, and faculty to make astrophysical observations and serve as a satellite tracking ground station. M-STAR systems will be controlled by the ACU built by VertexRSI, the company contracted to construct the M-STAR. M-STAR Operator Program will control the ACU in order to position the antenna for observational astrophysics. Data is collected via a DAQ card which is controlled by the Operator Program being developed in Labview, a graphical programming language produced by National Instruments. This project is an application of Computer Science in the realm of Radio Astrophysics designed to develop software to operate equipment needed for data collection. The massive amounts of data taken with the MRT (13.25 m radio telescope) can take hours sometimes days to reduce, image, and analyze; with the M-STAR this is expected to become an even more time consuming task. DRAP is an application being engineered to dramatically decrease the time required to reduce, format, image, and analyze data. DRAP v1.0 will also be capable of attaching a FITS header to the data for imaging and analysis using commercial software such as AIPS that runs in the UNIX environment. FITS was developed to provide a single standard interchange format for transporting digital images among cooperating institutions. NRAO created AIPS for the manipulation of radio interferometric data and astronomical images. One of the main aspects of this project aims to enable the SSC to take advantage of the AIPS software package via FITS.

108. Mary Mather

(Oral Presentation)

Murray State University

Faculty Sponsor: Sonya Baker

A Comparison of the Female Characters of Rodgers and Hammerstein to Those of Stephen Sondheim

This project compares the female characters in the musicals of Richard Rodgers and Oscar Hammerstein to those of Stephen Sondheim. The musicals of Rodgers and Hammerstein and those of Sondheim have been chosen because they were innovative and trendsetting for their time. Rodgers and Hammerstein, who began composing together during the late 1940's, produced the first musicals in which theatre, music, and dance were integral to the plot of the musical. Their musicals were some of the first to address serious issues such as racism, war, prejudice, and abuse. Sondheim began composing during the 1970's. While Rodgers and Hammerstein were innovative in their synthesis of theatre, music, and dance, Sondheim is innovative in his marriage of text, music, set, orchestration, etc., so that each of the elements supports his underlying purpose. Sondheim's musicals, like Rodgers' and Hammerstein's address serious issues; however, while Rodgers and Hammerstein often resolved these issues in an "idealistic" manner, Sondheim writes from a more "disillusioned" perspective. The focus of this study is on the choices made by the female characters and how they reflect the time period in which the musicals were written. The project includes a brief biographical background of Rodgers, Hammerstein, and Sondheim, an analysis of the female characters, and a survey of MSU students' perceptions of women's issues and how they are relevant to the musicals. In an effort to further understand these issues, original lyrics and dialogue will be displayed, as well as a scene and song from Rodgers' and Hammerstein's "Carousel" which has been re-written by Ms. Mather in the style of Stephen Sondheim.

109. Anna Torstenson

(Oral Presentation)

Northern Kentucky University

Faculty Sponsor: Nancy Jentsch

Raising Joey: A Mother's Journal

It's almost inevitable. I will someday see the day that I have a child to raise, having to make important decisions for him, providing the best for him, and sacrificing myself for him. Though I may not know exactly when I will see this day, it is approaching faster than I can imagine and the only thing I can do for it now is research important decisions I may have to make for this little one from infancy on that will affect him for his entire life. However, because of experiences in my own life, some of these decisions are outside the realm of many that most American parents choose to make. In a monolingual culture that prides itself on its fast-paced technological advancements, it is easy to get caught up in the greatness of everything this country has to offer. However, after a lifetime watching children close to me grow and develop and a year in Germany, my eyes were opened to many differences in youth culture and varying decisions parents have to make for their children. In my project, I raised my ideal child in two different cultures at different stages of his life and touched on issues that would prove important throughout, such as bilingualism, education, and the availability of technology to him, while briefly touching on issues that parents face on a regular basis regardless of location, age, or culture, such as peer pressure, family time, and involvement in extra-curricular activities.

110. Stephanie Logsdon (Oral Presentation)

University of Kentucky

Faculty Sponsor: Robin Cooper

Differentially Regulated Pools of Synaptic Vesicles within Motor Nerve Terminals

When the glutamate-ergic neuromuscular junctions of the crayfish are treated with DL-TBOA (10 μ M), a glutamate uptake blocker, excitatory postsynaptic responses (EPSPs) are attenuated in amplitude over time with repeated stimulation. Thus, one would assume the pool of vesicles for release are becoming used up and depleted of glutamate. Recycling of empty vesicles may occur. However, when the EPSPs were very small and the bath is exchanged to TBOA (10 μ M) and 5-HT (1 μ M), within 1 minute the EPSPs start to appear at random and upon stimulation the evoked EPSPs are very large as compared with the baseline control prior to exposure to TBOA. Thus, when 5-HT is added in the presence of TBOA, a new pool, also referred to as a reserve pool, of vesicles are recruited which have glutamate already packaged in them. This result demonstrates that the electrically excitable pool of vesicles and the 5-HT modulated vesicle pool are divisible within the presynaptic nerve terminal. Currently various stimulation paradigms are being used to measure the kinetics of the electrically excited pool of vesicles.

111. Stefanie B. Bumpus, Billy Allen, (Oral Presentation)

Sarah A. Andres, and D. Alan Kerr II

University of Louisville

Faculty Sponsor: James L. Wittliff

Laser Capture Microdissection of Normal & Neoplastic Cells for Gene and Protein Expression

Molecular basis of clinical behavior and therapeutic response of human carcinoma cells is poorly understood. Cellular heterogeneity and improper tissue handling of clinical specimens has been a complicating factor for assessing analyte/biomarker levels in specific cell types. Our goal is to determine the relationship of gene and protein expression profiles to patient-associated characteristics, tumor pathology & biomarker status and clinical course in human carcinomas to arrive at a new classification, to assess patient prognosis and to improve therapy selection while monitoring therapy response. Laser Capture Microdissection (LCM) allows procurement of pure populations of various cell types. In preliminary LCM experiments, H & E stained tissue sections from ovarian and uterine biopsies were used to collect 3000-5000 cells. Total RNA was extracted, purified, and the mRNA amplified to compare quantities in whole tissue sections compared to that of LCM procured cells using established protocols. Comparison was also made between samples incubated with and without a nucleic acid carrier (polyinosinic acid). Universal reference RNA served as a control. RNA yield from whole uterine sections (5-6 μ m) ranged from 30-290 ng, while LCM procured cells gave 18-79 ng. LCM procured cells of ovarian tissue sections yielded 9-86 ng. Using HSP70 as a model protein, Western Blot analyses required ~10,000 LCM pulses (30 μ m spot setting at 75 mW) of endometrial and ovarian tissue sections for protein detection. Preliminary studies suggest the LCM approach allows generation of cell-specific gene and protein expression results for correlation with patient characteristics and cancer clinical behavior.