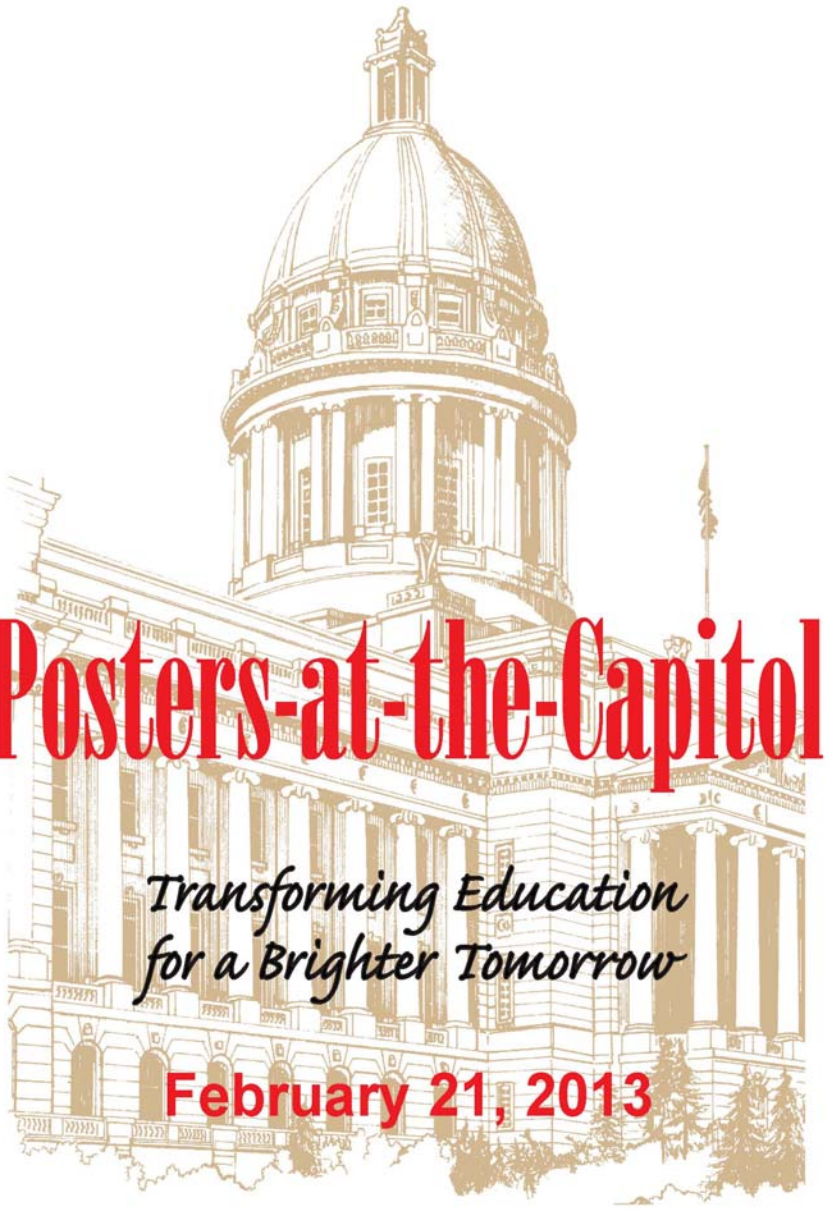
NORTHERN KENTUCKY UNIVERSITY • UNIVERSITY OF KENTUCKY • UNIVERSITY OF LOUISVILLE • WESTERN KENTUCKY UNIVERSITY • KENTUCKY COMMUNITY AND TECHNICAL COLLEGE SYSTEM • EASTERN KENTUCKY UNIVERSITY • KENTUCKY STATE UNIVERSITY • MOREHEAD STATE UNIVERSITY • MURRAY STATE UNIVERSITY •



Posters-at-the-Capitol

Transforming Education for a Brighter Tomorrow

February 21, 2013

Welcome from President Doug Whitlock of Eastern Kentucky University:

Eastern Kentucky University is proud to participate in the 12th annual ***Posters-at-the-Capitol*** program because we believe it clearly demonstrates the high quality of our public universities, the tremendous value of public higher education in our Commonwealth, and the scholarly and creative achievements of some of our best and brightest students.

The projects represented in this exhibit reflect the collaborative efforts of students and dedicated members of our outstanding faculty – men and women who model a passion for excellence and lifelong learning. As we nurture our students to reach deep within themselves and realize their full potential, these faculty mentors bring great honor to themselves, our University, and to the teaching profession.

Undergraduate research is an integral component of the teaching-learning process at EKU, where students are encouraged to explore their full potential. As a "School of Opportunity," we are committed to providing all our students with diverse educational opportunities that enhance their classroom experiences and develop their intellectual curiosity. Each year, our students' exemplary work is displayed in a Undergraduate Presentation Showcase. This discovery and application of new knowledge is exciting for the student participants and uplifting to our entire University community.

I applaud all the faculty mentors in the ***Posters-at-the-Capitol*** program for providing such quality learning experiences for their students. To all the students, I offer my heartfelt congratulations and this challenge: let this experience mark only the beginning of your educational journey and a life committed to personal excellence.

Educator Marva Collins once said, "Success doesn't come to you – you go to it." Students, I am pleased to see that already you are living your life by that truth. Congratulations, and keep up the good work!

Welcome from President Michael B. McCall of the Kentucky Community and Technical College System:

The Kentucky Community and Technical College System is delighted to take part in this celebration. I applaud the efforts of the ***Posters-at-the-Capitol*** Organizing Committee and our university partners in promoting innovative student research and scholarship.

Engaging students in substantive research projects stimulates critical thinking and builds a strong foundation for advanced research and professional development after graduation. Undergraduate research opportunities also provide student-scholars the added benefits of faculty expertise and mentorship. Moreover, college students with solid research skills typically achieve greater educational outcomes and are also more likely to pursue postgraduate studies than those without these valuable skills.

Welcome

President McCall's Welcome Cont'd.

I am extremely pleased that KCTCS students will have the opportunity to showcase their accomplishments in the research arena. KCTCS, where higher education begins for most Kentuckians, is committed to improving the quality of life for Kentuckians and the pursuit of applied research is one of the myriad ways KCTCS students can enhance economic development within the Commonwealth. Congratulations to the ***Posters-at-the-Capitol*** scholars. I wish each of you continued success on your journey of scholarly achievement.

Welcome from President Mary Evans Sias of Kentucky State University:

Undergraduate research programs are a valuable resource for the Commonwealth of Kentucky. They drive innovation and support STEM studies at institutions of higher education. Ultimately, undergraduate research programs produce leaders who will discover technologies that lead to jobs.

Providing hands-on research opportunities is helpful in preparing students for careers in the sciences. Budding researchers and scientists benefit from close collaboration with faculty members. This exceptional experience captures students' interest and creates enthusiasm for the science disciplines. In addition, research trains students to think independently and to solve problems.

Meaningful undergraduate research experience can help science graduates land interviews and even jobs. With continued support from the Kentucky Legislature, the next generation of doctorates in the STEM fields will continue to get their start in Kentucky's undergraduate research programs.

Best wishes and much success for another great year of ***Posters-at-the Capitol***.

Welcome from President Wayne Andrews of Morehead State University:

Morehead State University is pleased to participate in the 12th Annual ***Posters-at-the-Capitol*** program. This event provides a wonderful opportunity for our undergraduate students to showcase their projects and to meet and interact with members of the General Assembly. These student projects, completed in collaboration with faculty members outside the traditional classroom setting, represent the personal, value-added educational opportunities available at Morehead State University. I take great pride in the high priority that we have placed on faculty-mentored, student-engagement activities in basic and applied research, artistic and other creative endeavors, and community and regional stewardship.

In an age of declining budgets, larger classes, and an increasing emphasis on less personal forms of instruction through the Internet, it is critical that we continue to recognize the importance of one-on-one faculty-student mentoring relationships in the educational process. The involvement of undergraduate students with faculty in research, scholarship, and other creative endeavors

provides the type of rich academic environment necessary for the development of leaders with the intellectual skills and vision to guide the future social and economic development of our Commonwealth and the Nation. Morehead State University is committed to the continued expansion of these scholarly opportunities for students in all academic programs through initiatives such as our unique *Undergraduate Research Fellows* program and our *Celebration of Student Scholarship Week.*

The 12th Anniversary of the ***Posters-at-the-Capitol*** clearly demonstrates the commitment of Morehead State University and Kentucky's other public institutions of higher education to faculty-mentored undergraduate research and the pursuit of academic excellence.

I offer my sincere thanks to the faculty mentors who go the extra mile to meaningfully involve students in their scholarship, and my hearty congratulations to these student scholars for their outstanding research and creative accomplishments.

Welcome from President Randy J. Dunn of Murray State University:

This year marks the twelfth anniversary of ***Posters-at-the-Capitol***. Murray State's involvement in this worthy event is both a testament to our students, who are seeking out these kinds of scholarly activities in growing numbers, and to our University as we all work to provide a greater number of high quality, research-based teaching and learning opportunities for MSU students.

Murray State University places a high premium on programs that promote one-on-one interaction between our faculty and students. Through our Undergraduate Research and Scholarly Activity office and our system of Residential Colleges, Murray State continuously supports faculty-student interaction. By providing our students with these kinds of learning opportunities, Murray State is meeting the objectives of the Kentucky General Assembly by ensuring that our graduates are well prepared for life and work.

I join the ***Posters-at-the-Capitol*** Organizing Committee in inviting all of our Commonwealth's citizens to visit and review the work of Kentucky's most gifted students. These undergraduates are contributing ideas that are impacting communities and changing lives. Also, Murray State University is honored to play a key organizing role for this event each year. Congratulations to all those students and faculty whose hard work has made ***Posters-at-the-Capitol*** possible.

Welcome from President Geoffrey S. Mearns of Northern Kentucky University:

One of the most important goals of Northern Kentucky University is to expand student participation in undergraduate research and other forms of creative activity. This goal points to the very important role that undergraduate research plays in the fabric of our university life. Direct interaction between faculty and students is 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, the twelfth ***Posters-at-the-Capitol***. We have observed the growth of this event and that the quality of work has increased each year. These posters and presentations are the culmination of much effort by our students and their faculty mentors. They exemplify the high 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. Their talent gives us great faith in the future of our region, our state, and our country.

Welcome from President Eli Capilouto of the University of Kentucky:

Undergraduate research – the creation of knowledge – is a fundamental component of our three-fold mission as the state's flagship and land grant research institution. The interplay between research in the lab and academic preparation in the classroom provides a rich educational experience for our students.

Now in its 12th year, ***Posters-at-the-Capitol*** is an opportunity to recognize undergraduate research as an essential part of academia; one that benefits students, faculty and the Commonwealth.

Our students work alongside world-class researchers – experts in their fields – enhancing what they learn in the classroom with practical applications in the lab. Through undergraduate research, students experience the intellectual inquiry that is the foundation of scholarship at the University of Kentucky.

For faculty, among the greatest rewards in academia is serving as a mentor for an eager young mind and watching a student passionately pursue new knowledge. They build unique connections with students that may inspire their scholar-protégé to commit a career to transformative research and discovery. Igniting curiosity in the next generation of leaders enriches our faculty's experience and is at the core of our noblest profession.

The University of Kentucky is deeply committed to a culture of undergraduate research because of the profound impact it has on learning and the inherent value it brings to the Commonwealth

of Kentucky. By engaging in innovative research activities and inspiring a generation of thinkers, pioneers and inventors, we position ourselves to address our state's most intractable problems and create a better future for all Kentuckians.

Welcome from President James Ramsey of the University of Louisville:

The University of Louisville has a legislative mandate to be a "premier metropolitan research university." That means quality research is at the top of our agenda and involving students in that research is part of our mission. In many cases, undergraduate students, including sophomores and juniors, are participating in research at UofL. They're getting a chance to work on cures for cancer, heart disease and other health care dilemmas. They're also working on solving social and energy problems. Our students are working with some of the top researchers in the country, UofL faculty members who are mentoring them and exposing them to "real world" problems and solutions. Through the ***Posters-at-the-Capitol*** program, our undergraduate students share their experiences, ideas and discoveries with Kentucky's elected leaders. The ***Posters-at-the-Capitol*** program gives our students a chance to show off their great work while validating UofL's commitment to their educational experience. It's proof to our government officials that the state's financial support of public universities and research and development is paying off.

The University of Louisville is proud to participate in the ***Posters-at-the-Capitol*** program. We're also proud of our students. We hope you will take a look at their work and ask them questions. We think you'll find they're smart, talented and ready to do their part to improve the quality of life for all Kentuckians.

Welcome from President Gary A. Ransdell of Western Kentucky University:

Western Kentucky University takes great pride in the fact that highly credentialed faculty from a wide array of academic disciplines involve undergraduate 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. At WKU, scholarly collaborations utilize the concepts learned in classrooms and laboratories to prepare 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 previous years, it is gratifying to see the number and diversity of student scholars, along with their faculty mentors participating in this twelfth 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.

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

David Eaton
Jody Cofer
www.murraystate.edu

Darrin Smith
www.eku.edu

George Antonious
www.kysu.edu

Michael Henson
Shannon Harr
www.moreheadstate.edu

Dan Curtin
www.nku.edu

Diane Snow
Evie Russell
www.uky.edu

Pamela Feldhoff
www.louisville.edu

Blaine Ferrell
www.wku.edu

Mary Janssen
www.kctcs.edu

Proclamation

by

Steven L. Beshear

Governor

of the

Commonwealth of Kentucky

To All To Whom These Presents Shall Come:

WHEREAS, Both the public universities of Kentucky and the Kentucky Community and Technical College System emphasize the importance of research in higher education for students and the pursuit of in-depth knowledge; and

WHEREAS, The Council on Postsecondary Education strongly encourages Kentucky universities to place emphasis on research initiatives, thereby increasing the opportunity for undergraduates to engage in research and scholarly work; and

WHEREAS, Undergraduates who participate in research and scholarly activity are more likely to pursue advanced degrees that better prepare them for future challenges; and

WHEREAS, The Commonwealth commends the undergraduate students participating in these life-changing educational opportunities and the 12th annual Posters-at-the-Capitol;

NOW, THEREFORE, I, STEVEN L. BESHEAR, Governor of the Commonwealth of Kentucky, do hereby proclaim February 21, 2013, as

UNDERGRADUATE RESEARCH DAY

in Kentucky.

DONE AT THE CAPITOL, in the City of Frankfort the 15th day of November, in the year of Our Lord Two Thousand Twelve and in the 221st year of the Commonwealth.

STEVEN L. BESHEAR
GOVERNOR

ALISON LUNDERGAN GRIMES
SECRETARY OF STATE

Group Photograph

All participants and mentors are encouraged to take part in the **group photograph scheduled for 10:00 a.m.** on the Senate Staircase. This photograph will be posted online shortly following the program.

Schedule of Activities

9:00 a.m. …….……..…*Posters-at-the-Capitol* Registration Opens (House-side Mezzanine)

9:00 a.m. to 11:00 a.m. ……. Poster Setup, Participant Browsing, and Legislative Visit Time

10:00 a.m.…….....….Group Photograph (Senate Staircase)

10:15 a.m. ……...……Brief Organizational Meetings by Institution *(Locations for these meetings will be announced during the group photograph)*

11:00 a.m. …….…..……..……..Welcome and Invited Guests (Rotunda)

11:30 a.m. to 12:30 p.m. …….……...……Legislative Visit Time and Lunch Break

12:30 p.m. to 2:30 p.m. …….……...…..…..General Poster Display Time

1:30 p.m. to 2:30 p.m. …….……..….……....Reception (Senate-side Mezzanine)

2:30 p.m. to 3:00 p.m. ……..….Conclusion (return easels and boards to registration table)

All times listed are Eastern Standard Time.

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Eastern Kentucky University

Poster No.	Student		Faculty Mentor(s)	Page No.	House No.	Senate No.
28	**Dickey**	Ashley	Cheryl Ramey, Adam Lawson, & Richard Osbaldiston	33	74	25
113	**Fisher**	Eden	Michelle Gerken	85	56	7
40	**Hays**	Lindsey	Andrew Deane	41	81	34
49	**Henderson**	Moses	Tanea Reed	48	81	34
49	**Johnson**	Joseph	Tanea Reed	48	81	34
73	**Nichols**	Earl	Rose Perrine	62	81	34
75	**Nowicke**	Clint	Theresa Botts	63	81	34
77	**P'Pool**	Jessie	William Staddon	64	94	31
85	**Ray**	Kari	Jing Wang	69	73	28
110	**Schmiers**	Jessica	William Staddon	83	36	22
49	**Sellers**	Zachariah	Tanea Reed	48	81	34
94	**Smith**	Connor Thomas	David Cunningham	74	81	34
94	**Sterling**	Mellisa	David Cunningham	74	81	34
105	**Thacker**	Ashley Salyer	Sue Mahanna-Boden	80	81	34
106	**Thacker**	Matthew	John Bowes	81	81	34
110	**Watts**	Elizabeth	William Staddon	83	89	21
113	**White**	Anna	Michelle Gerken	85	36	34
49	**Williams**	ReBecca	Tanea Reed	48	81	34
120	**Young**	Tyler	John Dizgun	89	53	16

Kentucky Community and Technical College System

Poster No.	Student		Faculty Mentor(s)	Page No.	House No.	Senate No.
4	**Arnett**	Adam	Pamela Smith & Mary Janssen	19	10	6
8	**Brantley**	Chrystal	Aseem Talukdar & G. Michael Shifflett	21	10	6
10	**Brown**	Ian	Kirk Greenfield	22	4	4
14	**Cabrera, Jr.**	Victor	John Ward	25	35	35
18	**Church**	Michael	Kathy Hoffman & Timothy Dick	28	7	8
18	**Easton**	Jimmy	Kathy Hoffman & Timothy Dick	28	7	8
91	**Floyd**	Kristen Marie	Felix Akojie	73	3	2
10	**Freeman**	Lance	Kirk Greenfield	22	4	4
4	**Fuller**	Holli	Pamela Smith & Mary Janssen	19	10	6
4	**Hack**	David	Pamela Smith & Mary Janssen	19	10	6
18	**Hall**	Aaron	Kathy Hoffman & Timothy Dick	28	7	8
4	**Kinney**	Aaron	Pamela S. Smith & Mary Janssen	19	10	6
10	**Laurent**	Anna	Kirk Greenfield	22	4	4
18	**Lee**	Brandon	Kathy Hoffman & Timothy Dick	28	7	8
60	**Lewis**	Irina	John Ward	56	35	35
4	**McCann**	David	Pamela Smith & Mary Janssen	19	10	6
70	**Morris**	James	Norman Strobel	61	16	13
4	**Opp**	Lacy	Pamela Smith & Mary Janssen	19	10	6
91	**Seilheimer**	Micah Renee	Felix Akojie	73	3	2
10	**Weber**	Emily	Kirk Greenfield	22	4	4
4	**White**	Alesha	Pamela Smith & Mary Janssen	19	10	6
4	**Woodruff**	Nathan	Pamela Smith & Mary Janssen	19	10	6

Kentucky State University

Poster No.	Student		Faculty Mentor(s)	Page No.	House No.	Senate No.
20	**Cook**	Nicholas	Michael Bomford, Jon Cambron, & Anthony Silvernail	29	56	7
36	**Grant-Simmons**	Ilea	George Antonious	39	57	7
51	**Johnson**	McKenzie	George Antonious	50	57	7
57	**Kratzer**	Kyle	John Sedlacek & Karen Friley	54	57	7
59	**Kronmaah**	Lydia	Kirk Pomper, Jeremiah Lowe, & Sheri Crabtree	55	57	7
64	**Mathis**	Victoria	Avinash Tope	58	56	7
96	**Smith**	Tiana	Changzheng Wang, Lingyu Huang, & Cecil Butler	75	56	7
102	**Taltoan**	Achaia	Avinash Tope & Phyllis Rogers	79	56	7
116	**Wingfield**	Kandyce	Narayanan Rajendran	87	56	7
117	**Wyatt**	Brittney	Michael Bomford, Changzheng Wang, & Lingyu Hwang	87	57	7

Morehead State University

Poster No.	Student		Faculty Mentor(s)	Page No.	House No.	Senate No.
15	**Cagle**	Nikki	Kristina DuRocher	26	99	27
17	**Chapman**	Jaime	Jody Fernandez	28	100	27
83	**Dye**	Jonathon	Christine McMichael & Stephen Lange	68	95	29
32	**Fitzpatrick**	Jonathan	Benjamin Malphrus & Kevin Brown	37	77	7
109	**Gingras**	Carol-Rose	David Eisenhour	83	60	11
50	**Johnson**	Lanora	James Masterson	50	71	27
52	**Johnston**	Allison	Rebecca Roach	51	62	17
56	**Koontz**	Kelsey	Edna Schack	54	39	22
83	**Lewis**	Taylor	Christine McMichael & Stephen Lange	68	71	27
63	**Mason**	Nicholas	Steven Chen & Kenneth Henderson	57	27	61
68	**Messer**	Katherine	John Ernst	60	71	27
69	**Miller**	Russell	Duane Chappell	60	71	27
83	**Murphy**	Cody	Christine McMichael & Stephen Lange	68	71	27
78	**Parker**	Rebecca	Kristina DuRocher	65	99	27
83	**Pfalzer**	Laura	Christine McMichael & Stephen Lange	68	55	7
86	**Reeder**	Kathryn	Katy Carlson	70	73	28
99	**Story**	Danielle	Bernadette Barton & Constance Hardesty	77	70	27
109	**Washburn**	Brooke	David Eisenhour	83	28	37
83	**Wells**	Chad	Christine McMichael & Stephen Lange	68	71	27
114	**White**	Scotty	Hans Chapman	85	72	28

Murray State University

Poster No.	Student		Faculty Mentor(s)	Page No.	House No.	Senate No.
1	**Althoff**	Mark	Chris Trzepacz	17	47	26
71	**Bohac**	Patrick	Alexey Arkov	61	5	1
48	**Craig**	Clint	Iin Handayani, Bobby Hill, Andy Bailey, Gustav Helmers, David Ferguson, & Chris Rodgers	46-47	5	1
115	**Crump**	Chesika	Terry Derting	86	8	13
1	**Cude**	Andrew	Chris Trzepacz	17	4	4
24	**David**	Adam	David Eaton	31	5	1
25	**Davis**	Clay	David Eaton	32	4	4
71	**Davis**	Jordan	Alexey Arkov	61	5	1
26	**Demers**	Lanna	David Pizzo	32	5	5
29	**Earhart**	Alexander	Claire Fuller	34	5	1
34	**Geile**	Morgan	Howard Whiteman	38	5	1
71	**Greer**	Brandi	Alexey Arkov	61	5	1
37	**Hannan**	C. Evan	Jana Hackathorn	39	1	2
47	**Jameson**	Austin	Wafaa Fawzy	45	2	1
48	**Jarvis**	Brian	Iin Handayani, Bobby Hill, Andy Bailey, Gustav Helmers, David Ferguson, & Chris Rodgers	46-47	6	2
29	**Jent**	Derrick	Claire Fuller	34	5	1
48	**Kelly**	Joseph	Iin Handayani, Bobby Hill, Andy Bailey, Gustav Helmers, David Ferguson, & Chris Rodgers	46-47	5	1
71	**Lin**	Yanyan	Alexey Arkov	61	5	1
61	**Linzy**	Benjamin	David Pizzo & Paul Lucko	56	4	4
71	**Loganathan**	Sudan	Alexey Arkov	61	5	1
71	**Martin-Mozeleski**	Marisca	Alexey Arkov	61	5	1
71	**McConnell**	Atom	Alexey Arkov	61	5	1
72	**Nance**	Riley	Lynn Patterson	62	5	1
48	**Paschall**	Kathleen	Iin Handayani, Bobby Hill, Andy Bailey, Gustav Helmers, David Ferguson, & Chris Rodgers	46	1	5
81	**Pellock**	Sam	Kate He	66	5	1
48	**Puckett**	John Michael	Iin Handayani, Bobby Hill, Andy Bailey, Gustav Helmers, David Ferguson, & Chris Rodgers	46-47	5	1
48	**Ranes**	Barrett	Iin Handayani, Bobby Hill, Andy Bailey, Gustav Helmers, David Ferguson, & Chris Rodgers	46-47	12	4
115	**Rekosh**	Carly	Terry Derting	86	5	1
1	**Samples**	Laura	Chris Trzepacz	17	5	1
88	**Schadler**	Craig	Jessica Naber & Joanne Hall	71	69	17
48	**Story**	Charlton	Iin Handayani, Bobby Hill, Andy Bailey, Gustav Helmers, David Ferguson, & Chris Rodgers	46-47	5	1
29	**Tartar**	Elizabeth	Claire Fuller	34	15	6
48	**Vowell**	Kalie	Iin Handayani, Bobby Hill, Andy Bailey, Gustav Helmers, David Ferguson, & Chris Rodgers	46-47	2	1
1	**Wells**	Courtney	Chris Trzepacz	17	5	1
115	**Whittington**	Carli	Terry Derting	86	10	6
48	**Wray**	Ira	Iin Handayani, Bobby Hill, Andy Bailey, Gustav Helmers, David Ferguson, & Chris Rodgers	46-47	2	1

Northern Kentucky University

Poster No.	Student		Faculty Mentor(s)	Page No.	House No.	Senate No.
6	**Bashall**	Nicole	Kereen Monteyne	20	78	24
97	**Brown**	Clifford	Cecile Marczinski	76	66	11
13	**Butts**	Sean	Wei Hao	25	63	23
16	**Campbell**	Vincent	Wayne Bresser & Chari Ramkumar	27	64	17
101	**Cahill**	Kaitlin	Kebede Gemene	78	60	11
21	**Correa**	Juan	Sharmanthie Fernando	30	69	23
104	**Cresswell**	Briana	Belle Zembrodt	80	49	20
41	**Fisher**	Christopher	Kajsa Larson	42	65	17
31	**Fitter**	Ari	Joe Nolan & David Agard	36	68	24
104	**Gabbard**	Katelyn	Belle Zembrodt	80	60	11
39	**Hayes**	Katelyn	Shauna Reilly	40	60	11
41	**Hedges**	Alexandra	Kajsa Larson	42	3	35
45	**Ivers**	Alexandra	Judy Voelker & Grant Edwards	44	67	24
16	**Lancaster**	Wayne	Wayne Bresser & Chari Ramkumar	27	60	11
31	**Lovins**	Meagan	Joe Nolan & David Agard	36	69	11
97	**Maloney**	Sarah	Cecile Marczinski	76	7	11
67	**Melton**	Brian	Michael Baranowski	59	39	12
104	**Miller**	Kathryn	Belle Zembrodt	80	3	2
13	**Newkirk**	Joshua	Wei Hao	25	69	17
16	**Oden**	Damian	Wayne Bresser & Chari Ramkumar	27	65	23
80	**Patel**	Arpita	Mary Collier, Monica Worrell, Barbara Smith, & Kathy Bergman	66	68	24
80	**Patel**	Hiral	Mary Collier, Monica Worrell, Barbara Smith, & Kathy Bergman	66	68	24
104	**Reed**	Jenny	Belle Zembrodt	80	69	11
6	**Schoettle**	Kevin	Kereen Monteyne	20	63	23
97	**Stamates**	Amy	Cecile Marczinski	76	63	17
101	**Suttmiller**	Rebecca	Kebede Gemene	78	68	24
103	**Taylor**	Kelsey	Christine Perdan Curran	79	68	24
104	**Teegarden**	Emily	Belle Zembrodt	80	69	23

University of Kentucky

Poster No.	Student		Faculty Mentor(s)	Page No.	House No.	Senate No.
5	**Barney**	Sarah	Jason Schmidt, James Harwood, & Mark Williams	19	75	13
27	**Chaffin**	Brian	Luke Bradley & Robert Houtz	33	75	13
22	**Crouch**	James	Melody Carswell, Ryan Hargrove, & Bob Sandmeyer	30	77	13
27	**Dick**	Emerson	Luke Bradley & Robert Houtz	33	50	14
38	**Hatfield**	Richard Stratton	John Cox	40	99	27
43	**Henkle**	Talia	David Horohov & Charles Issel	43	45	12
53	**Jusma**	Marquiana	Andrew Deane	51	75	22
54	**Kaiser**	Amanda	Susan Barron	52	88	12
65	**Matveeva**	Elina	Richard Smith	58	79	12
76	**Owen**	Kellie	Alison Davis	64	19	5
92	**Shah**	Aman	Esther Dupont-Versteegden	73	75	12
100	**Sunthankar**	Kunal	Luke Bradley & Peter Hardy	77	29	38
107	**Urian**	J. Wesley	Susan Barron	81	75	13
108	**Votaw**	Victoria	Susan Barron	82	79	13
111	**Wente**	Rebecca	James Harwood & Jason Schmidt	84	96	18
112	**Whelan**	Sarah	Jeramiah Smith	84	75	13

University of Louisville

Poster No.	Student		Factulty Mentor(s)	Page No.	House No.	Senate No.
2	**Alvarez**	Alejandro	Cynthia Corbitt	18	35	38
12	**Bushau**	Adrienne	Jim Wittliff & Sarah Andres	24	78	28
19	**Coleman**	Clayton	Kristi King	29	35	35
23	**Dabbs**	Cole	Andrew Grubb	31	59	26
33	**Fox**	Michelle	Jennie Burnet	37	59	26
44	**Imel**	Janna Lynn	Suzanne Meeks & Shruti Shah	43	98	18
46	**James**	Dexter	Adrienne Bratcher & Irving Joshua	44	3	35
55	**Kannan**	Suraj	Kyung Hong	53	59	36
62	**Lor**	Khoua	Michael Tseng	57	32	19
66	**Meek**	Hayley	Joseph Steffen	59	97	31
2	**Naik**	Kuntesh	Cynthia Corbitt	18	48	36
74	**Nieves**	Jeremiah	Andrew Day	63	48	36
2	**Patel**	Dharti	Cynthia Corbitt	18	48	26
2	**Raghavan**	Ashwin	Cynthia Corbitt	18	35	38
87	**Saforo**	Douglas	J. Christopher States	70	41	33
2	**Sanders**	Alexia	Cynthia Corbitt	18	35	38
89	**Schatzman**	Sabrina	Teresa Fan, Pankaj Seth, Pawel Lorkiewicz, & Katherine Sellers	72	64	17
98	**Stewart**	Adam	Sergio Mendes	76	93	31
66	**Walden**	William	Joseph Steffen	59	3	2
118	**Yakkanti**	Ramakanth	Radhika Vaishnav, Ruolan Liu, & Robert Friedland	88	48	26

Western Kentucky University

Poster No.	Student		Faculty Mentor(s)	Page No.	House No.	Senate No.
3	**Armstrong**	Michael	Rick Grieve & Thomas Reece	18	20	8
82	**Badwaik**	Vivek	Rajalingam Dakshinamurthy	67	20	32
7	**Bradshaw**	Michael	Joel Lenoir	21	51	15
9	**Brown**	David	Hemali Rathnayake	22	15	6
11	**Brownstead**	Keaton	Catherine Carey	23	23	9
93	**Burden**	Ashley	Wendi Hulsey	74	4	4
82	**Donald**	David	Rajalingam Dakshinamurthy	67	20	32
30	**Edge**	Adam	Bruce Schulte & Jerry Daday	35	49	20
82	**Gonzalez**	Matthew	Rajalingam Dakshinamurthy	67	80	34
35	**Gott**	Ryan	Chris Byrne	38	21	32
95	**Hall**	Meghan	Michael Collyer	75	80	34
42	**van der Heiden**	Lara	Cathleen Webb	42	72	28
7	**Johnson**	William	Joel Lenoir	21	16	3
7	**Keltner**	Andrew	Joel Lenoir	21	20	32
58	**Krishna**	Nitin	Richard Schugart	55	86	25
82	**Paripelly**	Rommohan	Rajalingam Dakshinamurthy	67	20	32
79	**Parks**	Jessica	Aaron Wichman	65	21	32
82	**Pender**	Dillon	Rajalingam Dakshinamurthy	67	25	10
58	**Pennington**	Hannah	Richard Schugart	55	60	11
84	**Powers**	Michael	Aaron Celestian	69	20	32
58	**Russell**	Brandon	Richard Schugart	55	22	9
90	**Schmitt**	Wayne	Yan Cao, Wei-Ping Pan, & Hou-Yin Zhao	72	74	28
93	**Sherfey**	Tara	Wendi Hulsey	74	23	9
95	**Smith**	Melissa	Michael Collyer	75	16	3
7	**Storrs**	William	Joel Lenoir	21	65	23
82	**Thompson**	Helen	Rajalingam Dakshinamurthy	67	20	32
82	**Vangala**	Lakshmi	Rajalingam Dakshinamurthy	67	20	32
90	**Wen-Yen**	Cheng	Yan Cao, Wei-Ping Pan, & Hou-Yin Zhao	72	20	32
119	**Yates**	Chris	Brian Strow	89	51	15
90	**Zheng**	Pu	Yan Cao, Wei-Ping Pan, & Hou-Yin Zhao	72	20	32

Notes

1) Mark Althoff, Laura Samples, Courtney Wells, & Andrew Cude

Murray State University

Mentor: Chris Trzepacz

***Reverse Genetic Analysis Indicates Redundancy in the M1 Aminopeptidase Family of* Caenorhabditis elegans**

Mutations of the puromycin sensitive aminopeptidase (Psa) orthologs of flies, mice, and plants result in meiotic errors and reduced embryonic viability. Genetic lesions of the *Caenorhabditis elegans* ortholog of Psa, pam-1, similarly result in a dramatic reduction of worm fecundity. PAM-1, an M1 aminopeptidase, normally functions in the somatic gonad tissue where it activates the conserved germinal LET-60/Ras, MEK-2/Mek1, and MPK-1/Erk1 signaling axis which ultimately triggers the exit from pachytene and nucleolar breakdown during oogenesis. Worms harboring mutant pam-1(ne4176) and pam-1 (or282) alleles have a compromised signaling pathway which is manifested as an expanded population of pachytene germ cell nuclei toward the proximal end of the gonad and a delayed nucleolar breakdown, ultimately hindering embryonic viability and overall brood sizes. Based on the homology between the amino acid sequences of eight additional M1 aminopeptidase proteins encoded within the *C. elegans* genome, sequence analysis suggests that one or more of these proteins may also function in regulating *C. elegans* fertility. Using RNAi techniques, we have systematically evaluated the effects of inactivating the expression of the functional aminopeptidase paralogs individually in the wild type (N2) worm or in combination with the reduced-function pam-1(ne4176) allele and loss-of-function pam-1(or282) allele. We demonstrate compensatory paralog function affecting worm fertility with observed statistically significant decreases among both overall brood sizes and embryonic viability. Evidence of exacerbation within the germ cell phenotype of pachytene extension and delayed nucleolar breakdown compliments the fecundity data, suggesting that multiple M1 aminopeptidases have compensatory functions in the *C. elegans* gonad.

2) Alejandro Alvarez, Kuntesh Naik, Alexia Sanders, Ashwin Raghavan, & Dharti Patel

University of Louisville
Mentor: Cynthia Corbitt

Effects of Glyceollin on Estrogen Responsive Tissues

The glyceollins are anti-estrogenic compounds produced by soy plants when the plants are grown in stressful conditions, such as UV light, fungal infections, and low temperature. Previous work has shown that these compounds can inhibit estrogen-responsive tumor growth in vitro and in vivo, however, little is known about the effects of these compounds on other estrogen-responsive tissues in vivo. For this study we hypothesized that glyceollin had anti-estrogenic effects on gene expression on various estrogen-responsive tissues. Twelve adult ovariectomized CFW mice (Charles River) were divided into 4 groups of three mice: 1) Control, 2) 17β-estradiol (E2) only, 3) Glyceollin only, and 4) Glyceollin + E2. Anxiety-like behavior was measured after 11 days of treatment. On day 12, estrogen-responsive tissues including the brain, uterus, liver, mammary gland, kidney, and adipose were harvested to be analyzed via real-time quantitative PCR to look at the effects of gene and protein expression. After these tissues were harvested, RNA was extracted and nanodrop analysis was conducted to determine the concentration and purity of RNA in the samples. cDNA was then created to conduct real-time qPCR analysis on various proteins/receptors in the harvested tissue. We expected to see primarily anti-estrogenic effects of glyceollin on gene expression; however, our results suggest that, besides opposing effects of estradiol, glyceollin also acts on pathways independently of estradiol, and its effects can be opposed by E2.

3) Michael B. Armstrong

Western Kentucky University
Mentors: Rick Grieve & Thomas Reece

Regressions on Personalities and Political Preference on Collegiate Greek Letter Social Organizations

Empirical research examining collegiate Greek letter social organizations (fraternities and sororities) has been minimal. Whenever research does arise, it usually focuses on negative stigmas with these organizations (alcohol abuse, hazing). This study sought to examine more positive aspects of Greek organizations. This study hypothesized that Greeks differ from non-Greeks in the Big Five personality traits such that Greek members are less open to experience, less conscientious, more extraverted, and less neurotic than non-Greek members. Greek and non-Greek members will be similar in agreeableness. It is also hypothesized that Greek members are more politically conservative than non-Greek members. In a 2 (affiliation: Greek vs. non-Greek) by 6 (traits: openness, conscientiousness, extraversion, agreeableness, neuroticism, conservatism) within-subjects design, 572 college students (395 female) participated in a 24-item online survey consisting of the Mini-International Personality Item Pool and a brief measure of conservatism. Preliminary analyses via logistic binary regression provided partial support for the hypotheses. Greeks were more likely to be extraverted than non-Greeks ($p < .001$), less likely to be neurotic than non-Greeks ($p < .01$), and more likely to be conservative than non-Greeks ($p < .01$). Implications of these findings will be displayed.

4) Adam Arnett, Holli Fuller, David Hack, Aaron Kinney, David McCann, Lacy Opp, Alesha White, & Nathan Woodruff

Madisonville Community College
Mentor: Pamela S. Smith & Mary Janssen

Escherichia coli *is a Higher Quality Food Source than* Bacillus megaterium *for* Caenorhabditis elegans *nematodes*

The nematode *Caenorhabditis elegans* (*C.elegans*) is capable of choosing a high quality food that best supports its growth. Nematodes were placed between two food sources, *Bacillus megaterium* (*B.megaterium*) and *Escherichia coli* (*E.coli*), on nematode growth agar. The number of nematodes in each food source was counted for 25 minutes at one-minute intervals. Greater numbers of *C. elegans* were found in *E.coli* than in *B.megaterium*. This suggests that *E.coli* is a higher quality food source than *B.megaterium*.

5) Sarah Barney

University of Kentucky
Mentors: Jason Schmidt, James Harwood, & Mark Williams

The Effects of Management Practices on Functional Diversity in Organic Cucurbit Production Systems

Low natural enemy diversity and abundance in agroecosystems often result in detrimental pest outbreaks. Conventional agriculture often relies on application of synthetic insecticides to manage pests, while organic systems typically combine exclusion tactics and naturally-derived insecticides. Our study was designed to quantify the effects of exclusion by row covers paired with organic approved insecticides on arthropod community structure in cucurbit production systems. Effects were measured by characterizing the functional diversity of natural enemies and the abundance of the key pest species. We hypothesized that the implementation of row covers with insecticides would reduce pest abundance but would also reduce natural enemy functional diversity. Replicated fields of muskmelon and butternut squash were sampled throughout a growing season to explore these questions. The fields were divided into twelve plots and each was randomly assigned to one of three treatments: no management, row covers removed at anthesis and treated with organic approved insecticides, and row covers removed and treated with insecticides then replaced upon pollination. Although natural enemy groups varied in their response to treatments, functional diversity significantly increased throughout the season in all treatments with the highest levels in plots with no management. Conversely, pest pressure was highest in no management treatments, and each of the pest species, *Acalymma vittitum*, *Diabrotica undecimpunctata*, and *Anasa tristis*, responded differentially to treatments. These results underscore the challenge of managing pest complexes. Further analysis will help determine the role of natural enemies for pest management in a continued search for sustainable solutions in cucurbit systems.

6) Nicole Bashall & Kevin Schoettle

Northern Kentucky University
Mentor: Kereen Monteyne

Study 1 (Bashall): ***Assessment of Student Perceptions about Science in a General Chemistry Lab***

The laboratory can be an effective environment to teach students about the way in which science is done. The purpose of this study was to assess the attitudes students have towards sciences. The assessment tool used was the student attitude inventory (SAI), that uses six different scales to measure student perception of the value of and means by which scientific research provides explanation. The SAI was administered to general chemistry students during the fall of 2011, and spring of 2012 semesters. The result of this research will inform selection of meaningful assessments to evaluate inquiry based lab activities. Analysis of student response on SAI will be presented.

Study 2 (Schoettle): ***Development and Assessment of Cognitive Skills in Chemistry***

Students in chemistry courses, or any other science courses for that matter, require a variety of cognitive skills to solve both algorithmic and conceptually-oriented problems. Throughout the course, students learn various science process skills (e.g., identifying variables; designing investigations; and graphing and interpreting data) and are tested on their mastery of those skills. One of the main problems in science education today is finding an effective way to assess students' abilities to use these skills. The purpose of this research project was to assess college students' abilities to utilize science process skills through the use of a previously published instrument, The Test of Integrated Process Skills (TIPS II; Burns, Okey, and Wise, 1985), which was developed for use on high-school students. The results of this analysis will be used to develop an instrument to measure science process skills in college-level students.

7) Michael Bradshaw, William Storrs, William Johnson, & Andrew Keltner

Western Kentucky University
Mentor: Joel Lenoir

Developing a Four-Rotored Radio Control Helicopter for Photography and Photogrammetry Applications

Recently, unmanned aerial vehicles have become increasingly utilized for military and security applications. However, they are also easily applied and useful in peaceful situations, offering a simpler, far less expensive alternative to manned aircraft in many instances where capabilities of flight are required. Some such civilian applications are in the field of aerial photography and surveying, using remotely controlled aircraft as sky borne platforms for the deployment of camera equipment. Using flight software and vehicle plans freely available from the AeroQuad open-source project, this venture aimed to design and implement a four-rotored helicopter (quadcopter) with which to carry and remotely operate photography equipment payloads to be used on Western Kentucky University projects and even in potential commercial applications and contracts, controlled by a microprocessor specifically intended and programmed to govern the stable flight of such a craft. The original AeroQuad designs were improved upon, beginning with purchased hardware and progressing to modified components created in the lab once possible enhancements had been determined though flight testing. Methods were also investigated to quickly and easily produce helicopter frames and parts using rapid prototyping systems and automated milling equipment. The primary application was to take aerial photographs from multiple angles for the creation of point clouds used in 3D virtual models of ground features. Although the aerial photographs are still in the early stages of development, satisfactory results were obtained using this technology.

8) Chrystal Brantley

Madisonville Community College
Mentors: Aseem Talukdar & G. Michael Shifflett

Using Stationary Waves in a Closed Pipe to Determine Temperature

A standing wave is a wave that remains in a constant position. Sound can be produced from the vibration of standing waves in a column of air within a tube or a pipe, for example, an organ pipe. Standing waves can occur at more than one frequency, and the frequencies at which standing waves are produced are called the resonant frequencies. In this experiment tuning forks of known frequencies were used and the length of the air column was varied to produce resonance, and therefore determine the speed of sound. Since the speed of sound is known as a function of temperature, the temperature of the room could be determined. The procedure was repeated for tuning forks at several different frequencies. On each occasion the experimental result was compared to the room temperature measured with a thermometer.

9) David Brown

Western Kentucky University
Mentor: Hemali Rathnayake

Creation of Poly(3-hexylthiophene)-Functionalized Silsesquioxane Nanorods for Organic-Based Solar Cells

Polymeric and oligomeric À-conjugated systems have garnered significant interest due to their distinctive electronic properties. These have unique moieties of a silsesquioxane nature. These can be used to produce an electric charge through external stimuli by utilizing donor-acceptor hybrid nanostructures. Significant progress has been made in synthesizing nanoparticles, which utilize these properties. The silsesquioxane nanostructures described herein have had their geometry optimized into the form of nanorods. These show promise as donors in the charge-producing layer of organic solar cells. The derivatives of poly(3-hexylthiophene) nanorods were synthesized and characterized using TEM and IR spectroscopy. Future studies will focus on their performance in electricity production by analyzing power conversion efficiency.

10) Ian Brown, Lance Freeman, Anna Laurent, & Emily Weber

Madisonville Community College
Mentor: Kirk Greenfield

Largemouth Bass (*Micropterus salmoides*) Pigmentation

Largemouth bass (*Micropterus salmoides*) caught in various environments have differences in the coloring of their scales. In this study, largemouth bass were captured and water depth and temperature, air temperature, type of structures the fish were near, amount of sunlight, and scale coloring were measured. Factors that were related to darker scale coloring were shallower and warmer water; factors associated with lighter scale coloring were movement from deep to shallow water and low light conditions.

11) Keaton Brownstead

Western Kentucky University
Mentor: Catherine Carey

Are We Fed Economic Uncertainty?

The Federal Reserve (Fed) uses monetary policy in an effort to produce stable prices, employment, and economic growth. To do so, we believe the Fed needs to foster certainty about its policy actions. Using the Daily News-based Economic Policy Uncertainty Index (DNEPUI) from www.policyuncertainty.com, one can see many occasions of surges in economic uncertainty. While the Fed certainly isn't the only source of uncertainty in the economy, their leading role in setting policy that affects the world's largest economy merits investigation. Recently there have been two main methods of conducting monetary policy: 1) the use of "rules," or systematic methods which determine their course of action (e.g. the Taylor Rule), and 2) discretionary action, which means acting in the best interest of the present situation (e.g. the latest rounds of "quantitative easing"). Since 1985 both have been implemented at various times. It seems recent surges in economic uncertainty are partially related to the Fed's discretionary policy actions. By going through the various rules and discretionary policy times to see what policies were implemented and why, correlation between policy and uncertainty may be detected. Changes in variation in the uncertainty index before and after the most recent recession illustrate how much more uncertainty fluctuated during recent times. If uncertainty in policy hampers growth, then there is something fundamentally flawed with policy. Discerning if the Fed has failed at creating economic growth by increasing uncertainty instead will broaden the macroeconomic perspective of analyzing monetary policy, as well as, inform citizens and businesses how they can use reports of Fed policy in their labor and investment decisions. That is why it was useful to determine which monetary policies of the Fed increase the overall level of uncertainty in the economy.

12) Adrienne Bushau

University of Louisville
Mentors: Jim Wittliff & Sarah A. Andres

Gene Expression in Breast Carcinomas from Patients with Ethnical Differences

African American women often exhibit more aggressive breast cancer and have a higher mortality rate than Caucasian women. Socioeconomic differences do not explain all differences observed in clinical behavior of breast carcinomas. Our goal was to determine dissimilarities in gene expression of breast carcinoma biopsies of white and black patients and to evaluate if they are related to cancer behavior. Using an IRB-approved biorepository and database, gene expression levels were compared in biopsies from white and black patients utilizing microarray analyses of LCM-procured carcinoma cells. Frozen tissue sections from de-identified patients with primary breast carcinoma were utilized for qPCR analyses. Total RNA was extracted with the RNeasyÒ Mini Kit (Qiagen), evaluated with the Bioanalyzer (Agilent) and reverse transcribed using iScript (Biorad). QPCR was performed using Power SybrÒ Green (Applied Biosystems), and relative expression was calculated using Universal Human Reference RNA (Stratagene) as the calibrator and ACTB for normalization. Examination of candidate gene expression levels from microarray revealed that CARD11, TRAPPC2L, CRYBB2P1 and PDHA1 exhibited significant differences in carcinomas of African American patients compared to Caucasian patients. Of these genes, only PDHA1 expression was correlated with overall survival (P=0.05) when the entire population of 245 breast carcinoma patients was stratified by median expression level without regard to race. Only PDHA1 expression assessed by microarray was correlated with overall survival of white patients (P=0.04) when stratified by race and gene expression level. Using a comparison of expression levels of PDHA1, CRYBB2 and TRAPPC2L from qPCR and microarray, CRYBB2 was correlated (P=0.01), while PDHA1 was not. Although dissimilarities in gene expression levels were observed in black and white patients, preliminary evaluation of a gene subset to personalize prognosis assessment requires additional studies. Supported in part by the grant NCI Summer Research Program, PHS Grant 1 R25 CA 134283-1 to AMB.

13) Sean Butts & Joshua Newkirk

Northern Kentucky University
Mentor: Wei Hao

Study 1 (Butts): ***Designing "Green" Mobile Apps with Cloud Computing***

As smart phones are becoming more prevalent among cell phone users, there is a trend towards an all encompassing platform. Smart phones are required to be able to process and execute the same or similar applications to those of a laptop or desktop. These demands cause more stress on the processing power of the phone, which can lead to a decrease in performance and a strain on the battery. Amazon's Elastic Computing Cloud (EC2) makes it is possible to launch instances of the cloud and do some of the processing in these instances. Using Amazon's EC2 Mobile SDK it is possible to launch instances from the mobile phones and have the off site cloud instance perform the operations required. With the technologies Amazon provides it was possible to create "green" mobile applications because of the power saved on the phone from executing processes off site.

Study 2 (Newkirk): ***Cloud-based P2P Web Caching for Mobile Devices***

More and more web traffic is generated from mobile devices. User-perceived response time is an important performance metric for mobile user experience. Web caching is a widely used approach to reducing the response time. However, mobile devices often have limited storage space. The traditional web caching approaches cannot achieve very high cache hit rate. In this research, we used cloud computing and Peer-to-Peer (P2P) techniques to design a cloud-based P2P web caching approach for mobile devices. Our approach was not replacement of the existing web caching approaches. It complemented the existing approaches to increase cache hit rate to further reduce the response time for mobile users. We performed experimental studies to validate our approach.

14) Victor Cabrera, Jr.

Jefferson Community & Technical College
Mentor: John Ward

Factors Influencing the Choice of a Smart Phone

The use of smart phones has become almost ubiquitous in current society. In the present study the factors influencing the choice of a smart phone were investigated. Factors included the percentage of respondents who feel compelled to have the newest and best smart phone, the percentage that need a screen or case protector for the phone, and whether income or payment of the phone by a parent, spouse, or employer was a factor in making the decision. Demographic variables included age, gender, and ethnic origin. Results of a survey of Louisville area adults were analyzed using chi-square tests to determine whether the variables were related at the 95% confidence level.

15) Nikki Cagle

Morehead State University
Mentor: Kristina DuRocher

Evolution of the "Hoochie Coochie" Show from 1893 to the Modern Sex Industry

The Hootchie Cootchie dance debuted in the United States at the Chicago World's Fair in 1893. Performed in the exhibit A Street in Cairo, Little Egypt gyrated her way into the hearts and pocketbooks of the white male audience. What started as a seductive belly-dance showcasing the best of what Egypt had to offer, later transformed into live strip and sex shows held regularly at rural carnivals and fairs through the 1970s. The hootchie cootchie girls were idolized by young and old men alike with many spending a half-day's wages to see a short thirty-minute performance. Hootchie Cootchie shows often became the highlight of male youth and their transition into the world of adult sexuality. As the occurrence of carnival strip shows declined, the modern sex industry exploded with video pornography, gentlemen's clubs, and peep show booths. Although both the occurrence carnival strippers and the modern sex industry have been moderately documented by research such as Robert Allen's Horrible Prettiness and Wendy Chapkis's Live Sex Acts, there is little analysis of how carnival sex shows helped influence, or inspire the modern sex industry. Additionally it is important to draw parallels between the similar roles that carnival sex shows held in former society and modern sex work hold within modern society. Further exploration in this field allows for a long view of our culture's fascination with the sex industry. In addition, this research provides an understanding of how our culture propagates masculine, feminine, and sexual norms.

16) Vincent Campbell, Wayne Lancaster, & Damian Oden

Northern Kentucky University
Mentors: Wayne Bresser & Chari Ramkumar

Study 1 (Campbell): ***Creation of Carbon-Nanotubes via Thermal CVD Process***

We successfully produced carbon nanotubes (CNTs) using a quartz chamber and thermal Chemical Vapor Deposition (CVD) method. The main goal of this study was to grow CNTs in a uniformly aligned array on a silicon wafer coated with a thin layer of a metal catalyst by controlling the flow rates of acetylene (source for carbon molecules), hydrogen, and argon gasses, temperatures and pressures. The grown CNTs were investigated by a scanning electron microscope (SEM). The future goal of the project is to utilize these CNTs to enhance the strength of ferrite toroids used as potential pressure sensors. The goal of this summer's research was to produce carbon nano-tubes (CNTs) using a thermal Chemical Vapor Deposition (CVD) method. Our lab has purchased a quartz chamber for CVD and successfully used it to produce CNTs. The ultimate objective of this project is to establish a method of producing carbon nano-tubes for future use to enhance the strength of ferrite toroids used as pressure sensors. The process entailed sputter coating a thin layer of metal catalyst onto a silicone wafer. Acetylene (as the source for carbon molecules), hydrogen, and argon gasses were delivered at varying flow rates, temperatures and pressures to grow CNTs into a uniformly-aligned array. The various CNTs were harvested and examined utilizing NKU's scanning electron microscope (SEM).

Study 2 (Lancaster & Oden): ***Compositionally Tuning Ferrite Compounds for Magneto-Elastic Pressure Applications***

Our goal was to identify specific characteristics and inductance values in commercially manufactured toroids and subsequently reproduce them, altering those characteristics for specific applications. Based on this investigation, we tuned the properties of the [MXFe3-XO4] (where M=Mn, Ni, and/or Zn) ferrites by changing "X" and the ratio of different metals (M) for magneto-elastic pressure sensors. The value of x is changed by thermal decomposition of iron and metal oxides. The properties of the synthesized ferrites were studied by x-ray and SEM and pressed into a toroidal shape. It is then sintered in a furnace and its magnetostrictive properties investigated.

17) Jaime Chapman

Morehead State University
Mentor: Jody Fernandez

The Educational Social Networking Website; Analyzing Menifee County Middle School's Use of Edmodo

Edmodo is a social networking website used for educational purposes. Edmodo is a free website that is available to the public, and allows teachers to interact with their students on different levels. Students and teachers can post podcasts, articles, links, pictures, graphs, assignments, videos, and documents. Edmodo allows the teacher and the students to have beneficial organization with a calendar of due dates reminders, and ability to turn in an assignment via Edmodo. This interactive website was one of the teaching strategies implemented in Keep the Momentum: Transitional Struggling Adolescent Readers from Elementary Schools in Menifee County Middle School. Teachers from Menifee County Middle School used Edmodo in their classrooms this year to improve reading comprehension and assessment along with targeting the needs of students. The goal of this research was to learn how teachers can improve students' reading ability, improvement in the classroom, and learning needs of students by using Edmodo.

18) Michael S. Church, Jimmy L. Easton, Aaron Hall, & Brandon J. Lee

Owensboro Community & Technical College
Mentors: Kathy H. Hoffman & Timothy T. Dick

A College Vampus Survey for Community-acquired MRSA Before and After Sanitation

Staphylococcus aureus (*S. aureus*) is responsible for a number of infectious diseases at the tissue and systemic level. Person-to-person transmission has made *S. aureus* a leading cause of nosocomial infections in the United States. In recent years, hospital-acquired methicillin-resistant *S. aureus* (MRSA)has been increasingly found in the community. This study examined fomites of the facilities on a community college campus. Samples were collected from fomite surfaces with sterile cotton-tipped applicators and subsequently inoculated onto Mannitol salt agar (MSA) plates. All sites positive for *Staphylococcus* on MSA were re-tested on media selective for MRSA. The distribution of MRSA and the effect of a comprehensive cleaning program are summarized.

19) Clayton Coleman

University of Louisville
Mentor: Kristi King

Preliminary Analysis of an After-school, Physical Activity Intervention for Children in a Rural Community

Kentucky has the highest rate of childhood obesity in the nation. In communities where rural residents have limited (if any) access to physical activity opportunities, the prevalence of obesity is higher. If unaddressed, previous research has show that these obesity rates due to sedentary lifestyles can contribute to higher levels of heart disease, type II diabetes, and cancer. In efforts to address this problem, five primary schools in Meade County, Kentucky participated in a pilot intervention, Coordinated Approach To Children's Health (CATCH) Kids Club, with the goal of improving children's health knowledge, skills, and behaviors. Children (n = 68) engaged in physically active games and learned about healthy snacks twice a week after school for 90 minutes per session with their peers and a CATCH Coach. Children's physical activity (amount of time spent being physically active), screen time (amount of time spent at a computer or television screen), physical activity self-efficacy (perception of one's ability to be physically active) were measured via surveys and aerobic capacity was measured via Progressive Aerobic Cardiorespiratory Endurance Run (PACER) test at baseline and post-intervention. Children increased their aerobic capacity levels from an average of 12.9 laps to 17.3, $t(40) = -3.079$, $p < .01$; increased their daily physical activity levels from 0-29 minutes to 60-89 minutes $t(42) = -6.016$, $p < .01$. Results showed that the program was effective in creating lifestyle changes in children. Meade County has begun full implementation after-school and weekend programs for children and on-going research is underway.

20) Nicholas Cook

Kentucky State University
Mentors: Michael Bomford, Jon Cambron, & Anthony Silvernail

Analyzing the Viability of Sweet Sorghum Bagasse as a Biofuel Feedstock

Kentucky is the largest producer of sweet sorghum (*Sorghum bicolor*) in the United States. It is grown for the sugar-rich sap, which can be processed into syrup or ethanol, and for the grain, which can be used for human or animal food. Bagasse, the fibrous material that remains after extraction of the sap, may have potential as a fuel source for gasification or combustion. Before the bagasse can be used in gasification or combustion systems it must be dried to less than 30% moisture by mass. Pelletization of this dried material can make it easier to handle, and improve its characteristics as a fuel source. We compared greenhouse and field drying methods for bagasse preparation prior to pelletization. Oven dried subsamples served as a control to calculate final moisture content. Initial moisture content of bagasse ranged from 24% to 59% of fresh weight. Bagasse was air dried in a greenhouse and outdoors at densities of 2 to 8 kg m^{-2}. A week of air drying reduced bagasse moisture content to an appropriate level for pelletization in either environment, and at all densities tested. The combustion potential of the dried bagasse was assessed using a calorimeter before and after pelletization. Our results can be applied by sweet sorghum growers needing low input pre-processing methods for waste bagasse destined for energy production through combustion or gasification.

21) Juan Correa

Northern Kentucky University
Mentor: Sharmanthie Fernando

Quasi-normal Frequencies of Black Holes

The purpose of this poster is to present the quasinormal mode frequencies (QNM) of the Bardeen black hole due to scalar perturbations. We have done a thorough analysis of the QNM frequencies by varying the charge q mass M and the spherical harmonic index l Furthermore, massive scalar field modes were also studied by varying the mass of the field. Comparisons were done with the QNM frequencies of the Reissner-Nordstrom (charged) black hole. This work was published in Physical Review D (2012).

22) James Crouch

University of Kentucky
Mentors: Melody Carswell, Ryan Hargrove, & Bob Sandmeyer

Form vs Function: The Impact of Aesthetic Design on Bus Shelter Usability

A majority of United States citizens own personal vehicles, yet others rely upon public transit in order to make their daily commutes. Riders in Lexington, Kentucky often wait for sporadic buses under no or inadequate shelter. LexTran, the local system provider, in collaboration with Art in Motion, a non-profit organization, have coordinated efforts in an attempt to equip the city with more sufficient "art shelters." We hypothesize that, while people driving past these shelters may consider them aesthetically engaging, several fail to deliver amenities such as support, comfort, and visibility to the intended group of users: the riders. The usability research distinguishes these features as vital for the creation of satisfying, ergonomically pleasing urban works. While formal elements of design inspire interest and admiration, they cannot be introduced at the sacrifice of more directly functional properties; a compromise must be reached. We aim to locate that perfect balance by incorporating both qualitative and quantitative data in the form of surveys, interviews, and impromptu focus groups. This methodology was motivated by a thorough review of engineering psychology literature. Our study has social, economic, and political value impacting both local and distant communities. The information we uncover can be used not only to govern tough design choices, but to determine the best means of allocating funds or laying out a city. Most importantly, it benefits the users who ride the bus every day.

23) Cole Dabbs

University of Louisville
Mentor: Andrew Grubb

Psychophysiology Internship with the Sydney Cognitive and Affective Neuroscience Research and Teaching Unit

This poster focuses on my experiences with the Sydney Cognitive and Affective Neuroscience (SCAN) Research and Teaching Unit at the University of Sydney in Australia. The SCAN Unit is a psychophysiology laboratory with members researching topics including heart rate variability (HRV), event-related brain potentials, electrocardiography, electroencephalography, and perception. While working with the SCAN Unit, I completed literature reviews on specific single nucleotide polymorphisms (SNPs) within the brain and body to analyze their relationship with mood disorders and affect. In regards to experiments, I was involved in a design measuring how bimodal and unimodal stimuli of light and/or sound, with varying amounts of time lapsing between, may affect the perception of a participant. Additionally, I was involved experimentation focused on HRV and whether unmedicated patients with major depression disorder, generalized anxiety disorder, or posttraumatic stress disorder, suffer from reduced HRV independent of medication. While these experiments are ongoing, the data express support for the hypotheses. In particular, the heart rate variability experiments could potentially lead to important discoveries that further tie the psychology field to the medical field and clinical aspects. Current studies are indicative of helping change how we measure the risk for myocardial infarction and heart disease.

24) Adam David

Murray State University
Mentor: David Eaton

Economics of the NFL Draft

The National Football League is a booming business that generates over one billion dollars in revenue every year. It's no secret that the teams featured in the NFL are very competitive on the field, but few people realize how competitive they are off the field as well. Although the NFL season only runs from September to January, the teams have a full time staff that is working year around trying to improve the team's players and personnel. The most important three days for any NFL team during the offseason is the annual draft that takes place in April. At the NFL draft teams will take turns selecting the world's best nonprofessional players in an effort to improve their roster. The draft order is simple, the worst team from the previous year gets the first pick and the best team from the previous year gets the last pick. The tricky question is, what should the worst team do with the number one overall pick? They have the option of selecting potentially the best new professional player, but history has taught us that many times players will be over rated coming out of college and be labeled a "bust". The number one overall pick in the NFL draft is a very valuable but very risky asset. In this paper I am going to use a production function to decide statistically which decision is better for a team in the long run, use the first pick, or trade it?

25) Clay Davis

Murray State University
Mentor: David Eaton

Inevitable Change of USPS

The United States Postal Service delivers mail to over 308 million Americans each day, they also employs nearly 600,000 full-time employees, and operates nearly 32,000 facilities; more facilities than the number of Starbucks coffee houses on the planet. USPS is a government organization that deals with regulatory constraints from the government, yet considers itself a retail business just like McDonalds, Subway, and etc. Two rivals, UPS and FedEx, both have technology innovations that are years ahead of postal service, making them more attractive to the consumer's needs. USPS has hit all-time highs in net losses reaching $8.5 million in 2010. Mail volume has dropped along with profits and the USPS is looking for reform. This paper addresses the cost/budget structure, technological innovations, logistics, regulations, and financial crisis of USPS. Change is inevitable for USPS, whether it is a minor change like 5-day week or technology upgrades, or major changes such as logistics reformation or even privatization of the entire company.

26) Lanna Demers

Murray State University
Mentor: David Pizzo

The Resurrection of Cavalry: The Russo-Polish War

The Russo-Polish War, fought in the early 1920s, was of decisive importance to the history of Central and Eastern Europe in the twentieth century. Most accounts of the period of 1914-1922 in Europe argue that the cavalry and horses had become anachronisms and irrelevant to modern warfare. My study, on the other hand, will show the ways in which horse-mounted forces continued to be decisive in the conflicts of the post-WWI era. By comparing cavalry statisitics to those of other great calvry battles, such as WWI, I will prove in my paper that the Russo-Polish War could not have been fought without the war horse. If the sources needed are avaliable, I also hope to discover a profile of sorts of each countries horses; such as breed, age, height, etc and use this information to decide if these were factors in how strong their cavalry force was.

27) Emerson Dick & Brian Chaffin

University of Kentucky
Mentors: Luke Bradley & Robert Houtz

Utilization of a Calmodulin Lysine Methyltransferase Co-expression System for the Generation of a Combinatorial Library of Post-translationally Modified Proteins

Modified proteins are increasingly being utilized as tools for Kentucky's and the nation's growing biotechnology and biopharmaceutical industry. By successfully incorporating sequence diversity into proteins, combinatorial libraries have been a staple technology used in protein engineering, directed evolution, and synthetic biology for generating proteins with novel specificities and activities. However, these approaches mostly overlook the incorporations of post-translational modifications, which nature extensively uses for modulating protein activities in vivo. Therefore, we hypothesize that post translational modifications of libraries will alter specificity toward the initial step of incorporating post- translational modifications into combinatorial libraries. In order to do so, we present a bacterial co-expression system, utilizing a recently characterized calmodulin methyltransferase (CaM KMT), to trimethylate a combinatorial library of the calmodulin central linker region. We show that this system is robust, with the successful over-expression and post- translational modification performed in *E. coli*. Furthermore we show that trimethylation differentially affected the conformational dynamics of the protein upon the binding of calcium, and the thermal stability of the apoprotein. Collectively, these data support that when applied to an appropriately designed protein library scaffold, CaM KMT is able to produce a post-translationally modified library of protein sequences, thus providing a powerful tool for future protein library designs and constructions. Thus, could prove essential in Kentucky's emerging the biotechnology industry.

28) Ashley Dickey

Eastern Kentucky University
Mentors: Cheryl Ramey, Adam Lawson, & Richard Osbaldiston

The Relationship Between Psychopathy, Sensation Seeking, and Deception

Psychopaths are the truly bad element of our society. These individuals are the people who commit violent crimes, manifest other antisocial behavior, and who make up a large portion of the prison population. If we could understand the precursors and correlates of psychopathy, it would help with the diagnosis and treatment of this chronic mental disorder. Two personality traits believed to be correlates of psychopathy are deception and sensation seeking. This study aims to establish a relationship between these constructs and evaluate the strength of that relationship. An expected sample of 100 undergraduate students enrolled in psychology courses will complete three questionnaires assessing their level of sensation seeking (SSS-V), deception (MACH-IV), and psychopathy (TriPM). Each of the three distinct phenotypic constructs measured by the TriPM will also be correlated with total SSS-V and MACH-IV scores. It is expected that significance will be found at the $p < .01$ level using Spearman and Pearson correlations. Implications from this study could serve to further research in understanding the precursors and correlations of psychopathy and may allow us to identify this mental disorder in its early stages so that an effective treatment may be established.

29) Alexander Earhart, Elizabeth Tarter, & Derrick Jent

Murray State University
Mentor: Claire Fuller

Study 1 (Earhart & Tarter): ***Describing Tropical Termite Nest Growth and Decline Patterns Using Logistic Growth Models***

Describing tropical termite nest growth and decline patterns using logistic growth models
Termites act as ecosystem engineers, capable of recycling most dead organic material and maintaining the flow of resources in a tropical ecosystem; this characteristic may be especially important on St. John, USVI, where the arboreal nesting termite, *Nasutitermes acajutlae* is the major invertebrate degrader. Our goal is to investigate nest growth, decline, and longevity on St. John, as well as to understand how biotic and abiotic factors affect changes in nest size and survival, via mathematical models. We have collected natural history data on >200 N. acajutlae nests from five major habitat types (dry, mangrove, moist, sparse, wooded/wetlands) spanning the years 1998-2012. We developed an adaptive logistic model using nest volumes from these years capable of describing the patterns of nest growth and decline from year to year for each habitat. We observed that growth and decline, and general nest size patterns were typically unrelated between habitats. However, each habitat has its own typical pattern of growth and decline. Using this model, it is possible to estimate when nests first appeared and their likely longevity, enabling us to effectively determine the average nest lifespan for each habitat. In the future, we will incorporate both abiotic (i.e., ambient humidity and ambient temperature) variables, and intrinsic biotic (e.g., production of alates) to estimate their affects on nests in each habitat. This will allow us to predict the efficacy of termite degradation in tropical ecosystems in changing environmental conditions.

Study 2 (Jent): ***Pathogenic Fungi Affecting Cellar Spiders,*** **Pholcus phalangioides**

Cellar Spiders, *Pholcus phalangioides*, are originally from tropical regions and are an introduced species in North America. Since they require a warm environment, they are common in homes and other buildings occupied by humans. Occasionally Cellar Spiders are found dead and covered in a dense white fungus. Understanding what types of fungi are being distributed by P. phalangioides would give us a better idea of what human occupants are being exposed to as well. We first determined what fungi were associated with cellar spiders by plating on potato dextrose agar. Six species of fungus, including four putative pathogens, were sent to the USDA for identification. We then tested to determine whether the fungi were pathogenic to the spider. Live Cellar Spiders were collected and 6 individuals were exposed to each possible fungal pathogen. Only one fungus, *Engyodontium aranearum*, resulted in death and overgrowth of the spiders. In further tests exposure to *E. aranearum* resulted in a 100 percent mortality rate in 13 spiders compared to 12 unexposed controls in which none died. All of the deaths took place between 13 and 30 days after exposure. The outcome strongly suggests that Cellar Spiders are susceptible to this fungal pathogen which may be common in many homes considering the spiders almost world-wide distribution.

30) Adam C. Edge

Western Kentucky University
Mentors: Bruce Schulte & Jerry Daday

Examining Human Perception of African Elephants (*Loxodonta africana*) and Large Trees for Insights into Conservation of an African Savanna Ecosystem

The ability of African elephants (*Loxodonta africana*) to modify habitat, specifically with large trees, such as the marula (*Sclerocarya birrea*) and the knob-thorn (*Acacia nigrescens*), creates the need for carefully planned conservation strategies in the savanna ecosystem. The management of elephants and woody tree species requires considering the interests of different human groups. The goal of this study was to understand the perceptions of the particular interest groups (tourists, managers and landowners) towards elephants and large trees and to translate these thoughts into ecologically or economically focused conservation strategies. Management methods would need to consider the potential variation in perception by the different study groups. In order to develop an optimal conservation system these perceptions, along with the relevant biological factors, must be taken into account. A survey was devised to seek answers pertaining to the perception of different elephant types, tree impact, and the factors that can influence the balancing act between the two. Questionnaires were distributed throughout the Associated Private Nature Reserves (APNR) in South Africa. Tourist surveys were dispersed in coordination with 10 different lodges across the APNR to obtain a convenience sample. Manager and landowner surveys were distributed via email using a list of names provided by Dr. Michelle Henley of Save the Elephants- South Africa. Analyses explored trends between the different interest groups and their perceptions, thus, generated knowledge to construct a management plan that attempts to find equilibrium between the desires of the interest groups.

31) Ari Fitter & Meagan Lovins

Northern Kentucky University
Mentors: Joe Nolan & David Agard

Study 1 (Fitter): ***Super Bowl Squares: A Different Approach***

Super Bowl Squares is a game played across the country every year. In this game individuals purchase squares from a ten-by-ten grid at a fixed price. After all squares are purchased, digits (0-9) are randomly assigned to the rows and likewise to the columns. The row and column headings represent the "ones" digit for the respective team scores in the National Football League (NFL) championship game. At the end of each quarter, a portion of the pool is awarded to the holder of the square that matches the current score of the game. Empirical data from the NFL were used to estimate scoring patterns; these estimates were incorporated into Markov models that approximated the "fair" price for each square under the condition that the assignment of the digits is known in advance of purchase.

Study 2 (Lovins): ***Measuring Performance Peaks in Sports***

Each sport has an age range in which athletes perform at their highest levels. The main purpose of this research was to estimate and compare age ranges for peak performance among the sports baseball, basketball, and golf. A literature review revealed adequate measurements of success for each sport. These were applied to large samples of athletes and Analysis of Variance was employed to estimate peak performance age ranges. Evidence indicates that baseball and basketball are similar with peak performance occurring between the ages of 25 and 29. Golfers seemingly have a longer period of peak performance lasting as high as age 40.

32) Jonathan Fitzpatrick

Morehead State University
Mentors: Benjamin K. Malphrus & Kevin Z. Brown

The Cosmic X-Ray Background NanoSat (CXBN): Measuring the Cosmic X-Ray Background Using the CubeSat Form Factor

The CXBN mission goal is to significantly increase the Cosmic X-Ray Background measurement precision in the 30-50 keV range. The mission addresses a fundamental science question that is central to our understanding of the structure, origin, and evolution of the universe by potentially lending insight into both the high energy background radiation and evolution of primordial galaxies. X-Ray spectrum investigations necessitate using space platforms because of the attenuation by the Earth's atmosphere. The CXBN spacecraft will map the Extragalactic Diffuse X-Ray Background (DXB) with a new breed of Cadmium Zinc Telluride (CZT) detector. The DXB measurement will pose a powerful tool for understanding the early universe and provides a window to the most energetic objects in the far-away universe. The science objectives were condensed into a novel spacecraft concept characterized by a sun-pointing, spinning spacecraft (1/6 Hz) in LEO with moderate inclination. Trajectories for launch allow 4 nominal passes per day over the primary Earth station at Morehead State University (Morehead, KY). Science data and spacecraft telemetry will be downloaded at the MSU Earth station and will serve as the primary command and control facilities. Innovative systems include power distribution, command and data handling, and attitude determination and control system all developed at Morehead State University. Both the science program and the spacecraft engineering have been conducted by graduate and undergraduate students in concert with university faculty mentors. CXBN is a CubeSat mission that has been developed at low cost and on a highly constrained 12 month timeline, but with potentially significant science returns.

33) Michelle Fox

University of Louisville
Mentor: Jennie Burnet

Social Behavior and Genocide Crimes in Rwanda: An Analysis of the Social Networks of Convicted Genocide Perpetrator, **Hassan Ngeze**

This project is a part of a larger ongoing study examining rescuer behavior and the roles of Muslims in the Rwandan genocide. The project aims to document and understand the social network connections of key actors in the genocide using data drawn from the International Criminal Tribunal for Rwanda online archives and other sources. We hypothesize that the social network characteristics of Hassan Ngeze will reveal factors common to high-level genocide perpetrators and suggest social network characteristics that should be explored for rescuers. For this project, social network data was mined from published sources; entered into a database that documents connections between individuals, groups, events, organizations, and geographic locations; the data was then imported into UCINET, a software package designed for analyzing the characteristics of whole social networks. Data analysis considered node characteristics, like degree centrality, betweenness centrality; closeness tie characteristics, such as strength; and network characteristics, such as structural cohesion and clustering. The social network data and analysis will be used to develop interview questions for the new data to be gathered.

34) Morgan Geile

Murray State University
Mentor: Howard H. Whiteman

Spreading the Disease: Using Tiger Salamanders as Sentinels of Chytrid Fungus for Boreal Toad Restoration

The chytrid fungus *Batrachochytrium dendrobatidis* has been linked to mass mortalities of a variety of amphibian species world-wide. *B. dendrobatidis* affects the dermal surface of an individual and uses water to disburse motile flagellate zoospores, making amphibians extremely susceptible to infection. Unfortunately this fungal disease appears to be one of the few pathogens that continuously emerges in what would be called "pristine" ecosystems, and is therefore a critical current issue in conservation biology. Boreal Toads (*Anaxyrus boreas*), once very common throughout the Rocky Mountains, have been suffering population declines and local extinction due to chytrid, and are classified by the IUCN Red List as near threatened and specifically endangered in Colorado. It is therefore important to survey for potential restoration areas to determine chytrid-free sites for boreal toad reintroduction. The tiger salamander resists infection of *B. dendrobatidis,* but can still carry the fungus making them both a pathogenic reservoir species as well as a sentinel for the presence of chytrid. In this study, tiger salamanders were swabbed for the presence of *B.dendrobatidis* in various aquatic habitats located in the Grand Mesa-Uncompahgre-Gunnison (GMUG) National Forests in Colorado, in order to determine potential chytrid-free restoration areas for the boreal toad. The samples were analyzed for the presence of *B.dendrobatidis* zoospores, and reported to the Colorado Department of Wildlife to contribute to the chytrid distribution data of the region. This research aided boreal toad restoration and also served as a contribution to the overall understanding of the range and proliferation of this enigmatic fungus for scientists attempting to combat this global conservation issue.

35) Ryan Gott

Western Kentucky University
Mentor: Chris Byrne

Understanding the Haptic Response of Wood Finishes

In the modern age of touch-screen technology, there has been an increased interest in the friction characteristics of skin. Using a custom-built friction device, the frictional properties of skin on different wood species and wood finishes were tested. The wood samples included Eastern White Pine, North American Cherry, and Birdseye Maple. The finishes included shellac, lacquer, and polyurethane. The friction coefficients ranged from kinetic values of 0.22 to 5.42 and static values of 0.46 to 4.80. Raw wood had the lowest friction coefficients, but it is more common to apply a finish in most applications. The results showed that the satin finishes had lower friction than the gloss finishes on each type of wood. On average, a satin finish has 300% less friction than a gloss finish. The increased and very high friction from skin on gloss finish suggests an adhesion mechanism is a strong factor in the friction system. The data also suggests that moisture in a hydrated finger increases friction in both satin and gloss finishes. This research is the first to quantitatively define the tactile feel of wood surfaces.

36) Ilea Grant-Simmons

Kentucky State University
Mentor: George Antonious

Trace-Elements Concentrations in Edible Plants

Plant uptake is one of the main pathways through which metals enter the food chain. Farmers, especially limited resource farmers, are continually searching for alternatives to synthetic fertilizers to alleviate the escalating production costs associated with the increasing costs of energy and fertilizers and the problems of soil deterioration and erosion associated with intensive farming systems. Municipal sewage sludge (MSS) used for land farming typically contains heavy metals that might impact crop quality and human health. The main objective of this investigation was to determine the concentrations of seven heavy metals (Cd, Cr, Ni, Pb, Zn, Cu, and Mo) in soil and their accumulation in edible plants (potato tubers, sweet potato, broccoli, and pepper fruits) at harvest. Soil samples were collected and analyzed for total and extractable metals using two extraction procedures, concentrated nitric acid (to extract total metals from soil) as well as CaCl2 solution (to extract soluble metals available to plants), respectively. Elemental analyses were performed using inductively coupled plasma mass spectrometry (ICP-MS). Concentrations of Zn, Cu, and Mo were significantly greater in tubers and peppers grown in sludge compared to their respective controls. Monitoring heavy metals in soil and edible plants should be regarded as a requirement for the safe use of soil amendments in agricultural fields.

37) C. Evan Hannan

Murray State University
Mentor: Jana Hackathorn

Sexual Selection Strategies and Sociosexual Orientation at Odds

Sociosexual orientation (SO), one's willingness to engage in sexual behaviors outside of committed relationships, has been linked to pursuing physically attractive partners. This study examined the relationship between SO and attractiveness, resources, and masculinity of targets. Findings suggest that females with unrestricted SO tend to undervalue attractiveness, resources, and masculinity. Perhaps it is because these females are not searching for commitment but are only interested in the act of intercourse, also resulting in a decrease value of perceived physical attractiveness and masculinity of those they seek out for intimacy. Perhaps unrestricted SO heterosexual females have no interest in producing offspring with those they seek and pursue thus resulting in the devaluing of the mentioned traits that normally play a role in sexual selection strategies.

38) Richard Stratton Hatfield

University of Kentucky
Mentor: John Cox

Population Dynamics of the African Lion (*Panthera leo L.*) within the Maasai Mara Region of Southern Kenya

The newly formed Naboisho Wildlife Conservancy in southern Kenya is a 20,000 hectare ranch that is collectively owned by 500 Maasai tribesman. As a result of this recent, locally-inspired conservancy, numerous tourism investors and non-profit organizations have been invited to develop businesses and research opportunities in order to facilitate the conservancy's growth and stability. Monitoring and protecting big cat populations that thrive in this landscape is a cornerstone of developing conservancies like Naboisho and is the backbone of the tourism industry in Southern Kenya. In 2010, a research project was established by the Mara Naboisho Lion Project and African Impact to census, identify, and continuously monitor lions within this conservancy. As of September 2012, 59 lions from six different prides have been identified and profiled within Naboisho. This minimum population estimate was achieved through visual observation, ground tracking, and, most recently, with 12 camera traps strategically located to identify remote and elusive lion prides. Individuals were identified by unique whisker spot patterns which, once mapped, were uploaded into a database to ensure no lions were counted twice. GPS coordinates were recorded whenever a sighting was made in order to determine home range sizes for both prides and individuals. Initial results after two years of study have indicated that lion density in the conservancy may constitute one of the highest in the world, placing Naboisho in the center of numerous global conservation initiatives.

39) Katelyn Hayes

Northern Kentucky University
Mentor: Shauna Reilly

Investigating the Most Influential Barriers to Youth Participation

Despite its significance, the rate at which youth vote is consistently significantly lower than the rest of the voting population. While the tendency of youth to abstain from voting has been a significant area of research, the matter remains unsettled. This research attempts to establish the most significant barrier to youth participation in electoral politics.

40) Lindsey Hays

Eastern Kentucky University
Mentor: Andrew Deane

Preliminary Results from Analyses of the Comparative and Functional Anatomy of the Forelimb Musculature of Humboldt's Woolly Monkey (*Lagothrix lagotricha*)

Humboldt's woolly monkey (*Lagothrix lagotricha*) is a "tail-assisted" brachiator similar to other members of the subfamily Atelinae, however that taxon more frequently engages in non-suspensory forms of locomotion (i.e. quadrupedal climbing). As a group, the atelines share a suite of derived forelimb skeletal characters that are specialized for brachiation and convergent with "true" brachiators (*Hylobates, Symphalangus*). The forelimb skeletal anatomy of lagothrix is similar to more suspensory atelines (*Ateles, Brachyteles*) and "true" brachiators, but is typically less derived and many skeletal characters are intermediate between those forms and non-suspensory anthropoids. Although the functional morphology of the ateline skeletal forelimb is well documented, relatively little is known about the comparative and functional morphology of the forelimb musculature. Specifically, can locomotor differences between Lagothrix and more suspensory atelines and hylobatids be explained, in part, as a result of differences in muscle-tendon architecture? This study provides quantitative anatomical data on the muscle-tendon architecture (muscle mass, physiological cross-sectional area, fascicle length) of the forelimbs of *Lagothrix*, *Symphalangus* and *Macaca* (n=9). Despite less frequent brachiation, the distribution of Lagothrix forelimb muscle mass and force is identical to similar results obtained for *Symphalangus* and with published data available for *Hylobates*. Specifically, *Lagothrix* resembles *hylobatids* in the concentration of muscle mass and force in the flexor compartments of the arm and forearm. This suggests that despite a reduced reliance on suspensory postures and brachiation, *Lagothrix* forelimb muscle-tendon architecture may be, at least in part, a response to the minimum functional demands of brachiation.

41) Alexandra Hedges & Christopher Fisher

Northern Kentucky University
Mentor: Kajsa Larson

Service Learning in the Spanish Classroom: Two Approaches

This study examined two ways in which service learning and student philanthropy have been incorporated into the Spanish classroom at the advanced level. The purpose of this research was to assess the impact that two service activities had on students' professional development and their oral and written skills in Spanish. First, students enrolled in Spanish Composition & Conversation completed volunteer work with Santa Maria Community Services of Cincinnati, wrote reflection papers in the target language about their experiences, and gave a presentation to the class in Spanish. As a second approach, students in an advanced topics course, Hispanic Women Writers, received $2,000 in grant money from NKU's Mayerson Student Philanthropy Project and decided how best to award local nonprofits that serve women, including Hispanics. The results of an (IRB approved) anonymous student survey from both classes confirmed our hypothesis that service learning and philanthropy greatly enhanced students' professional growth by making them more aware of the needs of Hispanics living in the United States and the Northern Kentucky area. It also refined their problem-solving skills, and empowered them to seek both future career and volunteer opportunities that require Spanish. The follow-up with oral and written class reports improved their language skills. To conclude, there are numerous benefits of incorporating volunteerism in the classroom, showing students the practical applications of their language studies in a real world setting.

42) Lara van der Heiden

Western Kentucky University
Mentor: Cathleen J. Webb

Mercury Analysis in Rafinesque Big Eared Bat Populations

Mercury (Hg) from atmospheric deposition from coal-burning power plants and other anthropogenic sources was analyzed in Rafinesque Big Eared Bats from Mammoth Cave National Park. The mercury from water progressively moves up the food chain through insects, and eventually into bats. In 2011, 58 bats were collected and hair samples were taken for an analysis. The AMA254 Mercury Analyzer was used to determine the mercury concentration from the bat hair in parts per million. A considerable amount of mercury was discovered in the bats analyzed. The mercury concentration of juvenile Rafinesque bats averaged between 0.5-1.0 ppm. Mercury levels in adult Rafinesque bats averaged between 1.0-2.0 ppm, with female bats overall containing the highest amount of mercury. Notably, the mass and forearm length of Rafinesque bats do not appear to affect the amount of mercury the bats contain.

43) Talia Henkle

University of Kentucky
Mentors: David W. Horohov & Charles J. Issel

Comparison of Immune Gene Expression Between Virulent EIAV and an Attenuated Vaccine Strain

The equine infectious anemia virus (EIAV) is closely related to HIV and has been used as a model to identify protective mechanisms against these viruses. In horses, EIA infection progresses for about a year before the horse manages to control virus replication. Exactly how the immune system operates to gain this control is still under investigation. A modified live vaccine provides effective protection against a challenge with a virulent strain of EIAV without causing disease, though the mechanism of protection remains undefined. We believe that cellular immune responses play a key role in controlling EIAV in the horse. We hypothesize that cytotoxic T lymphocytes (CTL) are upregulated in vaccinated ponies and that there would be a difference in this CTL response between the vaccine and virulent virus- infected ponies. To test this hypothesis, ponies were inoculated with either the vaccine or virulent strain of the virus. Whole blood samples were collected into PAXgene" tubes weekly during the acute infection stage (first 6 weeks) and at monthly intervals thereafter corresponding to the chronic infection phase. Total RNA was isolated from the PAXgene" tubes and gene expression for both cytokine and CTL markers were determined using qRT-PCR. Gene expression patterns occurring in response to the in vivo infections with the parental virus and the attenuated vaccine were then compared. The results of this study will help to further elucidate the protective mechanisms controlling EIAV replication in horses and could be of interest to those researchers working on HIV.

44) Janna Lynn Imel

University of Louisville
Mentors: Suzanne Meeks & Shruti Shah

Comparing Resiliency in Early and Late-Life Bereavement

Grieving is a highly personalized experience that differs from person to person. Typically, reactions to grief do not have a certain ending point or course. Thus, the time spent and method of grieving varies. Bereavement is the state of dealing with a significant loss. (M.S. Stroebe, Hansson, Schut, & Stroebe, 2008). Although evidence suggests that there are significant differences in the bereavement of older and younger adults, few studies have been done focusing solely on the differences. The purpose of this project was to examine the differences in negative emotions, affective complexity, and repressive coping, between bereaved younger and older adults.

45) Alexandra Ivers

Northern Kentucky University
Mentors: Judy Voelker & Grant Edwards

Prehistoric Copper Production in Central Thailand: Environmental Waste and Health Concerns

The archaeological sites of Non Pa Wai and Nil Kham Haeng, located in the Khao Wong Prachan valley in central Thailand were major copper production sites in prehistory. As a result of intensive use, tons of slag from the smelting of copper ores accumulated. Monsoonal weather in Thailand may have led to the leaching of copper from the slag into the soil and rainwater. In excess amounts, copper can cause liver failure, kidney failure and gastrointestinal distress. This pilot study utilized Atomic Absorption Spectroscopy to determine the amount of copper in the slag samples from these two sites. Using this method, the amount of copper in the slag from different stratigraphic contexts at the two sites was compared. It was found that copper was present in significant amounts but the expected trends between the two sites were not observed. To determine the toxicity of the copper in the slag, a leaching study modeled after the Environmental Protection Agency's Toxicity Characteristic Leaching Procedure or EPA Method 1311 was also conducted; preliminary results of this procedure will also be presented.

46) Dexter James

University of Louisville
Mentors: Adrienne Bratcher & Irving G. Joshua

The Role of Antioxidant Tempol on Endothelial-Mediated Vascular Responsiveness

Hypertension is a major health problem in the United States, where more than 50 million people (1 in 4 adults) have the condition. Research suggests that hypertension development creates oxidative stress in the body forming harmful reactive oxygen species attacking the microvasculature, particularly the endothelium. Endothelium produces nitric oxide, essential in smooth muscle relaxation. The use of antioxidants such as Tempol neutralize these free radicals therefore restoring relaxation. We hypothesize that there is a decrease in aortic endothelial mediated relaxation with hypertension development and these alterations are due to oxidative stress. The objective of this study was to develop a protocol that would effectively help us investigate the presence of oxidative stress in the aorta of the mouse. Vascular function was determined in thoracic aorta segments of female wild-type mice exposed to vasoactive agents. *In vitro* studies involved dose responses to acetylcholine (ACH), sodium nitroprusside (SNP) and phenylephrine (PHE). Results indicate that endothelial dependent relaxation could be decreased in the presence of Tempol. The contraction response to PHE didn't appear to be affected with or without Tempol. Aortic relaxation to SNP appears to be increased in comparison to ACH. The results could also suggest that endothelial cells of the aorta were damaged during the aortic ring preparation. Therefore, we are currently conducting more experiments to continue our investigation of the role of Tempol endothelial-mediated vascular responsiveness.

47) Austin Jameson

Murray State University
Mentor: Wafaa Fawzy

Computational Investigations on the Intramolecular and Intermolecular Interactions of the DNA Base Cytosine and Reactive Species

Reactive species, produced by oxidation processes in human bodies, is thought to play a major role in the development of many diseases by damaging the DNA/RNA molecules. Understanding how these reactive species interact with DNA/RNA, is a vital component in understanding the mechanism of reactive species damage on the molecular level. The purpose of this study was to explore how reactive species interact with nucleotide bases. Such interactions were explored using computational chemistry, where different levels of theories were employed to characterize the intermolecular and intramolecular potential energy surfaces. These calculations included geometry optimizations, vibrational frequency calculations, fixed and relaxed potential energy scans. This study was primarily focused on the fluoride ion and superoxide species interactions with cytosine. Results of this study show that the fluoride ion interacts with different sights on cytosine. One of these reactive sights includes a hydrogen bond that plays a major role in the stability of the DNA/RNA molecule. Disruption of such a hydrogen bond can cause further damage to the DNA/RNA molecule, which may give rise to mutations that lead to malfunctions in the body. These investigations could play future roles in medicine by understanding the mechanism of these destructive reactive species.

48) Brian Jarvis, Kathleen Paschall, Ira Wray, Joseph Kelly, Barrett Ranes, Clint Craig, John Michael Puckett, Kalie Vowell, & Charlton Story

Murray State University
Mentors: Iin Handayani, Bobby Hill, Andy Bailey, Gustav Helmers, David Ferguson, & Chris Rodgers

Study 1 (Jarvis, Paschall, & Wray): ***Evaluation of Potassium Response in Dark Tobacco***

Tobacco producers are generally interested in raising a high yielding, high quality crop with the fewest amounts of fertilizers. One fertilizer of major concern is potassium (potash) since its price has been highly volatile over the past decade. The objectives of this study were to (i) evaluate the response of dark tobacco to differing levels of potassium and (ii) examine the efficiency of two common application practices, broadcast and banded. Therefore, the treatments were untreated conditions, 50% below adequate conditions (145 lb/acre), recommended conditions (290 lb/acre), and a 50% increase in recommended potassium (435 lb/acre). Each application rate was tested using both broadcast application in one study and banded application in a second study. The dark tobacco variety used for this study was PD 7309. The experiment was set on June 12, 2012. The crop was harvested on October 9, 2012. Total crop yield and yield of lugs, seconds, and leaf were examined to determine overall response to the different treatments. The data and the results are presented in the poster.

Study 2 (Kelly, Ranes, & Craig): ***Methods of Sucker Control for Dark Fired Tobacco with Over-the-Top & Conveyer Hood Applications***

Tobacco, one of Kentucky's largest cash crops, is harvested solely for its leaves. Topping is done to stop the plants apical dominance and production of its flower. This is done in order to direct most nutrients into the leaves. The flower is broken off (topped) and when this happens, sucker growth occurs. Chemicals are then applied to control sucker growth. Tobacco traditionally uses a drop-line application that is time and labor intensive, to spray each plant. Research conducted at Murray State University's farm evaluated sucker control treatment alternatives without drop-line applications. Chemicals are applied over-the-top using a sprayer. Each plot received Off-Shoot-T (a fatty alcohol compound) applications one week pre-topping. Treatments 2 and 4 were treatments with three nozzles producing a mist directed at each row. Treatments 1 and 3 were treatments using the standard drip-line. Treatment 5 was a control plot with no additional chemical treatments. Treatments 1 and 2 received a mixture of Off-Shoot-T and FLUPRO (flumetralin) seven days after topping. Treatments 3 and 4 received only Off-Shoot-T seven days after topping. Treatments 1 and 2 received a mixture of Off-Shoot-T and FLUPRO fourteen days after topping. Treatments 3 and 4 received a mixture of Off-Shoot-T and MH-30 (maleic hydrazide) fourteen days after topping. Data collected includes sucker biomass and yield for all treatments, which was analyzed statistically.

Study 3 (Puckett, Vowell, & Story): ***Trials with a New Experimental Herbicide, Rimsulfuron, for Dark-Fired Tobacco***

There is a need for a post-emergence herbicide in tobacco that controls broadleaves. This research tested experimental rimsulfuron with broadleaf activity that includes post-emergence treatments. The pre-emergence herbicide treatments were applied June 11, 2012 and the post-emergence herbicide treatments were applied July 16, 2012. The herbicide treatments were: Treatment #1 was 0.027 lb carfentrazone per acre and 0.246 lb. sulfentrazone per acre both applied pre-emergence; Treatment #2 was 0.027 lb carfentrazone per acre, 0.246 lb. sulfentrazone per acre, and 0.75 lb. clomazone per acre all applied pre-emergence; Treatment #3 was 0.027 lb carfentrazone per acre, 0.246 lb. sulfentrazone per acre, and 0.0156 lb of rimsulfuron per acre all applied pre-emergence; Treatment #4 was 0.027 lb carfentrazone per acre, 0.246 lb. sulfentrazone per acre, and 0.03125 lbs of rimsulfuron per acre all applied pre-emergence; Treatment #5 was 0.027 lb carfentrazone per acre and 0.246 lb. sulfentrazone per acre both applied pre-emergence, plus a post-emergence application of 0.0156 lbs of rimsulfuron per acre with 0.25% (v/v) of non-ionic surfactant; Treatment #6 was 0.027 lb carfentrazone per acre and 0.246 lb. sulfentrazone per acre both applied pre-emergence, plus a post-emergence application of 0.03125 lbs of rimsulfuron per acre with 0.25% (v/v) of non-ionic surfactant; Treatment #7 was a control with no herbicides applied. The tobacco was set June 12-13, 2012 with the variety PD 7309LC. Data collected included two crop injury ratings, three weed control ratings, and yield. Tobacco was harvested on October 15, 2012. All data was statistically reported after stripping.

49) Joseph Johnson, Moses Henderson, Zachariah P. Sellers, & ReBecca Williams

Eastern Kentucky University
Mentor: Tanea T. Reed

Study 1 (Johnson, Henderson, Sellers, & Williams): ***Analysis of Antioxidant Enzymes in Wistar Rats with a Moderate Traumatic Brain Injury: A Dosage Dependent Approach***

Imbalances in the production of ROS and native antioxidant mechanisms have been shown to increase oxidative stress. Glutathione peroxidase (GPx) is the central enzyme used for reduction of peroxides in the brain through the catalyzed reaction with reduced glutathione. Oxidized glutathione is then reduced to allow further protection against oxidative stress via the oxidation of β-nicotinamide adenine dinucleotide phosphate (β-NADPH) by glutathione reductase (GR). GCEE was administered using a dosage dependent approach, and the significance of each dose was determined by examining the activity of GPx and GR in the brain samples. Each sample was treated with 150 mg/kg of body weight of GCEE or saline at a time interval of 30 or 60 minutes post injury. Using spectrometric analysis, brain samples treated with GCEE had an increase in the activity GPx and GR compared to those treated with saline. The increased activity of these enzymes correlates with elevated antioxidant capacity and lowers overall oxidative stress making this a potential post therapeutic strategy for moderate TBI.

Study 2 (Henderson): ***3-Nitrotyrosine as an Oxidative Stress Indicator in Wistar Rats Involving Moderate Traumatic Brain Injuries for Proteomic Analysis***

As a biomarker of nitrosative stress, elevated levels of 3-Nitrotyrosine (3-NT) signify the presence of oxidative stress and decreased levels of antioxidant enzymes. Since TBI is profoundly related to oxidative stress, 3-NT can be utilized as *in vivo* marker of oxidative nitric oxide damage following TBI. By using a moderate traumatic brain injury model with Wistar rats, it is hypothesized that formation of 3-NT as an intermediate will predict the involvement of protein nitration and oxidative stress in the brain. In this experiment, the levels of 3-NT were significantly elevated in TBI injured, saline treated rats compared to those who sustained an injury and were treated with the glutathione mimetic, GCEE, providing insight into the relationship between protein nitration and oxidative stress.

Study 3 (Williams): ***Slot Blot Analysis of ^{3}-glutamyl cysteine ethyl ester in Wistar Rats with a Moderate Traumatic Brain Injury: A Dosage Dependent Approach***

Traumatic Brain Injury (TBI) has been known to demonstrate an increase in the level of oxidative stress in proteins, which leads to irreversible secondary injury, including extensive brain damage to the individual. Glutathione is a vital intracellular antioxidant used in the neutralization of reactive oxidative species (ROS). The γ-glutamyl cysteine ethyl ester (GCEE), a glutathione mimetic, can hypothetically generate a decrease in oxidative stress in the moderate traumatic brain injury Wistar rat model. GCEE was administered intraperitoneally to Wistar rats 30 minutes post injury using a dosage dependent approach of 150 mg/kg and 200 mg/kg. Sham animals underwent craniotomy and were used to ensure that the injury was consistent. Slot blot technique was performed on all samples to determine levels of oxidized protein carbonyls, 3-Nitrotyrosine (3-NT), and 4-Hydroxynonenal (HNE) in injury and GCEE treated animals. Membranes were analyzed using Adobe Photoshop and Scion Image software and showed evidence of injury in saline treated rats, with a decreased amount of oxidation in GCEE treated animals compared to those treated with saline. Treatment with GCEE lowers overall oxidative stress making this a potential post therapeutic strategy for moderate TBI.

50) Lanora Johnson

Morehead State University
Mentor: James Masterson

Globalization and Human Rights in China

Since China opened up to FDI and trade, its economy has demonstrated remarkable growth. Along with increased economic prowess, China has taken a larger role in international law, and has been involved in the international dialogue on human rights since the early 1980's. In 1982, the new Constitution for the Peoples' Republic of China identified numerous political, civil, economic, and social rights. In addition, since 1980 China has joined several human rights treaties by the United Nations General Assembly and all four of the Geneva humanitarian conventions. Despite this, China still falls under criticism for its poor human rights record. Our research analyzes whether the effect of China's economic integration into the global market has a positive or negative effect on China's human rights record. To do this, we conduct a within case study of China before and after 1980. Using levels of FDI, portfolio investment, and foreign trade within each studied area, economic integration is measured. Our research demonstrates that despite China's increased global economic integration and economic rights, civil, political, and social rights enjoyed by Chinese citizens have declined while respect for physical integrity rights have fluctuated.

51) McKenzie Johnson

Kentucky State University
Mentor: George Antonious

Impact of Soil Amendments on Antioxidants and Trace-Elements Content of Bell Pepper and Melon Fruits at Harvest

Composting and land application of sewage sludge are increasingly popular ways for using organic waste and decreasing the amount of municipal waste being diverted into landfills. However, the mobility of heavy metals from soil amended with sewage sludge into the food chain and their subsequent bioaccumulation in edible plants have increased the attention they received as major environmental pollutants. The objectives of this study were to: i) quantify the concentration of seven heavy metals (Cd, Cr, Mo, Cu, Zn, Pb, and Ni) in bell pepper and melon fruits grown in soil amended with sewage sludge (SS) or yard waste (YW) compost, ii) quantify the concentrations of ascorbic acid and phenols in bell pepper and melon fruits grown in soil amended with SS or YW and iii) study the impact of soil amendments on the antioxidant content of bell pepper and melon fruits. Analysis of bell pepper revealed higher concentrations of Ni and Cu in fruits grown in soil amended with SS. There was no significant difference in ascorbic acid content of bell pepper and melon fruits among soil treatments. Phenols concentrations in bell pepper and melon fruits indicated a significantly higher concentration in plants grown in soil amended with YW and SS. Overall concentrations of Ni, Cd, Pb, and Zn in melon fruits were significantly greater ($P < 0.05$) than pepper fruits. No significant differences were found in Cr, Cu, and Mo concentrations between pepper and melon fruits at harvest time.

52) Allison Johnston

Morehead State University
Mentor: Rebecca Roach

How Technology is Incorporated into the Jackson Independent School District

This study was focused on understanding what kind of organizational change the Jackson Independent school district went through during their adoption of individual classroom websites in replacement of hard copies of study plans and blackboard shells. It was completed through interviews and an online survey and determined that the kind of organizational change was long-lasting, and pervasive.

53) Marquiana Jusma

University of Kentucky
Mentor: Andrew Deane

Revisiting Incisor Allometry and Diet (Again): New 2D and 3D Approaches to an Old Question

Among anthropoids, and hominoids in particular, incisors function in the pre-processing of food prior to ingestion. Given the unique selective pressures imposed by the mechanical loading associated with individual dietary resources, it is not surprising that incisor allometry and shape are strongly correlated with anthropoid diets. Although it has been commonly accepted that incisor row width discriminates between frugivorous and folivorous anthropoids, this conclusion has recently been questioned on the basis that dietary discrimination is likely a composite function involving several variables unrelated to incisor width (i.e. procumbency, spacing, orientation) and that, in isolation, incisor width is a relatively poor discriminator among dietary groupings. The present study addresses methodological differences among prior analyses of incisor allometry and contrasts their results with those from a similar analysis quantifying the "true" length of the parabolic incisor row for a taxonomically and ecologically diverse anthropoid sample (n=120). In addition, a supplemental analysis of the relative hominoid I1 crown surface area was completed to examine the potential for individual incisors to reliably predict diet. Results indicate that the "true" length of the parabolic incisor row is a more accurate predictor of anthropoid diet relative to the summed widths of individual incisors or the maximum distance between the distal margins of the left and right I2. Likewise, relative hominoid I1 crown surface area accurately discriminates among soft and hard object frugivores, seasonal folivores and dedicated folivores. These results pose significant implications for future dietary analyses of extant and fossil anthropoids based on incisor allometry.

54) Amanda Kaiser

University of Kentucky
Mentor: Susan Barron

Adding Insult to Injury: Hypoxia Following Ethanol Exposure Produces Multiplicative Damage in Vitro

Despite knowledge of the long-term damaging effect, alcohol consumption during pregnancy continues to be a significant problem and is the leading preventable cause of mental retardation in the western world. It is not well understood why some children are more affected than others, but it is believed that a shared mechanism between alcohol withdrawal and hypoxia could have a synergistic effect. The hypothesis of this study was that prenatal alcohol exposure can reduce the ability of an organism to respond well to otherwise innocuous hypoxic challenges and therefore the combination can have far worse effects than either variable alone. The hypothesis was tested using a hippocampal slice model taken from neonatal rats as a model for the human 3rd trimester of pregnancy. Slices were exposed to either alcohol or a control solution for ten days followed by exposure to either compressed air or anaerobic gas for 15, 30, or 60 minutes. Cell damage was quantified in the CA1, CA3, and dentate gyrus of the hippocampus. The combination of ethanol withdrawal and 30 minutes of hypoxia caused multiplicative damage, while neither variable alone produced damage above control levels. These results suggest that exposure to amount of alcohol that would not cause significant damage on its own would sensitize the brain to hypoxic challenges, which could cause significant damage when in combination. This could explain the variability that is seen among the clinical population of individuals exhibiting Fetal Alcohol Spectrum Disorder. (Supported in part by NIAAA 017956 to SB)

55) Suraj Kannan

University of Louisville
Mentor: Kyung Hong

Development of a Molecular Probe for Measuring Cardiomyocyte Proliferation

Currently, one of the biggest controversies in the field of cardiac regenerative medicine revolves around the ability of cardiomyocytes to proliferate. In contrast to the long-held hypothesis that the heart is a terminally differentiated, post-mitotic organ, some studies have suggested that the heart is capable of undergoing limited regeneration following injury. Others have reported induction of cardiomyocyte proliferation following various treatments mostly *in vitro*. Conventional tools such as BrdU labeling fail to distinguish between mitotic events and other phenomena such as endoreduplication or poly-nucleation, thus making it difficult to assess cardiomyocyte proliferation. The present study presents an innovative approach to unambiguously study cardiomyocyte proliferation by use of a cell division probe to identify cells that undergo mitosis. The system utilizes a mutant form of the mitotic regulator cytoskeleton-associated protein 2 (CKAP2). CKAP2 remains cytoplasmic during interphase, but translocates to the nucleus following mitotic cell division. Usually, wildtype CKAP2 is degraded via the ubiquitin-proteosome pathway following translocation to the nucleus; however, by mutation of a destruction motif, the protein persists in the daughter nuclei following cell division. Thus, this non-degradable mutant of CKAP2 (ndCKAP2) can be used to track mitotic events ndCKAP2 should remain cytoplasmic in quiescent cells but appear nuclear in cells that have undergone mitosis. Here we show the efficacy of ndCKAP2 as an *in vitro* cell division probe. NIH 3T3 and HEK 293 cells were transfected with GFP-ndCKAP2. Following transfection, cells were arrested at the G0 phase through serum starvation. Synchronous re-entry into cell cycle was controlled by re-supplying cells with serum-containing media. Proliferation status and localization of ndCKAP2 were studied with epifluorescence and time-lapse microscopy as well as flow cytometry. We also propose an *in vivo* cardiomyocyte-specific tetracycline-regulated expression system for ndCKAP2. This system will allow for an investigation of cardiomyocyte proliferation *in vivo* under a variety of physiological and pathological conditions, and allow for assessment of various proposed clinical therapies.

56) Kelsey Koontz

Morehead State University
Mentor: Edna Schack

Assessment of Early Numeracy

The focus of this research project was the development of the skills of early numeracy (the awareness of relationships and patterns that make up the foundation of mathematics) through specific small group instruction strategies. To gather this data a class of first grade students was assessed using the Student Numeracy Assessment Progressions (SNAP) mathematical interviews. The SNAP assessment includes six categories of early numeracy: counting forwards, counting backwards, grouping, identifying numerals, sequencing, and addition and subtraction. Professional noticing was used to place each student on a six point scale to indicate their level of understanding. The strategies of attending, interpreting, and deciding are essential to professional noticing and were implemented during the diagnostic interviews. Attending refers to seeing the strategies used by students to solve the problems. Interpreting is an awareness of the child's abilities and understandings in the context of the mathematics. Deciding refers to asking appropriate questions to reach a deeper understanding of the students' knowledge and making instructional decisions. Following the SNAP assessments a group of children in need of intervention in early numeracy was identified. A set of pre-planned strategies focused on a few specific early numeracy categories was implemented with this small group. A matched group with similar pre-assessment scores did not receive any intervention. All of the students were assessed again to determine their improvement in relation to the strategies implemented. The changes in scores following the treatment period were analyzed to indicate the effectiveness of the targeted strategy intervention.

57) Kyle Kratzer

Kentucky State University
Mentors: John D. Sedlacek & Karen Friley

Ground Dwelling Arthropods Associated with Newly Established Native Perennial and Pasture Border Rows in Franklin County, Kentucky

Pitfall traps were set in native perennial and pasture border rows to determine abundance of ground dwelling arthropods in each community type. This study was conducted at the Kentucky State University Research and Demonstration Farm in Franklin County, KY. Pitfall traps were deployed weekly for four weeks. Traps were reset and the samples were returned to the laboratory for identification and enumeration of all taxa. All arthropods were identified to order, and family when possible. Specimens were grouped into the ground beetles (*Coleoptera: Carabidae*), rove beetles (*Coleoptera: Staphylinidae*), miscellaneous beetles (*Coleoptera*), ants (*Hymenoptera: Formicidae*), crickets (*Orthoptera: Gryllidae*), grasshoppers (*Orthoptera: Acrididae*) and spiders (*Arachnida*). The total number of arthropods caught in pasture border rows was greater than native perennial border rows. There were a greater number of ground beetles, rove beetles, ants and spiders in the pasture border rows. However, there were a greater number of miscellaneous beetles and crickets in the native perennial border rows. Results will be discussed within the context of ground cover during this time of year.

58) Nitin Krishna, Hannah Pennington, & Brandon Russell

Western Kentucky University
Mentor: Richard Schugart

Formulating Mathematical Models to Analyze the Treatment of Chronic Wounds

Chronic wounds plague approximately 1.3-3 million Americans. The treatment of these wounds requires knowledge of the complex healing process of typical wounds. With mathematical modeling, we can simulate this intricate process. Researchers can potentially use the models to understand the effects of various therapies, and thus modify their treatments to maximize healing capabilities. In this work, two mathematical models using differential equations have been developed. The first model describes the interaction within the wound site among oxygen, bacteria, and neutrophils, which kill the bacteria. The model was analyzed and computationally simulated to determine whether it accurately described the biological processes that occur during wound healing. Analytical techniques were used to determine that the model provided biological solutions during the first hours of wound healing. Numerical solutions provided a visualization of the modeled healing response and can be used to analyze various oxygen treatment strategies. The second mathematical model describes the interactions of the proteins and their change over time and are based upon the data from Muller, et al., 2007, a research outcome that provided patient measurements of the proteins and the percent of which the wounds had healed. Matlab, a high-level technical computing language, was used to minimize the error between our model solutions and the data. The best model was established by choosing the results with the least error. A sensitivity analysis was then conducted to measure to what degree the equations were affected by slight changes in the model. The sensitivity analysis aided in identifying the effect of a particular treatment on each of the considered protein levels.

59) Lydia Kronmaah

Kentucky State University
Mentors: Kirk W. Pomper, Jeremiah Lowe, & Sheri Crabtree

Determining a Correlation for North American Pawpaw Acetogenin Activity between Twig and Ripe Fruit as Determined by the Brine Shrimp Test

The North American pawpaw is a tree fruit native to Kentucky. *Annonaceous acetogenins* are long chained fatty acids contained in pawpaw fruit and vegetative tissues which display pesticidal activity, possibly representing a new botanical pesticide for agronomic pest control. Kentucky State University (KSU) is the site of the USDA Repository for pawpaw species and germplasm evaluation and collection are program priorities. Fruit is a major biomass source for acetogenin extraction; however, 5 to 8 years are required for a tree to mature and produce fruit. Early detection of high acetogenin fruit selections would shorten the pawpaw breeding cycle. The objective of this study was to determine if there is a correlation between acetogenin activity in ripe fruit and twig tissues. Twigs fruit were collected from trees of pawpaw varieties and advanced selections (Mitchell, Overleese, NC-1, Susquehanna, Zimmerman, Wells, Wabash, Sunflower, G4-25, Hi4-1, and Hi7-5) that vary from high to low in fruit acetogenin activity. Two and one half grams of dried twig tissue or ten grams of frozen fruit pulp were extracted with 95% ethanol and the brine shrimp test (BST) was employed to assess acetogenin activity in extracts. Concentrated extract was transferred to vials to correspond to 0, 0.5, 1.0, 5.0, and 10 ppm concentrations for twig and 5, 10, 20, and 50 ppm concentrations for pulp with three replicate vials per concentration. There was a negative linear correlation ($R^2 = 0.57$) between the twig BST mortality at 20 ppm of extract and pulp LC_{50}, indicating a useful relationship.

60) Irina Lewis

Jefferson Community & Technical College
Mentor: John Ward

Correlations Between Current Demographic Variables and Community College Student Populations

Until the mid-1980s there were more men than women in college. At present, nearly 60% of college students are women. Many community college students may be returning to school because there is an advertised positive correlation between income and education. This survey of community college students attempted to determine how demographic variables of the current student population and the degree to which students utilize "free" college services such as computer labs and tutoring are related. Results of the survey were analyzed statistically to determine which pairs of variables were related with at least 95% confidence.

61) Benjamin Linzy

Murray State University
Mentors: David Pizzo & Paul Lucko

Mussolini's Shadow War: The Struggle Against Organized Crime in Fascist Italy

As a dual criminal justice and history major, I constantly seek to deepen my understanding of historical events by looking at them through the lens of criminal justice. In doing so, I am often able to garner a deeper understanding of the past as well as contemporary criminal justice issues. The recent controversy related to the National Defense Authorization Act and its provision that grants “the authority for the Armed Forces of the United States to detain covered persons (as defined in subsection (b)) pending disposition under the law of war” is not the first controversial measure a nation has implemented in the name of national security. What impact these measures have on a nation’s population and whether they actually achieve their intended goals was worth consideration. To evaluate this, I decided to research the methods used by another nation to protect itself from dangerous internal elements, as well as, what effect these methods had on the citizenry. I chose to analyze Benito Mussolini’s Italy and its combat against organized crime in order to illuminate the issue.

62) Khoua Lor

University of Louisville
Mentor: Michael T. Tseng

Nanotoxicology: In Situ Size Distribution of Nanoceria in Rat Kupffer Cells

Ceria nanocrystals are found in commercial applications such as diesel fuel additives, catalysts for self-cleaning ovens, dental hygiene products, polishing agents for glass mirrors and ophthalmic lenses. The toxicological effects of nanoparticles on human health remain unknown, but testing revealed potential pharmacological applications of cerium oxide as a powerful antioxidant that can be utilized in the treatment of neurodegenerative disease, cancer, cardiovascular disease, and radiation-induced tissue damage. Before the implementation or incorporation of ceria based pharmaceutical products, its effects on the body must be understood; therefore it is necessary to study the accumulation and toxicity. Previous studies of the bioaccumulation of 30 nm nanoceria in the phagolysosome were persistent in rat Kupffer cells at 90 days post-exposure. The biopersistence of nanoceria in the phagolysosome led to the formation of granuloma cells. Based on these findings, the biopersistence of naonoceria gains our interest to determine its fate over the period of 90 days. Cerium oxide nanoparticles endocytosed by Kupffer cells revealed ceria agglomerates enclosed within lysosomal and phagolysosomal cells at 1 hour post-exposure, 20 hours, 30 days, and 90 days of a single injection. Our analysis of particle size distribution reflects the persistence of naonceria in kupffer cells over an extended period of time.

63) Nicholas Mason

Morehead State University
Mentors: Steven Chen & Kenneth Henderson

Dynamic Pricing: Is It a Smart Way to Generate Income for Small Market Collegiate Athletics?

Many sport marketers predict that future sport organizations will pervasively utilize dynamic pricing strategy, a method involving price changes based on different demands and occasions, to generate extra ticket revenues soon. This study examined whether dynamic pricing strategy can be well accepted and implemented at regional, small market collegiate athletic programs. Twenty college/university athletic directors and marketing managers of the (FCS) Football Championship Subdivision responded to a phone interview by expressing their perceptions toward the use of dynamic pricing. All respondents' institutions were located in the Ohio Valley region and Mid-west. The interview questions addressed two key aspects: (1) the overall impression about the benefits and shortcomings of dynamic pricing, and (2) the willingness and support toward implementing the strategy. The qualitative information was gathered from late July to early October, 2012. In general, the results showed that the majority of respondents preferred the idea of adopting mini-series packages and different season ticket tiers over the use of dynamic pricing. Respondents expressed that changing the ticket prices frequently was cumbersome. They also did not perceive this strategy would bring excessive financial benefits. Although the marketing literature optimistically projects the popularity of dynamic pricing, respondents of this study sample seemed to reject this notion. In order to make the generalization concerning the applicability of dynamic pricing to all non-major conference athletic programs, future studies should be conducted by including a greater sample population and different geographic regions.

64) Victoria Mathis

Kentucky State University
Mentor: Avinash Tope

Metabolic Syndrome Among Students Attending a Historically Black College: Prevalence and Gender Differences

There are limited data on the prevalence rate of Metabolic Syndrome (MetS) among young African Americans (AA). We report the prevalence of and gender differences in the components of MetS in a predominantly young AA sample population from a Historically Black College and University (HBCU). First year college students (average age 19.8 years), (n=218 females and 158 males) attending Kentucky State University, Frankfort with no prior diagnosis of illness participated in the cross sectional study. Anthropometric screenings included measurement of height, weight, waist circumference and body mass index (BMI). Clinical screenings included measurement of blood pressure and determination of fasting lipid and glucose concentrations. MetS was defined using the National Cholesterol Education Program's Adult Treatment Panel III (NCEP ATP III) definition. Analysis of variance (ANOVA) scores on the Means procedure were used to examine differences between genders for all the screening parameters. Fisher's exact chi-square tests were used to analyze the point prevalence of MetS criteria. Most prevalent criteria observed were low levels of high-density lipoprotein cholesterol (37.3%) and elevated fasting glucose (22.1%). Statistically more males were found to have elevated fasting glucose and high blood pressure than females, while more females had high waist circumference. Overall prevalence of MetS in the total sample was 12%. HBCUs offer a unique opportunity to monitor and address the risks for MetS in a predominantly young AA population. Peculiar gender differences in glucose function and blood pressure management need to be addressed in designing of intervention strategies.

65) Elina Matveeva

University of Kentucky
Mentor: Richard Smith

Two is Company, Three is an Envious Crowd: Effects of a Third Party Evaluator on Expressions of Envy According to a Lacanian Psychoanalytic Perspective

This study aimed to test French psychoanalyst Jacques Lacan's theory that envy requires three parties, not two. Students on the University of Kentucky's campus were randomly selected to respond to vignettes designed to evoke envy. Some of the vignettes included mention of a "third party" or outside source providing feedback to the protagonist about the desirability of a certain enviable position. Researchers hypothesized that envy would increase in the presence of a third party that publically recognized the envied quality and heightened its desirability. The results suggest that envy does indeed increase when the desirability of an envied object is increased by public recognition. This opens the door for future research. The relationships between shame, humiliation, hostility, and envy were evaluated with results indicating that envy shares a positive correlation with both shame and hostility, but no correlation with humiliation. Possible applications of envy to motivate people to improve themselves are also explored and discussed.

66) Hayley Meek & William Walden

University of Louisville
Mentor: Joseph M. Steffen

Gender and Habitat Effects on Blood Glucose and Serum Triglycerides in Black Bears

The black bear population in Eastern Kentucky is increasing. Twenty two serum samples were obtained from bears with the potential for significant human contact (Pine Mountain, PM) and potential access to palatable and energy-rich human refuse. Fourteen serum samples were obtained from black bears almost totally isolated from human contact (Big South Fork, BSF), and therefore relying to a greater degree on a more natural diet. It was our hypothesis that bears exposed to a more energy rich diet would have higher blood glucose and triglyceride concentrations. Using assay kits from Cayman Chemical Company, serum glucose and triglyceride values were determined. Blood glucose in the overall BSF ((53.15 ± 3.20mg/dl) or PM (57.38 ± 5.83mg/dl) populations did not differ significantly. Comparison of all females (54.59 ± 7.16mg/dl) and males (56.65 ± 3.77mg/dl) in the two populations did not indicate any differences. However, comparison of adult animals in each population indicated significantly ($P<0.05$) higher blood glucose levels in females. In contrast, there was a significant difference ($P< 0.03$) in serum triglycerides between the PM (237± 35 mg/dl) and BSF (143 ± 21mg/dl) populations. This difference was accounted for by females in the two populations, specifically differences in the yearling and sub-adult females. This data supports our hypothesis and suggests both habitat and gender exert an effect on the levels of these two metabolites.

67) Brian A. Melton

Northern Kentucky University
Mentor: Michael Baranowski

Arab Spring: What Lead Decades Old Autocracies to Fall

The revolutions of the Arab Spring appeal deeply to us as Americans. The armed revolution in Libya mirrors the history of our own revolution against the British Empire, from the scrappy armed militias squaring off with a well trained and equipped army to the intervention of a foreign power that lead to victory. There lies a spiritual kinship between the Egyptian protesters who sought to end a corrupt order peacefully and the men and women of Birmingham who chose nonviolence to advance equality, even in the face of brutality. However, not all Arab autocracies have fallen to pro-democracy protests and thoroughly understanding the factors that lead to new regimes in Egypt, Libya, and Tunisia may guide our foreign policy towards correctly responding to similar situations in the future. In an attempt to future understand these factors, this article analyzed research regarding the impact of the global economic recession, social media, the internet, grass roots organizations, and other factors that have been though to play a role in the Arab Spring revolutions.

68) Katherine Messer

Morehead State University
Mentor: John Ernst

The War Comes to Campus

During the late sixties and early seventies, many students across the United States began to feel that university officials were infringing upon their rights. In particular, students were concerned about in-loco parentis, meaning the university assumed the role of the parent on issues like dorm hours. This coupled with the politicization of the Vietnam War forced students into action as young adults. Although a small campus in rural eastern Kentucky, Morehead State University also experienced these pressures and students began to speak up to defend what they felt were their undeniable rights. During this time, the college established ROTC, Reserve Officer Training Corps, which was compulsory for both freshman and sophomore men. This was a major issue for some students, who saw the creation of the military organization as an invasion of their rights. They focused their protest movements on ROTC, along with attacking the administration, especially President Adron Doran. Yet these protests were never as large or volatile as the ones at bigger schools or its close neighbor, the University of Kentucky. Doran, a former Speaker of the House for the Kentucky Legislature, was politically astute and considered skillful when dealing with sensitive campus situations. Many believe his skills kept the campus from undergoing major disruption. An examination of Morehead State's protest movement indicates that activism emerged even on smaller campuses and in many ways, addressed the same fundamental issues as the ones at more urban schools.

69) Russell Miller

Morehead State University
Mentor: Duane Chappell

Observing Performance of Swine that Receive Equine Plasma from Horses Immunized with Modified Live Porcine Reproductive and Respiratory Syndrome Vaccine1

Porcine reproductive and respiratory syndrome "PRRS" is a disease that drastically affects pregnant sows and growing piglets. Recent studies have determined that economic losses from this virus have reached $641 million dollars annually. In order to address this situation, studies have been focused on linking the inoculation period in relation to performance variance. Our objective was to observe the characteristics displayed after passive administration of equine origin PRRS antibody on humoral and cell mediated immunity. The study included two separate phases of 24 and 30 Yorkshire Cross, weanling piglets that came from a PRRS vaccinated, field virus negative herd. Each phase was inoculated with either: placebo, equine plasma from horses not immunized with PRRS vaccine, equine plasma from horses immunized with PRRS vaccine or modified live Porcine Reproductive and Respiratory Syndrome Vaccine1. Weekly intervals were used to measure the rate of growth, collect blood for serum samples and administer intradermal injection of PRRS antigen to evaluate delayed type hypersensitivity. Serum samples were assayed for PRRS antibody using Enzyme-linked Immunosorbent Assay "ELISA" for swine IgG and equine IgG. This project was funded by Mg Biologics. 1Inglevac PRRS MLV "Porcine Reproductive and Respiratory Vaccine"Boehringer Ingelheim.

70) James W. Morris

Bluegrass Community & Technical College
Mentor: Norman Strobel

Comparative UV Resistance of the Bread Yeast,* Saccharomyces cerevisiae*, a Yellow Bacterium, and a Pink Yeast

Factors that influence the UV resistance of two bacteria, *Deinococcus radiodurans* (highly pigmented) and a putative *Lactobacillus plantarum* (non-pigmented but resistant in the presence of elevated manganese levels) have been studied. In the present work, investigations have been extended to include an additional bacterium that produces copious amounts of yellow pigment, because yellow pigmentation has been associated with UV-resistance of bacteria that colonize natural environmental surfaces, such as plant leaf surfaces. Yeast-type organisms are also common colonists of leaf surfaces and it is logical to assume that they may be relatively resistant to the UV radiation they encounter. The common bread yeast, *Saccharomyces cerevisiae* (*S. cerevisiae*), has served as a model eukaryotic organism for physiological and molecular genetic investigations. Results obtained with *S. cerevisiae* may lead to further investigations of UV responses at these levels. The hypotheses were: (1) the yellow bacterium would show relatively high levels of UV resistance as compared with previously-tested non-pigmented bacteria; (2) the yeasts would be more resistant than non-pigmented bacteria; (3) the pigmented yeast would be more UV-resistant than the naturally non-pigmented *S. cerevisiae*. Results showed the more highly-pigmented organisms were more resistant to UV radiation.

71) Marisca Martin-Mozeleski, Atom McConnell, Patrick Bohac, Sudan Loganathan, Jordan Davis, Yanyan Lin, & Brandi Greer

Murray State University
Mentor: Alexey Arkov

Function of Tudor Protein in Germline Stem Cells and Brain Development

The medical field has made great strides due to extensive research in biology. More specifically, stem cell biology has provided a new approach to treating complicated medical ailments. Understanding the stem cell components will provide the medical field with the tools they need to better utilize their abilities for treatment. A well-known issue that comes with aging is the degeneration of the neurological system; for example, Parkinson's disease. Our main research focused on the germline stem cell scaffolding component, the Tudor protein, which has also been demonstrated to be expressed in the brain. Germline stem cells give rise to the sperm and egg, which ultimately produce all cells of the new organism. We worked on characterizing new interacting partners of Tudor and have shown that they are crucial for germline development. In addition, we tested the hypothesis that Tudor and its partners play a role in brain development and memory formation.

72) Riley Nance

Murray State University
Mentor: Lynn Patterson

Environmental Influences on Children's School Behavior

A common myth among teachers is that students "act out" or participate in "off-task" behaviors much more frequently during a full moon. Teachers believe and insist that students are reckless, moody, less focused, and disruptive during the dreaded "full moon" phase. Although there has been research completed on the effects of the moon's cycle upon behavior patterns, that research has been psychology based rather that education based. This psychology based research dispels this "moon myth". The purpose of our project was to complete research in an educational setting and make this information known in the educational world. The purpose of our research was to prove that there is no correlation between moon cycles and students "off-task" behaviors. We theorized that teachers automatically assume and blame their students "off-task" and "acting out" is a result of the full moon. We want to provide proof for teachers that perhaps it is not the student's fault that the days surrounding a full moon are stressful for them, but maybe it is the teacher's preconceived notion.

73) Earl Nichols

Eastern Kentucky University
Mentor: Rose Perrine

The Effect of Personality and Major on Types of Organizational Citizenship Behavior

In the present study, we explored the effect that the organization, a coworker that one liked, as well as a coworker that one liked but was also in competition with had on organizational citizenship behavior (OCB). Participants in this study completed four questionnaires. Three of the questionnaires measured the participants' OCB in three different situations where the fourth questionnaire measured the participants' extraversion and conscientiousness. There were 52 people who participated in the study: 18 males and 34 females. Participants reported that they would be more likely to engage in OCB for coworkers that they liked, followed by the organization. They would be least likely to engage in OCB for coworkers they were in competition with.

74) Jeremiah J. Nieves

University of Louisville
Mentor: Andrew C. Day

An Assessment of the Microclimatic and Pedological Conditions of Rock Shelters Containing* Solidgao albopilosa*, Red River Gorge, Kentucky

Very little is known about the microclimatic and pedological conditions present in the rock shelters of Kentucky's Red River Gorge in which the threatened species *Solidago albopilosa* is endemic. To address this issue we recorded and analyzed several microclimatic and pedological variables within the rock shelters to determine if any were significantly different from the surrounding environment. An estimation of the future viability of the shelters for sustaining *S. albopilosa* was also undertaken based on current plant distribution and recreational impacts at each site. Significant differences were found between the inside of the rock shelters and the surrounding environment with regards to relative humidity, air temperature, and luminance, suggesting that *S. albopilosa* prefers cooler, more humid environments which receive less sunlight. The distribution of the shelter aspects further suggest that *S. albopilosa* prefers Easterly or Northerly facing shelters that receive minimal direct sunlight. No significant differences were found among the surface soil pH and macronutrients that we tested, although evidence of recreational activity affecting site viability was present at most sites. However, a more complete analysis of the soil nutrients in the rock shelters and surrounding soils is suggested to build on this research.

75) Clint Nowicke

Eastern Kentucky University
Mentor: Theresa Botts

Hearing Voices: Negative Implications of Using the DSM in Diagnosing Deaf Individuals with Schizophrenia

The current edition of the Diagnostic and Statistical Manual IV-TR (DSM) rarely serves Deaf Americans sufficiently. Specifically, Deaf individuals with schizophrenia face extreme disparities in diagnoses compared to hearing individuals when the DSM is used. The diagnostic criteria for schizophrenia conflicts with inherent aspects of Deaf culture, especially related to American Sign Language (ASL) and similar gestural languages. Because the DSM was written for a target culture (in this case, the average white hearing American population) it excludes members of the Deaf culture and other marginalized groups. Focusing on common symptoms of schizophrenia, the current research analyzes how Deaf culture clashes, namely in the use of language and speech dysfluency, hallucinations and delusions, and movement disorders. Resolving this disparity can positively affect Kentucky's (and other states') current financial crisis in the area of mental health and Deaf consumers.

76) Kellie Owen

University of Kentucky
Mentor: Alison Davis

Measuring the Economic Impact of the Agriculture Industry in Fayette County

An important debate for many emerging urban communities is how to attract and support new businesses while also preserving the agriculture industry in the area. Fayette County is a great example of a community trying to solve this problem. Agriculture has been an important part of the economy in Fayette County for many years, but is the agriculture industry still essential in the economy today? Our goal is to determine the strength of the economic linkages between today's agriculture industry cluster and other industries around Fayette County. Our study has four main components: 1) the location quotient for Fayette County, 2) the median wage of the agriculture industry, 3) economic multipliers for different industries in Fayette County, and 4) the projected growth of the agriculture industry. To discover the location quotient, we will use data from the Bureau of Labor Statistics. This number, when compared to the state and national location quotients, reveals whether or not Fayette County is an importer or exporter of goods. We can also use the Bureau of Labor Statistics to calculate the median wage. By comparing the median wage in the agriculture industry to other industries in Fayette County, we can estimate the quality of jobs the agriculture industry creates. Once the agriculture cluster is defined by using the North American Industry Classification System (NAICS) codes, we will use the data program IMPLAN to estimate the economic multipliers within Fayette County. Lastly, we will use the Bureau of Labor Statistics to estimate the growth of the agriculture industry.

77) Jessie P'Pool

Eastern Kentucky University
Mentor: William Staddon

Triclosan Resistance Patterns in Bacteria from Aquatic and Terrestrial Environments in Madison County, Kentucky

Triclosan is an antibacterial agent found in a wide assortment of consumer products, from soap and personal hygiene products to socks and bedding. There has been much debate over the possible consequences of such widespread use of this compound. At low concentrations it behaves like an antibiotic, selectively targeting a carrier protein, reductase (FabI), an essential enzyme in the synthesis of bacterial fatty acids. The aim of this study was to determine resistance patterns in bacteria obtained from a variety of aquatic and terrestrial environments. It was hypothesized that bacteria from pristine ecological areas would be less resistant to triclosan than bacteria from areas with a high probability of contamination. Bacteria from the Kentucky River and other local water bodies were inoculated on media with various levels of triclosan. This was also done on bacteria isolated from soil samples. Bacteria showing evidence of resistance were tested against antibiotics. Initial results suggest that soil bacteria have low levels of resistance to triclosan.

78) Rebecca Parker

Morehead State University
Mentor: Kristina DuRocher

A Gendered Legacy: the Influence of the Burning Times on the Salem Witch Trials

The Salem Witch Trials lasted from 1692 to 1693, and reflected the fragility of hierarchical communal structures through the New England settlers' attempts to impose traditional English constructs in the fluid environment. Initiated and sustained by several Puritan girls, the witch hunt resulted in the deaths of twenty-four people. Historians have attributed the hysteria to Ergot, economic competition, or hostile threats, but few reference the parallel conditions of the earlier European witch trials. The Burning Times reached its apex between 1450 and 1750, and an estimated fifty thousand to one hundred thousand people, predominately women, were executed. The Salem Witch Trials were a continuation of the social control mechanisms employed during the Burning Times, because they centered on eliminating threats by the autonomy of women and the poor to the permanence of the social order. Despite the differences between the English and Salem cases, the victims were primarily older and widowed, female, or socially estranged, which limited their ability to defend themselves. Considering multiple contexts and the use of religious justification by privileged men to maintain authoritative control over every aspect of society further demonstrates the significance of maintaining conventional gender roles in explaining the hysteria, the characterization of witches, and how a belief in witches endured to travel across the Atlantic. European reform, interactions between diverse groups, and opportunities in America made social mobility possible, and both instances of persecution promoted patriarchy, codified witchcraft, and redefined femininity to discourage challenges to the positions of power reserved for elite men.

79) Jessica Parks

Western Kentucky University
Mentor: Aaron Wichman

Applying Regulatory Focus Theory to Change Attitudes Toward Breastfeeding: Reaching Women Who Lack Confidence in Their Ability to Breastfeed

Breastfeeding has numerous advantages for the infant. Breastfeeding helps build the infant's immune system in the early days of life. This is especially due to Immunoglobulin A (IgA) secretions in breast milk, which add immunological protection for the infant. In spite of this, according to the Centers for Disease Control (CDC; 2007), 42% of Kentucky infants do not receive any breast milk at all, and large numbers of infants in the United States as a whole share this situation. The current research tested how breastfeeding advocacy messages could be constructed to improve attitudes toward breastfeeding. Women intending to have children and varying in confidence about their ability to breastfeed were randomly assigned to a 2 (prevention vs. promotion focus) X 2 (gain vs. loss means frame) experiment. Prevention focused messages were more effective than promotion focused messages, but when breastfeeding confidence was taken into consideration, prevention focused messages in conjunction with loss means frames were most successful. For women low in confidence about their ability to breastfeed, prevention focused messages, combined with loss means frames, resulted in attitudes nearly as positive toward breastfeeding as those of women high in breastfeeding self-confidence. These findings demonstrate how regulatory focus theory can guide interventions to reach women who might otherwise not breastfeed.

80) Arpita Patel & Hiral Patel

Northern Kentucky University
Mentors: Mary Collier, Monica Worrell, Barbara Smith, & Kathy Bergman

Study 1 (A. Patel): ***Patient Education to Manage Heart Failure***

Heart Failure (HF) is the leading cause of hospital admissions nationwide. Most patients diagnosed with HF are readmitted into the hospital within 30 days of discharge due to worsening symptoms, the cost of which is not covered through Medicare and Medicaid. The Your Hearts Connection team at University Hospital had a vision to develop a program that would assist the HF patient to better manage their symptoms at home and avoid being readmitted to the hospital. After several months of surveying, the team discovered that education before discharge helps patients manage their heart condition. The purpose of this change was to reinforce HF education provided to patients and tips to be followed to manage HF. Reinforcing HF education to patients increased their understanding of ways to manage their symptoms while at home, in turn reducing hospital readmissions due to HF and reducing the overall costs incurred by University Hospital.

Study 2 (H. Patel): ***Catheter Associated Urinary Tract Infections in Medical Surgical Intensive Care Unit (MICU)***

Catheter associated urinary tract infections (CAUTIs) are the most common preventable nosocomial infections (hospital acquired infections) that leads to longer hospital stays, which increases the costs incurred by the hospital due to no reimbursement from Centers for Medicare and Medicaid Services (CMS). In the Medical Intensive Care Unit (MICU) at University Hospital, there were several reported CAUTIs that possibly could have been prevented. The goals for MICU were to improve knowledge on proper Foley catheter care; ensuring that protocols are strictly followed, documentation was completed properly, leading to reduced hospital costs. The purpose of this change project was to provide awareness about proper Foley catheter care to nurses, improve hand-washing protocols, and provide a checklist for proper documentation. This would reduce the rate of CAUTIs and the hospital costs. The education provided to nurses helped to reduce the rate of CAUTI, and improve adherence to Foley catheter care and hand washing protocols.

81) Sam Pellock

Murray State University
Mentor: Kate He

Testing Darwin's Naturalization Hypothesis using Generalized Linear Models

Naturalization is the process of introduction and establishment of an exotic or nonnative species. Darwin's naturalization hypothesis states that if a nonnative plant species is introduced into an environment with few native congeners, the nonnative species will have a greater chance of being naturalized. To test this hypothesis we compiled a Kentucky plant database containing approximately 800 species and selected particular traits of the plants to fit models to determine what affected the probability of successful naturalization. To analyze the database the statistical program R was administered using a generalized linear model. Results of our analyses will be discussed.

82) Dillon Pender, Lakshmi Vangala, Vivek Badwaik, Helen Thompson, Rammohan Paripelly, David Donald, & Matthew Gonzalez

Western Kentucky University
Mentor: Rajalingam Dakshinamurthy
Antimicrobial and Antiangiogenic Drugs - Relevance in Biomedical Research

Study 1 (Pender, Vangala, Badwaik, & Thompson): Need for novel, innovative strategies for developing antibiotics is becoming a necessity due to an increasing number of rapidly evolving micro-organismal threats. Antibiotic encapsulated gold nanoparticles (GNPs) are one such strategy showing promise. We report the development of ampicillin encapsulated gold nanoparticles (Amp-GNPs) that possess highly effective, dose dependent antibacterial activity. Our method for synthesizing Amp-GNPs is an entirely eco-friendly, single step reaction, taking place within an aqueous buffer. We have tested the antibacterial activity of Amp-GNPs against multiple strains of bacteria, both Gram-positive and Gram-negative, and have found Amp-GNPs to be highly efficient against all tested strains. Amp-GNPs have been shown to exhibit significant potential and ability to enter the medical field's arsenal to fight infectious disease.

Study 2 (Gonzales, Pender, Paripelly, & Donald): Fibroblast Growth Factors are a family of proteins that are involved in angiogenesis, wound healing, and cell development. FGFs rely upon binding with heparin for signal transduction throughout the cell. Inositol is a monosaccharide and it is component of membrane phospholipids. Inositol also able to bind with phosphate groups to create complexes that have numerous roles in cellular function. In this context, we expressed, purified FGF1 and investigated its interaction with myo-inositol using various biophysical techniques including fluorescence thermal denaturation, pulse proteolysis and multidimensional NMR spectroscopy. Results show that the myo-inositol binds with FGF1 and enhances its thermal stability as well as its solvent accessibility. Currently multidimensional NMR studies are underway to investigate the binding site(s). This information will aid in the design of better pharmacological targets.

83) Laura Pfalzer, Cody Murphy, Taylor Lewis, Chad Wells, & Jonathon Dye

Morehead State University

Mentors: Christine McMichael & Stephen Lange

Quality of Life Indicators for Community Sustainability: Rowan County, Kentucky

This project is directed at better understanding what factors contribute to long-term community sustainability in Rowan County in eastern Kentucky. While the scholarly literature and prior student research do identify several factors, we still do not have a clear answer to the question "Why is this area so persistently distressed?" We have come to recognize, however, that the major obstacle to answering this question is the lack of suitable quantitative and qualitative data on which to base such scholarly studies. Consequently, we are working with local leaders to identify, collect, and analyze data on key economic, political, environmental, socio-cultural, and educational indicators, among others, that will help them better understand, improve, and sustain our community's long-term socio-economic condition and quality of life. Our Community Indicators Project is a key component in an ongoing initiative to collect and disseminate useful information to local citizens and leaders working together toward a shared vision of a more sustainable community. The long-term objective of this research, which future students will continue, is to identify definitively the underlying factors that account for the persistent distress of this particular community and of the East Kentucky region generally.

84) Michael Powers

Western Kentucky University
Mentor: Aaron Celestian

In Situ Time-resolved Raman and X-ray Diffraction of Rare Earth Element Ion Exchange in Nanoporous Sitinakite

The nanoporous mineral sitinakite ($Na2Ti2SiO7{\cdot}2H_2O$) is a highly selective, fast ion conductor that is being tested for targeted removal of cesium and strontium from high-level waste solutions. In addition to their environmental applications, titanium silicates have many technological uses including battery materials, hydrogen storage, and rare earth and transition element catalysts for gasses and petrochemicals. Sitinakite is stable under a wide range of pressure, temperature, and chemical conditions making it a potential host mineral to perform selective chemistries in extreme environments. We are determining the fundamental structural properties governing ion selectivity in this unique mineral with emphasis toward understanding its energy related applications. Sitinakite exhibits multiple ion exchange steps that serve to enhance ion selectivity, and these steps are controlled by the host crystalline framework as well as the chemistry and hydration state of the native and ion exchanged compounds. To determine the exchange mechanisms, we collected high resolution in situ Raman spectroscopy and X-ray diffraction data to capture the REE ion exchange processes from the native form and the H-form. The results from these rare earth element ion exchange studies (using Y, Eu, Gd, Tb) indicated that a range of exchange dynamics exist within a single host mineral. The exchange dynamics are significantly different for each REE tested. This was somewhat surprising as all three elements possess the same valence charge, similar ionic radii (±0.05Å), and similar hydration states in aqueous solutions (CN=8-9). TGA/DSC curves for before and after exchange states showed significant variation in nanopore H_2O capacities, indicating that the hydration states of the element and valence electron conduction have an effect on the sequestration mechanisms and pathways through the porous host structure. A selectivity hypothesis concerning the effects of internal hydration and valence electron conduction has been previously proposed, however the mechanisms of framework conformational changes, presence of intermediate structural states, and diffusion pathways have only been reported for a handful of materials and was the main area of focus for this study.

85) Kari Ray

Eastern Kentucky University
Mentor: Jing Wang

The Phenomenal Slinky

Slinky was invented in 1943 by Richard James when he knocked over a box of springs and was intrigued when one of the springs “walked” down instead of falling. It was first marketed to the public in 1945. Since its conception, the Slinky has been an interesting phenomenon for physicists. In this study we are exploring what happens when a slinky bounces off of a floor. We will be taking video of a slinky bouncing off of a floor and analyzing that data frame by frame. We hope to learn the behavior of the slinky and to build a mathematical model for this phenomenon.

86) Kathryn Reeder

Morehead State University
Mentor: Katy Carlson

Accents Can Affect Attachment

This project explored the effects of prosody, specifically the placement of accents, on the meaning of sentences. Given the sentence "John claimed that Mary had arrived last week," the listener could interpret "last week" as modifying "claimed," meaning that the claiming happened last week (the high attachment meaning); or could interpret "last week" as modifying "arrived," so Mary arrived last week (low attachment). We know that a prosodic boundary, a pause, after "arrived" makes it more likely that people will consider high attachment, even though low attachment is generally preferred. In this project, we placed accents on either "claimed" or "arrived," hypothesizing that emphasis on a particular verb might also draw attachment to that verb. The presence of a prosodic boundary was also varied. After hearing each of the 20 sentences, listeners chose between two visually-presented paraphrases. With 24 subjects so far, we found a significant effect of the prosodic boundary, with a break after "arrived" increasing high attachments to 26%, vs. 13% without a boundary. We also found a marginally significant effect of accent position, with the accent on the higher verb "claimed" also increasing high attachments. This finding is novel because accents are usually thought to affect processes outside the sentence, such as pronoun resolution. But this shows accents affecting the basic structure of the sentence. This accent effect may be due to increased memorability of a particular verb or to increased semantic processing.

87) Douglas Saforo

University of Louisville
Mentor: J. Christopher States

Candidate Drugs Target the APC/C to Induce Mitotic Arrest in Ovarian Cancer

Taxanes are a class of chemotherapeutic drug that disrupt microtubule function and cause mitotic arrest and cell death, however some cancer cells show resistance. The anaphase promoting complex/cyclosome (APC/C) is an E3 ubiquitin ligase that acts as the master regulator of cell cycle progression. Inhibition of the APC/C should result in disruption of the cell cycle, resulting in arrest during mitosis and/or pseudo-G1. Previous *in silico* studies of the APC/C structure have yielded potential compounds that bind to the APC/C subunit ANAPC2. Three of these compounds (8, 10, 11) were tested on A2780/CP70 and SKOV3 ovarian carcinoma cells and tGM24 telomerase immortalized human fibroblasts. Cell morphology was observed during treatment with the compounds and showed signs of mitotic and apoptotic cells in a dose dependent manner. Mitotic index determinations revealed a significant mitotic delay in both cancer cells and fibroblasts treated with compounds 8, 10, and 11. Compounds 10 and 11 were more potent than compound 8 in inhibition of colony forming ability for all three cell lines. Fibroblasts showed some resistance to compound 8, however fibroblasts exposed to compound 11 showed complete inhibition of cell growth without characteristic morphological signs of apoptosis. All three compounds induced apoptosis in ovarian cancer cells, as indicated by increased caspase 3 activity, but not in fibroblasts. These results indicate that compounds targeting the APC/C can induce mitotic arrest and kill ovarian cancer cells while sparing normal cells. This research was supported by the University of Louisville Cancer Education Program NIH/NCI grant R25-CA134283.

88) Craig Schadler

Murray State University

Mentors: Jessica L. Naber & Joanne Hall

A Narrative Analysis of Baccalaureate Nursing Students' Nurse-Patient Clinical Reflections

The purpose of this study was to identify characteristics of critical thinking in nursing students' reflective writing assignments, which was guided by Richard Paul's model of critical thinking. The importance of critical thinking as an outcome for students graduating from undergraduate nursing programs is well-documented by both the American Association of Colleges of Nursing (AACN) and the National League for Nursing (NLN). Graduating nurses are expected to apply critical thinking in all practice situations to improve patient health outcomes. In a previous study, Paul's model of critical thinking was used as a basis to develop questions for reflective writing assignments. Within this study, students completed six open-ended nursing students' narratives of nurse-patient clinical encounters during an eight-week clinical experience. Following completion of those assignments, improvements were seen in critical thinking scores. This is a report of the qualitative analysis of the content of student responses during the intervention. A narrative analysis approach was used. Researchers open-coded for content and three members of the research team performed repetitive readings of the narratives to enhance rigor. From these processes, narrative themes were derived. Each of the themes was defined and exemplars from the data were used to support the credibility of the findings. This study provided information as to how students critically think in and about nurse-patient clinical encounters. Identified themes provided information to nursing faculty members so that they could better understand students' critical thinking abilities and skills.

89) Sabrina Schatzman

University of Louisville

Mentors: Teresa Fan, Pankaj Seth, Pawel Lorkiewicz, & Katherine Sellers

LDH-A as a Potential Therapeutic Target for Non-small Cell Lung Cancer

Lung cancer is the leading cause of cancer related deaths in both men and women. Despite this alarming statistic, targeted therapies remain elusive. For this reason, there is a need to study cancer cell metabolism in order to find novel therapeutic approaches. Lactate dehydrogenase (LDH) catalyzes the interconversion of pyruvate and lactate. Suppression of LDH-A, a monomer of tetrameric LDH, is thought to cause ROS-mediated apoptosis of non-small cell lung cancer (NSCLC) cells (1). We have characterized the metabolic effects of LDH-A knockdown (KD) in lung cancer metabolism with the use of shRNA in A549 NSCLC cells to gain mechanistic insight into this detrimental effect. $^{13}C_6$-Glucose and $^{13}C_5$-$^{15}N_2$-Glutamine were used as tracers to probe the perturbation of metabolic pathways induced by cells transduced with an anti LDH-A shRNA plasmid. The fate of the carbon and nitrogen isotopes through metabolic pathways was monitored by various analytical techniques including NMR, GC-MS, and FT-ICR-MS. LDH-A KD enhanced the concentration and enrichment of TCA cycle metabolites such as $^{13}C_2$ isotopologues of malate and fumarate when cells were given labeled glucose, supporting enhanced TCA cycle activity which can lead to increased oxidative phosphorylation. The fate of ^{13}C derived from glutamine suggests increased anaplerosis to the TCA cycle from glutaminase. The increased TCA cycle activity as a result of LDH-A knockdown may account for the previously observed increase in ROS production which, in turn, leads to cell death (1). This work was supported by the University of Louisville Cancer Education Program NIH/NCI (R25-CA134283) and by funds to Seth Laboratory from Beth Israel Deaconess Medical Center and NCI. 1.Seth P, Grant A, Tang J, Vinogradov E, Wang X, Lenkinski R, Sukhatme VP. On-target inhibition of tumor fermentative glycolysis as visualized by hyperpolarized pyruvate. Neoplasia 2011;13(1):60-71.

90) Wayne Schmitt, Pu Zheng, & Cheng Wen-Yen

Western Kentucky University

Mentors: Yan Cao, Wei-Ping Pan, & Hou-Yin Zhao

Microbial Fuel Cells: Generating Electricity From Mud

Pressures from the abatement of global warming gas from the combustion of fossil fuels, call for the development of renewable energy sources, such as wind, solar and biomass energies. Our society faces a transition from the dependence on the traditional fossil fuel energy supply to the extended wide-spectrum renewable energy supplies. This study explores the likelihood of electricity generation using bacterium metabolism, while simultaneously cleaning up the polluted water. Organic contaminants in wastewater are the energy source for the metabolism of bacterium, yet some trace metal is vital for the metabolic activities. Demonstrated in the lab with test tubes and beakers filled with mud and water, the naturally collected bacteria created electricity potential through redox reactions of their metabolic activities. Bacteria generate a flow of electrons that can be potentially harvested as electricity using a setup of a cathode and an anode. By altering the conditions in which these bacteria reside in these different scenarios, it is possible to affect their metabolic activity, and thus to improve efficiencies of these microbial fuel cells. At the current stage of this study, only electricity potential has been created, and the further studies will focus on maintaining the constant electricity current in the microbial fuel cells.

91) Micah Renee Seilheimer & Kristen Marie Floyd

West Kentucky Community & Technical College
Mentor: Felix Akojie

Studies on the Peroxidase Enzyme Activity from Horse Radish

This project was carried out to study the factors that may affect peroxidase enzyme activity in horse radish. Peroxidase enzyme in its crude form was used. Enzyme was obtained by homogenizing horse radish in distilled water, filtered, and centrifuged. The activity of the crude peroxidase enzyme in the supernatant was determined using the Bergmeyer method, in which the rate of decomposition of hydrogen peroxide (H^2O^2) by peroxidase was determined by measuring the rate of color development. The factors studied included the effect of enzyme concentration, effect of pH, effect of temperature, and the effect of chemical inhibitors.

92) Aman Shah

University of Kentucky
Mentors: Esther E. Dupont-Versteegden

RNA Degradation is Elevated with Age, but not Disuse-Associated Skeletal Muscle Atrophy

Aging and inactivity are both associated with decreased muscle size and protein content. The possible role of RNA degradation in the loss of protein has not yet been investigated. Therefore, we hypothesized that RNA degradation was elevated with muscle atrophy in aging and disuse. Brown Norway/Fisher344 male rats at 6 and 32 months were hindlimb suspended (HS) for 14 days to induce muscle atrophy or remained weight bearing (WB). Cytosolic extracts from gastrocnemius muscles were prepared for Western analysis of Dcp-2 protein (marker of p-bodies) and RNA degradation assay. In vitro total RNA decay assay was performed using 30ug of total RNA (from tibialis anterior) incubated with 20ug of S15 extracts from gastrocnemius. RNA integrity was determined using the Agilent Technologies algorithm to calculate the RNA Integrity Number (RIN); decay rate and half-life were calculated for each sample. Results indicated an increase in Dcp-2 protein at 32 months of age in both HS and WB groups. In addition, an almost 2-fold increase in decay rate and 48% decrease in half-life of total RNA was observed in muscle from 32 month old rats. However, no significant difference in decay rate and half-life was observed with disuse at either 6 or 32 months. We conclude that muscle atrophy associated with aging, but not disuse, may be due to a decrease in total RNA because of increased RNA degradation. Supported by APS UGSRF and AG028925.

93) Tara Sherfey & Ashley Burden

Western Kentucky University
Mentor: Wendi Hulsey

Solutions to Access to Oral Care in Kentucky

Access to oral health care is a barrier that exists in many geographic regions of the United States but particularly in Kentucky. Lack of access, poor oral health literacy and poverty are all contributing factors to the continual decline of oral health in Kentucky. The limited access is directly related to the dentist to population ratio and the shortage of dentists in many rural areas of Kentucky. Seeking a viable solution to this oral health dilemma was the basis for our research. Upon review of professional and scientific journals, it was determined that creation of a mid-level provider in dentistry would be the solution. Investigation and research of the five proposed dental workforce models revealed the solution to limited access to care in Kentucky would be the creation of the Advanced Dental Hygiene Practitioner.

94) Connor Thomas Smith & Mellisa Sterling

Eastern Kentucky University
Mentor: David Cunningham

Characterization of Enzyme Formulations for Electrochemical Sensors

Enzyme containing formulations for constructing electrochemical sensors have been studied. An application of these enzyme electrodes is the rapid measurement of blood alcohol concentration. In the present study, ultraviolet light and a benzophenone initiator were used to initiate the free radical polymerization of ethylene glycol diacrylate. Formulations with various levels of the initiator, enzyme, stabilizing sugar and monomer were tested. Patterns were formed and the amount of hydrogel and enzyme immobilized were determined by extraction and measurement of the photoinitiator. Scanning electron microscopy (SEM) was used to characterize the surface and edges of the hydrogel in terms of smoothness and uniformity. Overall, formulations produced well-defined photopatterned hydrogels that immobilized the enzyme.

95) Melissa Smith and Meghan Hall

Western Kentucky University
Mentor: Michael Collyer

Does Ecology Promote Sexual Dimorphism in the Pecos Pupfish (*Cyprinodon pecosensis*)?

Pupfishes in the genus *Cyprinodon*, are renowned for their ability to survive in variable, and sometimes harsh, North American desert aquatic environments. Because desert aquatic environments are so variable in temperature, salinity, and species composition, the range of ecologies pupfishes encounter is quite remarkably diverse. One species, the Pecos pupfish (*Cyrpinodon pecosensis*) has a large distribution with populations in large rivers, small creeks, sinkholes, marshes, and lakes, all varying in salinity and species composition. Recent studies have shown for pupfishes and other desert fishes that physical constraints such as salinity and ecological constraints such as predation can influence streamlining in fishes. However, sexual dimorphism in pupfishes because of body deepening in males is frequently observed, suggesting that natural selection and sexual selection are at odds. In the current study, we compared body shape between males and females within different habitats of the broad-ranging *C. pecosensis*, to determine if there is an obvious ecological explanation for variation in sexual dimorphism. Our results suggest that the magnitude and direction of sexual dimorphism is difficult to predict based on gross ecological descriptions of habitats. In a broader context, the interplay between natural selection and sexual selection might be an explanation for the recent adaptive radiation of pupfishes.

96) Tiana Smith

Kentucky State University
Mentors: Changzheng Wang, Lingyu Huang, & Cecil Butler

Impact of Purple Sweet Potato Powder on Bone Mineral Content of Ovariectomized Rats

Oxidative damages might be partially responsible for bone loss associated with osteoporosis. Purple sweet potato is rich in anthocyanins and other antioxidants. The objective of this study was to determine if consumption of purple sweet potato powder would affect the bone mineral content of ovariectomized rats. Female SD rats (9 month old) were either ovariectomized or sham-operated before they were randomly assigned into 6 treatment groups. Rats in group A were sham-operated but those in other groups were all ovariectomized. Groups A and B were fed the AIN93M diet, but groups C, D and E were fed the AIN93M diet with 5%, 10% or 15% of the corn starch replaced by equal amount of purple sweet potato powder, respectively. Purple sweet potatoes from a North Carolina farm were steam cooked at 200 F for 1 hr before the skin was removed, mashed and freeze dried. Group A was fed ad lib, but the amounts of diets given to other groups were restricted to the average intake of Group A. The rats were fed their assigned diets for 6 weeks before they were sacrificed. The bone mineral content for group A was higher than for other groups but the group fed 10% purple sweet potato powder had bone mineral content similar to that of group A. Group fed 15% purple sweet potato powder had diarrhea and uterine inflammation These results confirmed that ovariectomy surgery significantly reduced bone mineral content. However, consumption of purple sweet potato powder at 10% of the total diet helped to maintain the bone mineral content close to the sham-operated rats. These results indicate that purple sweet potato powder helped to prevent bone loss caused by ovariectomy. Excessive consumption of purple sweet potato powder (15% of the diet) caused digestive disorders and was not protective against bone loss.

97) Amy Stamates, Sarah Maloney, & Clifford Brown

Northern Kentucky University
Mentor: Cecile Marczinski

Acute Effects of 5-Hour ENERGY on Blood Pressure and Subjective Ratings

Energy shots are marketed as providing users with increased alertness and reductions in fatigue, with no "crash". Despite recent news reports of cardiovascular complications after consuming 5-Hour ENERGY, empirical evidence is lacking. Moreover, there are no studies examining whether these shots actually alter subjective state as promised in the marketing materials. Thus, the purpose of this study was to examine the acute effects of 5-Hour ENERGY on blood pressure readings and on measures of subjective state. Participants (n=12) completed 3 test sessions where they received one of three dose conditions (5-Hour ENERGY, placebo, and no drink). Each test session lasted 6 hours. During each hour of the session, blood pressure readings and measures of subjective state were recorded. Results indicated that systolic and diastolic blood pressure readings were highest when participants were in the 5-Hour ENERGY condition at each time point compared to when they were in the placebo or no drink conditions. For subjective ratings, participants reported the lowest sedation ratings, but also the highest anxiety ratings, in the 5-Hour ENERGY condition for each time point after dose administration as compared to the placebo and no drink conditions. These findings suggest that 5-Hour ENERGY may ameliorate feelings of sedation, but it also may elevate blood pressure and feelings of anxiety. The blood pressure results are particularly concerning for consumers who have pre-existing hypertension. Future research on the effects of 5-Hour ENERGY consumption is warranted.

98) Adam Stewart

University of Louisville
Mentor: Sergio Mendes

Fabrication of Sub-Micron Periodic Structures on Glass

The development of optical waveguide circuits for several applications, e.g., in optical communications, optical computing, and bio-sensors, requires the fabrication of couplers for transferring light beams into- and out of- the device. An important waveguide coupler is based on integrated diffraction grating structures. The fabrication of such optical component involves several processes and requires critical micro-fabrication steps. Diffraction gratings by themselves are very useful tools to the extent of characterizing spectroscopic properties of matter. In this work, the fabrication of integrated diffraction gratings was taken one step further. We investigated if we could use hydrogen plasma or wet chemistry techniques to transfer a periodic modulation, originally holographically written in a photo-sensitive layer, to the surface of a glass substrate. Such substrate with a sub-micron surface-relief grating could then be over-coated with a high refractive index thin-film material to create a waveguide structure. An important challenge here is to develop integrated grating structures that can efficiently couple light into- and out of-single-mode optical waveguides.

99) Danielle Story

Morehead State University
Mentors: Bernadette Barton & Constance Hardesty

Fighting the "'F' Word" Organizing and Recruiting for a Feminist Group

Continuing efforts to develop feminist conscious raising groups on college campuses today remain as imperative as during the Second Wave of the Women's Movement. The combination of backlash against women's improved status and opportunities, raunch culture, an increasingly androsexist media, and an absence of gender equality curriculum in education means that most students are, at best, uninformed about feminism, and at worst, perceive feminism negatively. Drawing on ethnographic observations and interviews with other student leaders, this study explores the challenges of organizing and recruiting for the feminist group SAGE (Student Association for Gender Equality) at Morehead State University. In particular, this study explores how female and male leaders experience leading a feminist student group, challenges with organizing and recruitment, and overall dilemmas faced by social feminist activist groups.

100) Kunal Sunthankar

University of Kentucky
Mentors: Luke H. Bradley & Peter Hardy

Dependence of Volume of Distribution on Gel Strength for Convection Enhanced Delivery of Drugs to the Brain

Convection Enhanced Delivery (CED) is emerging as an effective clinical method for delivering therapeutic agents directly to the brain to treat neurological diseases, including Parkinson's disease, which increasingly affects patients from across the world, nation and commonwealth of Kentucky each year. While this method has had varying success in clinical trials, standardized CED in vitro models are needed to develop CED techniques which improve the reliable distribution of therapeutic compounds. Many groups, including ours, have conducted model studies using agarose gel mimics, which simulate the isotropic, porous environment of grey matter structures, such as the putamen. However, the composition of the gels is not defined in the literature. To gain insight into the dependence of the infusion pressure required, and the volume of distribution of compounds as a function of varying agarose gel strength, we infused safranin O dye into 0.6% agarose gels of tensile strengths of 500, 900 and 1200 g/cm3. Our results show that the volume of distribution and the infusion back pressure is dependent on agarose gel strength, with 900 g/cm3 better approximating CED delivery in the porcine brain. This information will be useful for future standardized in vitro evaluations of CED procedures for the improved treatment of neurological disorders.

101) Rebecca Suttmiller & Kaitlin Cahill

Northern Kentucky University
Mentor: Kebede Gemene

Simple and Inexpensive Electrochemical Detection of Proteolytic Enzymes and Their Inhibitors

Proteolytic enzymes function by cleaving proteins at specifically and involve in all cellular activities. The detection of these enzymes and their inhibitors are critical for disease diagnosis and therapeutic processes. A number of techniques have been used for the assay of the activities of these enzymes and their inhibitors. The most common methods are spectroscopy with synthetic chromogenic and fluorogenic substrates. However, although these methods are sensitive, they cannot be reliably used in highly colored and turbid samples such as whole blood. Potentiometric ion-responsive electrodes have also been used for this purpose. But due to the irreversible nature of their response, these are limited to single use and are not capable of continuous monitoring. We report here a reversible electrochemical method, pulsed chronopotentiometry for detection of enzyme activity. This method works on the fact that the sensor gives very sensitive response to the bigger molecules (proteins or synthetic oligopeptides), while it is much less sensitive to smaller fragments. In this method, the response to the peptide (voltage/potential) was first measured. Then, the enzyme was added to the peptide solution. The concentration of the original peptide decreased as it was broken into smaller fragments by the enzymes and the potential response of the sensor, which is a function concentration of the peptide decreases proportionally. This change in potential was monitored as a function of enzymatic reaction time and used as the analytical signal for the assay of enzyme activity. Here we detected the activity of the enzyme thrombin using synthetic peptides as substrates.

102) Achaia Taltoan

Kentucky State University
Mentors: Avinash Tope & Phyllis Rogers

Attitudes and Practice of Healthy Lifestyle in Young African American Student Population

More young adults, especially young African Americans (AA) are at greater risk for Metabolic Syndrome (MetS). Screening to determine its prevalence and evaluation of attitudes and practice of healthy lifestyles in this population is critical. The objective was to evaluate the attitudes and ascertain life style choices and the risk for MetS among college students comprising mostly AA young adults at a historically black college (HBCU). Each fall since 2009, freshmen students 18-24 years of age (n=376) attending Kentucky State University have participated in the study. MetS was defined using 2001 National Cholesterol Education Program's Adult Treatment Panel III. Anthropometrics and blood pressure were obtained, while lipid and glucose concentrations were determined. Overall prevalence of MetS was 12%. More females than males believed in having three nutritious meals a day, maintaining a healthy weight, and reported avoiding use of alcohol and tobacco than males. However, more females than males had higher Body Mass Index (BMI) as well as waist circumference (WC). More males than females reported greater frequency of being physically active and having seven hours of sleep for most days in a week. Less than half the participants reported consuming less than the recommended five servings of fruit and vegetables and two servings of dairy per day. A statistical correlation was found between high WC and lack of minimum exercise and between high blood pressure (BP) and vegetable intake. Young AA adults were found to be at a significantly higher risk for MetS. It would be critical in any college setting, especially in HBCUs to re-implement the practice of performing physical examination at the time of admission and to collect and analyze the data from the health history of the students to offer well targeted Health Education Programs around healthy life style choices.

103) Kelsey Taylor

Northern Kentucky University
Mentor: Christine Perdan Curran

Cyp1a1_1a2 Double Knockout Mice Show Impaired Motor Function

Previous work in our lab uncovered motor deficits in Cyp1a2(-/-) mice which are missing a key enzyme normally expressed in the liver, but also reportedly expressed in the cortex and cerebellum of the brain. To follow up our earlier work, we obtained Cyp1a1_1a2(-/-) double knockout mice that lack CYP1A2 and a related enzyme CYP1A1. We compared these mice and wild-type Cyp1a1_Cyp1a2(+/+) mice to determine if the motor deficits are exaggerated in the double knockout line. We used the same test battery from our previous studies and were able to replicate our earlier findings. The double knockout mice also had significantly impaired motor performance on the rotarod tests. This strongly suggests that CYP1A2 has an essential role in normal cerebellum development or function.

104) Emily Teegarden, Katelyn Gabbard, Kathryn Miller, Briana Cresswell, & Jenny Reed

Northern Kentucky University
Mentor: Belle Zembrodt

Human Trafficking in Northern Kentucky

The aim of the current study was to collect data on the prevalence of human trafficking in Northern Kentucky (Boone, Kenton, Campbell, Gallatin, Grant counties). Human trafficking is the exploitation of a person through force, fraud or coercion to perform labor or commercial sex acts. Prior studies have shown that key indicators such as interstate access, presence of commercial sex industries, poverty, and immigrant populations are predictors of areas where human trafficking exists. These indicators are present in northern KY. There have only been 91 cases of human trafficking identified in KY. Of these, there have only been 15 state indictments and 0 convictions. This research seeks to understand the disconnect between the perception and the reality of the crime. Our hypothesis stated that more human trafficking exists in northern KY but is often mislabeled. First responders are not aware of the signs and symptoms of human trafficking in the people that they see. Prosecutors and judges are not aware of the force, fraud, and coercion used by the perpetrators. Legislators are not aware of the need for a more extensive law against human trafficking. Through a series of surveys distributed to police departments, social service organizations, and medical providers in the northern KY region, we gathered information about the location and needs of trafficking victims as well as training needs of first responders. Data collection will be completed by the end of the fall semester, 2012. Quantitative data analysis will be completed by the end of January, 2013. Ultimately the goal of this study is to address the "three Ps" of fighting human trafficking: Prevention of trafficking, Protection of victims and Prosecution of traffickers.

105) Ashley Salyer Thacker

Eastern Kentucky University
Mentor: Sue Mahanna-Boden

Enhancing Prosodic Features in Children with Cochlear Implants

The role of professionals in speech-language pathology and/or aural (re)habilitation of children with cochlear implants (CIs) could account for incongruences across research concerning both perception and production of suprasegmental features in children with cochlear implants. These professionals are with the child throughout the implantation process and provide unique skills that benefit the children. However, little research has examined what suprasegmentals clinicians find important or what features are being addressed in therapy with children with CIs. Thus, this survey sought to survey speech-language pathologists (SLPs), audiologists, and deaf educators currently working with children with cochlear implants to determine what prosodic features professionals addressed and what techniques they preferred.

106) Matthew Thacker

Eastern Kentucky University
Mentor: John Bowes

Native American Berdache: An Advantageous Social Organization

From at least the time of first documented European encounters with North American indigenous peoples, same-sex sexuality and transgender activity has been interwoven within Native American culture. The Europeans labeled these Native Americans as berdache and noted how they did not abide by traditional gender roles. In Native American culture, it was common that men participated in war and were the hunters of the tribe, while women stayed local and tended to gardens, sewing, and homes. The berdache were usually men, but sometimes women, who abandoned the exceptions associated with their anatomical gender. From early ages, for boys anywhere between the ages of five and twelve, they adopted the lifestyle of the opposite gender. Rather than destructive, however, berdache existence and contributions were pivotal in the structure of Native American tribes, allowing anatomical men to adopt the role of women and perform tasks too strenuous for women.

107) J. Wesley Urian

University of Kentucky
Mentor: Susan Barron

A Model to Explain Learning Deficits Following Prenatal Alcohol Exposure

Despite warning labels, some pregnant women continue drinking alcohol, putting the developing fetus in danger. Fetal Alcohol Spectrum Disorders (FASDs) are caused by heavy drinking during pregnancy and are marked by a range of behavioral and neurocognitive problems, including learning and memory deficiencies, with significant variability in the clinical population. We hypothesized that the effects of alcohol on the developing fetus, such as those seen in FASDs, can be exacerbated by hypoxia (reduced oxygen flow). Hypoxia is a common occurrence during birth as the offspring exits the birth canal and has a limited source of oxygen; therefore offspring with a previous history of prenatal alcohol exposure may be at increased risk for learning deficits. We tested this hypothesis using our rodent model. Male and female Sprague-Dawley rat pups were exposed to either: alcohol (4.5 g/kg/day on postnatal days (PND) 1 - 7), intubated control, or non-treated control (this overlaps the human 3rd trimester brain growth spurt). On PND 8, rats were either exposed to control air or a brief hypoxic challenge (8.5 min). These offspring were tested during adolescence (PND 40 and 41) in a water maze to assess spatial learning. The alcohol and hypoxia exposed males took longer to learn the task than all other groups. Surprisingly, females were not impaired. These results suggest that the combination of alcohol exposure and hypoxia can increase the deficits caused by fetal alcohol exposure and that there may be sex differences in sensitivity on some measures. Further work is needed to understand this sex difference, the underlying mechanisms, and possible ways to reduce these effects. Supported in part by NIAAA 017956 to SB

108) Victoria Votaw

University of Kentucky
Mentor: Susan Barron

An Explanation for Hyperactivity Following Prenatal Alcohol Exposure

Public awareness of the damaging effects of drinking during pregnancy has resulted in fewer women drinking during pregnancy. However, the percentage of women that drink heavily has not changed. High levels of alcohol during pregnancy can cause lifelong conditions such as Fetal Alcohol Syndrome or Fetal Alcohol Spectrum Disorders. The severity of these effects varies between individuals and many factors have been proposed to explain this variation. We hypothesized that additional challenges to the fetus would increase the severity of prenatal alcohol exposure. For example, brief periods of mild hypoxia (reduced oxygen flow) are common during normal labor and delivery however this may put the alcohol-exposed offspring at increased risk. We used a rodent model to examine whether prenatal alcohol exposure and hypoxia would affect activity levels. Hyperactivity and ADHD occur in nearly 90% of children with an FASD. Male and female rat pups were divided into three treatment groups; an alcohol exposed group (4.5 g/kg/day), an intubated control, and a non-treated control. The alcohol dose was relatively low and given by a feeding tube on postnatal days (PND) 1-7. This exposure period overlaps a period of brain growth that occurs during the human 3rd trimester. On PND 8, the pups were divided into hypoxia or control groups and a brief hypoxic challenge was administered (8.5 min). Activity levels were examined in juvenile rats (PND 20 21) using a circular chamber with activity measured for 30 min daily. Offspring exposed to both the alcohol and hypoxia showed clear hyperactivity in the test chamber. These results show that brief hypoxia worsens the effects of prenatal alcohol exposure. By becoming increasingly aware of the factors that may increase the severity of FASD, we can work to reduce the adverse effects. Supported in part by NIAAA 017956 to SB.

109) Brooke Washburn & Carol-Rose Gingras

Morehead State University
Mentor: David Eisenhour

Dispersal Ability of the Frecklebelly Darter (*Percina stictogaster*)

The Frecklebelly Darter, *Percina stictogaster* (Burr and Page), is restricted to high-quality streams in the Kentucky River and Green River drainages. This species has narrowly documented basic life history information, including dispersal ability. Among the 12 darter species found in our study site in the Red River, Menifee and Powell counties, Kentucky, *P. stictogaster* is the most pelagic. Using a reach-specific tagging system we compared its movements with five other benthic or semi-pelagic darters. We tagged a total of 488 individuals of six darter species using subcutaneous injections of visible implant fluorescent elastomer (VIE) in May-October 2012. Fishes were tagged from four reaches of the Red River, spanning a total of 440 m. These reaches plus an additional four reaches (two upstream and two downstream), spanning a total of 1470 m, were sampled by snorkeling in August 2012 and by seining in October 2012. The VIE tags are brightly colored and easily visible underwater. During August snorkeling we observed a total of 832 individuals including 12 tagged darters, four of which were *P. stictogaster*. In October, we captured 437 darters, nine of which were tagged, including four *P. stictogaster*. One *P. stictogaster* moved downstream 206 m and one *P. sciera* moved upstream 767 m; all other recaptured darters were in the reach where they were originally tagged. Our data suggest that the darters studied move little during the summer and early fall, and provide limited evidence of greater dispersal for the pelagic and semi-pelagic species (*Percina*).

110) Elizabeth Watts and Jessica Schmiers

Eastern Kentucky University
Mentor: William Staddon

Characterization of the Archaea Community in Sediments Affected by Acid Mine Drainage

Members of the domain Archaea (microorganisms) are often associated with extreme environments such as those with high acidity. Acid mine drainage (AMD) is a common phenomenon in Kentucky, yet little is known about the composition of the Archaea communities in environments affected by this drainage within the state. Sediments affected by acid mine drainage were collected near Whitesburg, in Letcher County, KY. DNA was isolated using a MOBIO kit. Polymerase chain reaction (PCR) was performed using primers specific for Archaea 16S rRNA sequences. The PCR products were cloned in the pGEM Easy Vector System. Plasmids were isolated and the inserts sequenced. Initial analysis suggests that sequences match both known and unknown members of the domain Archaea.

111) Rebecca Wente

University of Kentucky
Mentors: James Harwood & Jason Schmidt

Effects of Intraguild Cues of Ground-dwelling and Foliage-dwelling Spiders on Lady Beetle Oviposition and Aphid Suppression

The presence of multiple predators in a system causes competition for resources which can impact the life-history traits of competitors. Little is known about the interactions of spider cues and lady beetles, which are both known biological control agents of pests. In this project, the influence of chemical cues of the ground-dwelling spiders (*Pardosa milvina*) and foliage-dwelling spiders (*Frontinella communis*) on oviposition of lady beetles (*Hippodamia convergens*) and aphid abundance was examined. Trials were performed in a greenhouse setting designed to simulate a winter wheat microhabitat with mild infestation of aphids (*Rhopalosiphum padi*). Spiders were placed in the microcosms two days prior to lady beetle introduction to lay silk and cues. Some treatments had the spiders removed to test the effect of only indirect cues on beetles and in other treatments, predators were left in the microcosm along with the lady beetles to assess the effect of predator presence along with the cues. In the presence of predator cues, lady beetles exhibited higher oviposition frequency. There is an indication that direct and indirect cues are important in influencing oviposition behavior. When spiders or spider cues are present, lady beetles oviposit at a greater rate. When only cues and predators are present, lady beetles forage less. These data suggest that predator cues elevate lady beetle oviposition and lower foraging, which provides evidence that beetles detect and respond to multiple predators in the system.

112) Sarah Whelan

University of Kentucky
Mentor: Jeramiah Smith

Vasa: Understanding Genomic Rearrangement in Lamprey

Lampreys undergo massive genomic rearrangements early in their development, resulting in a situation where in an individual's somatic cells possess a genome that is dramatically different from its germ cells. While understanding these rearrangements can be beneficial to understanding diseases in humans, there are no existing genetic markers that can be used to track germline through the lampreys development. The vasa gene makes an ideal marker for tracking germline development because it is specifically expressed in the germline of nearly every animal species. However, the lamprey vasa gene had yet to be isolated and sequenced. In order to do this, several polymerase chain reactions (PCR) were performed to isolate the vasa transcript and individual introns, using computational predictions from a highly fragmentary genome assembly. Additionally, computational sequence alignment was used to compare the vasa gene in lamprey to its human homolog. Notably, several lamprey vasa introns are characterized by large inverted repeats at their 5' and 3' ends, which are not seen in the human vasa gene. We speculate that this unique structure may be related to germline regulation of vasa. Cloning and sequencing the vasa gene has set the stage for more in-depth characterization of germline development in lamprey and genome rearrangement.

113) Anna White & Eden Fisher

Eastern Kentucky University
Mentor: Michelle Gerken

Recreational Therapy Licensure

Licensure is a critical part of the professionalism of any discipline and provides protection to the public. Licensure benefits include quality healthcare delivery, ensuring public safety, benchmark for practice, and protecting the public. Licensure gives the field of recreational therapy high quality standards of practice that must be met and an acceptance of professionalism within the medical field. Professions that recreation therapy closely relates to include occupational therapy and physical therapy, both are licensed professions. Recreation therapists plans, directs, and coordinates recreation programs and purposeful interventions for people with disabilities or illnesses. This research is a quantitative study addressing the support of licensure in the field of recreational therapy in Kentucky. Support for licensure is reported, Kentucky can mimic the licensure process of other states (North Carolina, New Hampshire, Oklahoma, Utah). This poster presentation includes background information on how current states with recreation therapy licensure succeeded in their process of gaining this credentialing in their state. The research will display the step-by-step licensure processes and give insight into how this goal could be accomplished in Kentucky.

114) Scotty White

Morehead State University
Mentor: Hans Chapman

Solar Radiation Measurements for Eastern Kentucky

The need for reliable region-specific solar irradiance data has become urgent as solar energy technology gains attention. Agencies such as the National Renewable Energy Laboratory (NREL) provide general solar radiation resources for the United States. However, there is only a limited amount of solar resource data specific for the Eastern Kentucky region that will assist developers engaged in the installation of green technologies. This research seeks to characterize measurements of solar radiation in the region, using Morehead State University (MSU) as a test site. Initial survey was done using live meteorological data from the Kentucky Mesonet Station at the Morehead State University Derrickson Agricultural Complex at Morehead, KY. In addition, a solar irradiance meter was used to collect solar irradiance data at selected locations at the MSU campus. Preliminary analysis of the data showed that the solar intensity was influenced by atmospheric conditions such as cloud cover, humidity, and ambient temperature, while the location showed no impact. For the second stage of this work, a designed experiment approach will be employed to analyze the data collected to compare them with those based on calculations. This research is supported by the MSU Undergraduate Research Fellowship and a grant provided by the MSU Office of Research and Sponsored Programs.

115) Carli Whittington, Carly Rekosh, & Chesika Crump

Murray State University
Mentor: Terry Derting

Experimental Analysis of the Relationship Between Parasite Burden and Cognitive Abilities in House Mice (*Mus musculus*)

During early mammalian development, the energetic cost of mounting an immune response may deplete available energy allotments from other biological processes such as brain development. Eppig et al. reported that parasitic infections may affect development of an organism's nervous system, resulting in reduced cognitive ability. Our goal was to determine whether parasitic burden is related with cognitive ability. We tested the null hypothesis that parasitism does not affect the cognitive ability of lab mice. Using *Mus musculus*, adults were bred and neonates from 10 litters were infected with the gastrointestinal nematode *Heligmosomoides polygyrus*. Control neonates from those same 10 litters were not infected for comparison. At 21 days of age, both groups were subjected to parasite load enumeration through fecal egg counts. At 35 days of age, both groups were subjected to a spatial memory test using a T-maze. After T-maze completion, each mouse was euthanized and the brain removed and mass recorded after drying. There was no significant difference in the dry brain mass of the parasitized and non-parasitized mice. We also failed to see any significant difference between the percent of successful T-maze trials for the parasitized compared with the non-parasitized group. Likewise, within the parasitized mice, parasite egg count and percent success on the T-maze was not correlated significantly. Our work showed that parasitic infection prior to sexual maturation had no effect on the cognitive ability of Mus musculus. These results did not support a relationship between parasitic burden during post-natal development and cognitive ability.

116) Kandyce Wingfield

Kentucky State University
Mentor: Narayanan Rajendran

***Qualitative Analysis of Surrogate Bioremediator* Arthrobacter nicotanae**

The growth-supporting ability of culture media and their differences are of deep interest in agro bacteriological and biomedical research. Analysis of microbial growth on culture media is an essential requirement to characterize a bacterium. Serum-based culture media study to achieve a stable bacterial growth is desirable. In the present study, we quantitatively analyzed the growth-supporting property of different media for our newly isolated *bioremediator strain of Arthrobacter.* For analyses, 1 % of *A. nicotanae* was inoculated into Nutrient Broth (NB) and the growth was measured at 600nm, using a spectrometer for 48 hours after incubating at 30°C. The OD, pH and temperature were recorded every 4 hours. For Fatal Bovine Serum (FBS) analysis, **t**hree sets of NB agar plates with and without 1% and 5% of the FBS were used. For the antimicrobial susceptibility test, 8 types of antibiotic discs (Novobiocin, Penicillin, Tetracycline, Erythromycin, Chloramphenicol, Neomycin, Kanamycin, and Streptomycin) were tested using NB maxi plates. UV analysis was run by exposing the NB plate at specific time intervals with controls. Mueller Hinton Blood agar, Phenol Red Lactose agar, Blood agar and McConkey agar plates were used for selective and differential media analyses. Results indicated that the bacterium had optimal growth in NB. The MH blood agar had good growth, while McMonkey showed no growth. Novobiocin had high effectiveness. Lack of growth was noticed on UV exposed plates. There was no significant difference in the zone of inhibition on FBS plates. The results indicated that these media had different level of growth-inhibiting activity, and suggested that the inhibition was due to the initial decrease in bacterial colonies rather than suppression of the multiplication process during their growth.

117) Brittney Wyatt

Kentucky State University
Mentors: Michael Bomford, Changzheng Wang, & Lingyu Hwang

Row Cover Weight Influences Nitrate Content of Kale Grown in Solar Greenhouses

Vegetables account for most human nitrate intake. Nitrates may accumulate in vegetables produced under low light conditions because nitrate reductase requires sufficient light to function. Row covers used to protect plants from low winter temperatures can reduce light transmission to winter-grown vegetables. To test this effect, and its impact on nitrate accumulation, Siberian kale (*Brassica napus var. pabularia*) was grown in a solar greenhouse, called a high tunnel, near Frankfort, KY, between September 2011 and January 2012. The kale was grown without row covers, or under one of three weights of translucent polyester row cover: light, medium, or heavy. Air and soil temperatures were recorded hourly throughout the experiment. Kale was harvested on clear mornings in November and January, immediately after measuring photosynthetically active radiation at canopy height. Young leaves were picked from the center of representative plants for nitrate analysis using nitrate-specific probes. Increasing row cover weight was positively correlated with warmer nighttime temperature, reduced light penetration, and higher leaf nitrate content. Yields ranged from 2.2 kg per square meter under heavy row covers to 3.8 kg per square meter without row covers. Leaf nitrate content ranged from 330 mg/kg without row covers to 1,850 mg/kg with heavy row covers. Although row covers had a clear impact on nitrate accumulation in kale leaves, none of the observed nitrate levels were sufficient to warrant health concerns in adults.

118) Ramakanth Yakkanti

University of Louisville
Mentors: Radhika Vaishnav, Ruolan Liu, & Robert Friedland

Amyloid Beta Cross-Reactive Potato Virus Y Antibodies in Human Serum

Amyloid Beta 1-42 (A Beta) accumulation occurs in the brain in Alzheimer's Disease (AD), contributing to the process of neurodegeneration. Previous research has shown that the amino acid sequence of Nuclear Inclusion b (NIB) protein of the Potato Virus Y (PVY) is similar to the immunogenic N-terminal region of the A Beta peptide and that antibodies generated against PVY cross-react with A Beta. Due to the abundance of potatoes in our diet, we hypothesized that antibodies against PVY are present in control subjects and AD patients, and that AD patients have a lower titer of serum PVY antibodies due to a consequence of competitive binding to A Beta. Our experimental design was to test for the presence of 1. PVY and 2. PVY-reactive antibodies in human serum obtained from AD and control subjects. We performed an initial immunostrip assay to detect PVY in 5 control and 5 AD serum samples. The PVY immunostrips were unable to detect PVY in any of the samples. This was followed by sandwich ELISA using a capture antibody, PVY infected leaves as an antigen source, and human serum from the same 10 subjects. The ELISA results for all 10 samples were positive, demonstrating the presence of PVY reactive antibodies in all subjects tested, but no significant difference was found between AD patients and healthy subjects. Experiments are currently underway with a larger sample size to assess whether there are statistically significant differences between the two groups. In conclusion, we have demonstrated for the first time that there are anti-PVY antibodies in human serum. Our results may have implications in Alzheimer's disease etiology, prevention, and management.

119) Chris Yates

Western Kentucky University
Mentor: Brian Strow

Indigenous Credit Associations in Rural Botswana

The African population can be broken up into three sectors: the modern, informal, and traditional. The modern sector, those elites who came to power and have remained in control of most of the modern African governmental institutions, has little role to play in African economic development. Growth has to come from the informal and traditional sectors: urban entrepreneurs and rural agricultural populations respectively. Research shows that despite the lack of formalized credit institutions as we have in the rest of the developed world, African countries have indigenous institutions that have allowed for some degree of access to credit and capital. We sought to answer a series of questions about the success of these indigenous institutions: do they provide adequate funding capital for socioeconomic groups? What role, if any, can governments play in facilitating their growth if they do prove to be beneficial? Can foreign investment help expand their reach and, if so, how? And is it economically viable for both parties to be involved? Rotating savings and credit associations (ROSCAs) are one example of these indigenous institutions. The amount of capital that has accumulated through these agreements is decreasing due to the new regulations being imposed. The decreasing tax revenues from other major industries - such as diamond manufacturing - has put pressure on the government to make up the difference by regulating and taxing other sources of revenue that were previously unfettered. Though ROSCA agreements are informal and very hard to monitor, they have come under closer surveillance and this increased cost has made them less viable options. Understanding the principles and foundations of such savings and credit associations allowed us to establish empirical criteria by which their economic effectiveness can be assessed.

120) Tyler Young

Eastern Kentucky University
Mentor: John Dizgun

"City of Immigrants," Buenos Aires, Argentina

Large scale immigration has been one of the great global phenomena of the modern era. It has dramatically reshaped the social, political, economic, and cultural landscapes of host countries the world over. Argentina, not unlike the United States, Canada, and Australia, is a new world country that has welcomed millions of newcomers. Indeed, it is impossible to understand Argentine history and society fully without considering the pivotal role immigration has played in its development. In Summer 2012, as part of the KIIS Argentina study abroad program, I was fortunate to travel to Buenos Aires for one month to experience this vibrant megacity of some 12 million people. Studying in this "city of immigrants" provided a unique opportunity to analyze first-hand the legacy of large-scale immigration in a country other than my own. Argentina's immigrant legacy is not only apparent by its largely Italian and Spanish-descended populace, it is evident in many other facets of society: Italian cuisine, Yiddish theatres, German hospitals, Armenian neighborhoods, and Arabic-language newspapers all attest to Argentina's rich immigrant history.

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