Kentucky Academy of Science

NEWSLETTER

www.kyscience.org | Susan Templeton, Editor | May 2010

The Voice of Science in Kentucky

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- Berea College
- Brescia University
- Centre College
- Eastern Kentucky University
- Kentucky Community & Technical College System
- Kentucky Science and Technology Corporation
- Kentucky State University
- Morehead State University
- Murray State University
- Northern Kentucky University
- Spalding University
- Transylvania University
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Patron - $5,000 level
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- KBRIN (Kentucky Biomedical Research Infrastructure Network)

Sustaining Member - $500 level
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- Kentucky American Water Company
- Kentucky Wesleyan College
- Lindsey Wilson College
- Pikeville College
- Thomas More College
- University of the Cumberlands
- Wood Hudson Research Laboratory

Associate Member - $100 level
- Hoffman Environmental Research Institute

☞ Editor's Note: When viewing the Newsletter in Acrobat Reader the Table of Contents (TOC) contains live links to each article; at the bottom right of each page is a link back to the TOC!

The KAS Newsletter is published in January, May and August. Current and archived issues are available at www.kyscience.org. You may contact the KAS Newsletter Editor at susan.templeton@kysu.edu.

From the President...

I had the opportunity to represent the Kentucky Academy of Science at the 2010 meeting of the National Association of Academies of Science (NAAS) which was held in conjunction with the American Association for the Advancement of Science (AAAS) annual meeting. NAAS has a dual mission, to facilitate communication among state/regional academies and to assure that the American Junior Academy of Science functions well.

We are fortunate in Kentucky to have a strong relationship between the KAS and KJAS because that is not true throughout the United States and one goal from the delegates meeting was to strengthen such relationships and reinvigorate state JAS chapters that have waned in effectiveness over the years.

There were 123 AJAS students at the national meeting and they represented thirty states. In Kentucky, we select the students through a judged competition but once they get to the national meeting it is a competition free event. We were represented by four outstanding students, Ann Cooper, Jack Grundy, Ankush Gupta, and Lindsey Hastings who were grand winners in our 2009 KJAS competition. I had the pleasure of hearing about their work during the AJAS poster session and can attest that they "did Kentucky proud." In addition to the poster session, the students made oral presentations, participated in numerous science related trips and discussions, attended the AAAS keynote speeches and had opportunities to meet with and talk to many other outstanding students and career scientists. KAS covers the expenses for these students and their chaperones to attend the meeting and I came away from the meeting convinced that it is money well spent.

There were far more interesting sessions, all running concurrently, during the AAAS meeting than any one person could possibly attend. I decided to focus on sessions dealing with communicating science and found two particularly informative. The first, entitled "Communicating on the State and Local Level: How Can Scientists Support Policy-Makers" provided pointers for scientists who want to help guide policy on climate change, stem cell research and/or evolution. Steve Schneider focused on climate change and emphasized that scientists should enter the public debate on policy issues but cautioned that we must make our value judgments explicit and separate from the scientific assessment process. He said "know your audience, know your stuff and know yourself." The first two were shared themes of the session and in some ways obvious. The third was a caution to pick your communication vehicle. If you are not good at sound bites, skip the local news interviews and go for discussion based programs, if you are not the best thinking on your feet, try an OP -ED column instead. Another speaker in the session was Eugenie Scott who focused on evolution and spoke about the successful attempt in1980 to keep the Lexington Public Schools from teaching creationism. She made the point that scientists can't take the usual route of influencing politicians because we are not numerous (not enough votes) nor are we wealthy (not enough money) so that we need to identify other stake holders who share our desired outcome but may come at it from different perspectives. In the Lexington case, science teachers concerned about professional ethics, clergy who did not wish their congregants to receive religious messages in school and parents with diverse reasons for opposing creationism in the

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☞ Inside this issue

Messages from the Executive Director

KAS membership is over 2000! Enhanced Affiliate Eastern Kentucky University has the highest number of KAS members-190 faculty, staff and students! Western Kentucky University is a close second with 187 members. The Voice of Science in Kentucky is growing. KAS started with 46 charter members when organized in 1914. Please continue to encourage your colleagues to join KAS and also consider taking a more active roll in our organization as a member of the executive board, sectional officer, or committee member. I look forward to seeing all of you at the 96th Annual KAS Annual Meeting on the WKU campus this fall. If you know of any organization that would like to exhibit at the 2010 Annual Meeting or sponsor this event please contact me:

PO Box 22579
Lexington, KY 40522-2579
859-227-2837
executivedirector@kyscience.org

Jeanne Harris, Executive Director

Call for Nominations for the KAS Governing Board

The Kentucky Academy of Science Nominations and Elections Committee is seeking assistance from the KAS membership in our effort to identify a ballot of quality candidates to assume leadership roles within the Academy for next year. KAS members interested in nominating colleagues for these vacant positions, or individuals willing to volunteer to be placed on the ballot, should forward the name, e-mail address/phone number for each candidate, and indicate the leadership position of interest. The Nominations and Elections Committee will contact each candidate to request the necessary information to be included on the ballot. This is an extremely important responsibility for the members of KAS and the committee needs your assistance in identifying candidates for these vacancies. The membership is being contacted at this time for nominations for the following offices:

- Vice President
- Social & Behavioral Sciences Representative
- Physical Sciences Representative

Any member may nominate another member for Vice President. However, for Social & Behavioral Sciences and Physical Sciences representatives, the nominators must identify with the Division for which they are nominating. Please send nominations by **August 1, 2010** to:

Sean Reilley, Chair
KAS Nominations and Elections Comm.
Department of Psychology
601 Ginger Hall
Morehead State University
Morehead, KY 40351
(606) 783-2985
s.reilley@morehead-st.edu

KAS 96th Annual Meeting

Hosted by Western Kentucky University
Tentative Program

FRIDAY, NOVEMBER 12, 2010

3:00 - 5:00 p.m.	KAS Governing Board Meeting
5:30 - 7:00 p.m.	Registration
6:30 - 8:30 p.m.	Symposium
8:30 - 9:00 p.m.	KAS Sectional Officers Meeting
8:30 - 10:30 p.m.	Social

SATURDAY, NOVEMBER 13, 2010

7:00 a.m. - 5:00 p.m.	Registration
8:00 a.m. - 4:00 p.m.	Vendor's Exhibits
8:00 - 11:30 a.m.	Paper Sessions & Scientific Posters
10:00 - 11:30 a.m.	KCTCS Faculty Meeting
11:30 a.m. - 12:45 p.m.	Lunch (on your own) KAS Past Presidents' Luncheon
1:00 - 4:00 p.m.	Paper Sessions & Scientific Posters
4:15 - 5:15 p.m.	Plenary Session
5:30 - 6:30 p.m.	Annual Business Meeting & Reception Student Reception
6:30 - 9:00 p.m.	Banquet

Headquarters hotel:	Holiday Inn 1021 Wilkinson Trace Bowling Green, KY 42103 270-745-0088
Location:	1.5 miles from WKU campus
Rate:	$85/room - Single/Double/Triple/Quad
Rooms reserved:	15 for Thursday; 100 for Friday; 20 for Saturday
Cutoff date:	October 22, 2010
Additional housing:	30 hotels/motels within 4 miles of WKU campus

KY/TN Branch of the American Society for Microbiology to Hold Joint Meeting with KAS

The KY/TN Branch of the American Society for Microbiology (ASM) will meet jointly with KAS at the Annual Meeting in November. Dr. Stanley Maloy, Chair of the ASM Committee on Communicating Science to the Public, will speak Friday evening on Emerging Diseases, a topic that should be of interest to a broad audience. Dr. Maloy is Dean of the College of Sciences, Professor of Biology, and the Associate Director of the Center for Microbial Sciences at San Diego State University; his lecture is funded by the National ASM.

From the President... continued

schools joined together with scientists to influence school board policy. The second session "Communicating Science to the Public: Culture and Social Context in East Asia" had three informative speakers but I thought that Yoon Chung from the Korea Foundation for the Advancement of Science and Creativity (KOFAC) made points most germane to our desire to expand the number of science, technology, engineering and math (STEM) graduates in the Commonwealth.

Korea reversed a decline in the number of STEM students by creating a culture of science. KOFAC organizes communications that connect science and society issues such as climate, water, disease energy and food and provides science related festivals and other activities for active participation of the general public. It also promotes public/private partnerships that provide youth with opportunities to experience and learn science and clearly see the advantages of realizing their potential in these fields. Finally they have developed strategies for narrowing the science culture divide between urban and rural areas. I recently attended the kickoff meeting for updating the Science and Technology Strategic Plan for Kentucky and I suggested that we might incorporate some of the successful approaches from KOFAC and apply them at home. As our updated plan develops, I'll keep you informed.

Nancy Martin

Call for Nominations for Superlative Awards Extended

The Kentucky Academy of Science seeks nominations of individuals who have made outstanding contributions to scientific research and education in the Commonwealth in the six areas designated below.

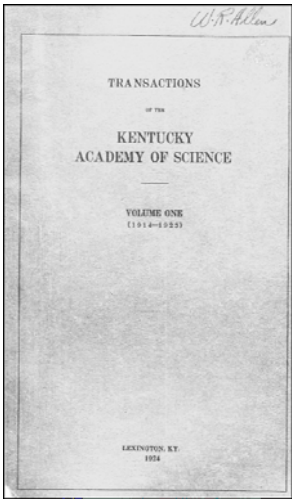
- **Outstanding Academy Service**
- **Distinguished College/University Scientist**
- **Outstanding College/University Teacher**
- **Outstanding Early Career in Post Secondary Education**
- **Outstanding Secondary School Science Teacher**
- **Distinguished Professional Scientist (in a non-academic position)**

Details on criteria and nomination packet content for all awards are available at www.kyscience.org/members/awards.php.

June 1, 2010, is the new deadline for nominations. All nominations and supporting materials should be sent in electronic format; e-mail attachments must be in MS Word format. Send to:

Dr. Dawn J. Anderson
Department of Biology
Berea College
CPO 1683
Berea, KY 40404
dawn_anderson@berea.edu

Volumes 1 - 70 of the KAS Journal Now Available

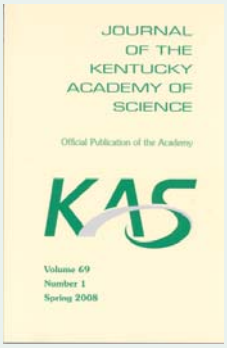


After nearly two years of scanning and hundreds of student worker hours, all volumes of the Journal (Transactions) of the Kentucky Academy of Science are now available in pdf format on the KAS website. At present, they are available only to registered academy members. You will need to log on to the site. Early volumes were borrowed from the University of Kentucky Library. Later volumes were from the Hancock Biological Station library or generously loaned by Tom Timmons. The journal was published in Kentucky through 1972 when it was transferred to Allen Press.

Volume 1 covers the first 10 years of the academy. Because of the age and condition of this copy, some pages appear dark; it is very readable, however. Much of the content is notes from the meetings plus natural history observations. This issue is worth reading as many of the problems facing science in Kentucky at that time are the same ones we face today. The web page link is given below.

www.kyscience.org/content/publications.php

Call For Papers



The *Journal of the Kentucky Academy of Science*, now in its 71st year, is published through Allen Press each spring and fall and is abstracted through BioOne. The *Journal* publishes peer reviewed articles from all disciplines within the Academy. Turnaround time usually is six months or less, and page charges ($35/page) are very reasonable. The Journal accepts regular articles (12-20 manuscript pages), scientific notes (2-5 pages), and will accept Letters to the Editor. The Journal also seeks series of manuscripts that result from special workshops or conferences. In these cases, a special editor may be appointed. All manuscripts should be sent to:

David White, Editor J-KAS
Hancock Biological Station
561 Emma Drive
Murray KY 42072

Instructions for authors can be found at the KAS website www.kyscience.org/content/publish.php. Please call 270-474-2272 or e-mail the editor (david.white@murraystate.edu) for more information.

KAS Research Funds Available

The following sources of research funding are available.

Marcia Athey and Botany Funds - Intended for research planned and conducted by students of Kentucky secondary schools, colleges, and universities under the supervision of a faculty member; consideration will also be given for support of faculty research projects. Faculty sponsors/researchers must be members of the Kentucky Academy of Science. Awards normally are in the several hundred dollars range, though in extraordinary circumstances some higher awards may be possible. All awards are made to the institution of the faculty supervisor/researcher.

Special Research Program - Directed particularly to faculty in Kentucky institutions, public or private, involved primarily in undergraduate education. Proposals may be for work related to the subject matter of any of the sections of the Kentucky Academy of Sciences. Awards are for one year; funding for an additional year may be requested by reapplying the following year and competing with newly submitted proposals. Awards of up to $5,000 will be available as funding allows. Progress of the project must be reported within one month after the anniversary of the award, in the form of a report to the KAS President-Elect.

Undergraduate Research Program - Funds available for research planned and conducted by undergraduate students of Kentucky colleges and universities under the supervision of a faculty member. Faculty sponsors/researchers must be members of the Kentucky Academy of Science. Currently, two undergraduate research grant programs are available. Students are expected to present their research at the annual meeting of KAS, and submit a final report by January 31st of the following year.

- *Undergraduate Research Supply Grants:* Awards up to $500.
- *Summer Undergraduate Research Grants:* Awards up to $3000.

Application process

Applications for all grant types must be submitted to the Chair of the Committee for the Distribution of Research Funds, and must be post-marked not later than November 15, 2010. Funding recommendations will be announced shortly after the January 2011 Board meeting. All proposals should include a Fund Application Cover Sheet and a Conflict of Interest List; downloadable PDF files are available on the KAS Grants webpage at www.kyscience.org/members/grants.php. Details on individual grant proposal requirements and evaluation critera are also available from this page. All submissions should be in electronic format on CD (7 copies) and should be sent to:

George F. Antonious, Ph.D.
Kentucky State University
Department of Plant and Soil Science
Water Quality/ Environmental Toxicology
218 Atwood Research Center
Frankfort, KY 40601

Office: 502-597-6005
Lab: 502-597-6253
Fax: 502-597-6381
E-mail: george.antonious@kysu.edu

2009 Research Grant Reports

Funding Source: Botany Fund
Project Title: *Chromosome Variation and Population Dynamics of a Mountain Species from Mexico (Dahlia coccinea), as Influenced by Climate Change*

Due in great part to the diligent and skillful work of undergraduate student Nathan Bundy, we (delightedly) were able to obtain more chromosome counts than originally expected. Chromosome data was obtained from 57 individuals representing 26 separate populations of Dahlia coccinea from western Mexico. Of these, approximately 85% have been sequenced. PCR, gel electrophoresis, and preparation for sequencing was carried out by undergraduate students Susan Cates and Nathan Bundy. The remaining DNA templates are at the sequencing lab at this time. Initial results indicate separation by both mountain range and ploidy number (tetraploids vs. octoploids).

Both N. Bundy and S. Cates continue to work in the research lab on this project. Once the data analyses have been completed (with student participation), results will be presented at MSU's Scholars' Week in April 2010, and a poster or presentation is expected at the KAS meeting in fall 2010. There appears to be solid data for a peer-reviewed paper in a scientific journal. Both undergraduates will be co-authors, and support from KAS will be acknowledged with all posters, presentations, and papers.

Dayle E. Saar, Ph.D., Faculty Advisor,
Associate Professor and Curator of the Herbarium
Department of Biological Sciences, Murray State University

Funding Source: Marcia Athey Grant
Project Title: *Genetic isolation as a result of dam construction: a look at the effects on two species of darters*

Project was completed in August 2009. Kerstin successfully completed her thesis (where she acknowledged KAS' support) and graduated in Dec. 2009. All funds were spent as requested in the proposal, to reimburse the WKU Biotechnology Center for analyses and supplies.

PUBLICATIONS & PRESENTATIONS

Edberg, Kerstin L. 2009. The effect of a reservoir on genetic isolation in two species of darters. Master's Thesis, Western Kentucky University, Bowling Green, Kentucky.

Edberg, Kerstin, and Philip Lienesch. Genetic isolation as a result of dam construction: A look at the effects on two species of darters. Annual meeting of the Kentucky Academy of Sciences, November 14, 2009. Highland Heights, KY.

Edberg, Kerstin, and Philip Lienesch. Possible genetic isolation in stream fishes as a result of reservoirs: a look at the effects on two species of darters. Annual meeting of the American Fisheries Society, August 31, 2009. Nashville, TN.

Philip W. Lienesch, Ph. D., Faculty Advisor,
Associate Professor, Department of Biology,
Western Kentucky University

The View from CPE: Why STEM Fields Should Embrace Diversity

As STEM fields increase in importance to citizens of the world, taking advantage of the human capital and the knowledge that is created by our global society becomes essential. Thus, there is an increasing need to continue our focus on diversity within departments in science, technology, engineering, and mathematics. Diversity is an excellent vehicle for STEM fields that are heavily dependent on higher order thinking.

Cuseo, Fecas & Thompson (2007) and Thompson & Cuseo (2009) in their work point out that studies show that creative people have a wide range of knowledge and interests, and their creative products often reflect combinations of ideas drawn from multiple subject areas (Riquelme, 2002). Their creativity rests on a broad base of knowledge that goes beyond the boundaries of particular areas of educational or professional specialization and creates connections across different subject areas (Baer, 1993; Kaufman & Baer, 2002).

Just as experience with different academic disciplines equips one with a broad base of knowledge and styles of thinking that can be combined to create new ideas so, too, does experience with different dimensions of diversity. Diverse experiences supply learners with greater breadth of knowledge and variety of thinking styles that can empower them to think outside the box or boundaries of their single cultural framework. Diversity expands students' capacity for viewing issues or problems from multiple perspectives, angles, and vantage points. These diverse vantage points work to their advantage as they encounter new problems in different contexts and situations. In contrast, limiting one's number of vantage points is akin to limiting the variety of lenses or angles accessible to solve new problems, thereby limiting one's creativity.

Once diverse perspectives have been acquired, they also can be combined or rearranged in ways that result in unique or innovative solutions to problems. Thus, ideas acquired from diverse people and diverse cultures often complement each other and "cross-fertilize," giving birth to new approaches for solving old problems. Furthermore, when ideas are generated freely in groups comprised of people from diverse backgrounds, powerful "cross-stimulation" effects can also occur, whereby one group member's idea often triggers different ideas from other group members (Brown et al., 1998). Drawing on different ideas from people of diverse backgrounds and bouncing your ideas off them is a good way to generate energy, synergy, and serendipity—unanticipated discoveries and creative solutions.

Not only are STEM departments in our K-16 educational systems typically the least diverse, so too are the student enrollments. At a time when STEM fields are increasingly important to our national security, health, and competitiveness, we are challenged to support the research and produce the diverse pool of scientists and engineers needed to fuel our future. Research clearly supports that a diversity of perspectives enriches science and makes engineering more responsive to a global pool of clients.

Chubin and Malcom (2008) suggest clearly articulating the educational case for diversity, showing how students and society benefit from it (a recommendation of Kentucky's STEM Task Force); thinking more holistically about diversity in STEM, including the need for all in academe to be exposed to diverse ideas and worldviews; to acknowledge that stereotypes still matter and that they affect perceptions of quality and expectations for performance; and acknowledge that stereotypes still matter and that they affect perceptions of quality and expectations for performance.

Dr. Aaron Thompson is Interim Vice President for Academic Affairs at the Council on Postsecondary Education. From his research, he has authored a number of publications on Diversity and Student Success in postsecondary education. His view examines the role diversity plays in the STEM disciplines.

Kentucky can be proud of its efforts in many of these areas as numerous collaborative efforts are underway to improve diversity in both academe and in response to the workforce by raising the awareness of the need for STEM discipline instruction and students. From the Girls' STEM Collaborative, SKY Teach, Advance Kentucky, Project Lead the Way, PIMSER, GEAR-UP, Kentucky Space Enterprise, and other programs too numerous to mention, educators are articulating the educational case for diversity, showing how both students and society will benefit.

References

Baer, J. M. (1993). *Creativity and divergent thinking*. Hillsdale, NJ: Erlbaum.

Brown, T. D., Dane, F. C., & Durham, M. D. (1998). Perception of race and ethnicity. Journal of Social Behavior & Personality, 13(2), 295–306.

Chubin, D.E., & Malcom, S.M. (2008). *Making a Case for Diversity in STEM Fields.* Inside Higher Ed. http://www.insidehighered.com/layout/set/print/views/2008/10/06/chubin.

Cuseo, J.B., Fecas, V., & Thompson, A., (2007). *Thriving in College: Research-Based Strategies for Academic Success and Personal Development.* Dubuque, IA: Kendall Hunt.

Kaufman, J. C., & Baer, J. (2002). Could Steven Spielberg manage the Yankees?: Creative thinking in different domains. Korean Journal of Thinking & Problem Solving, 12(2), 5–14.

Riquelme, H. (2002). Can people creative in imagery interpret ambiguous figures faster than people less creative in imagery? Journal of Creative Behavior, 36(2), 105–116.

Thompson, A. & Cuseo, J.B. (2009). D*iversity & the College Experience*. Dubuque, IA: Kendall Hunt.

2010 Posters-at-the-Capitol

The Posters-at-the-Capitol (P@C) exhibition of research projects by Kentucky undergraduate students, took place on Thursday, January 28, 2010, in the state capitol rotunda. Student researchers from all Kentucky state-supported four-year colleges and universities, and from the Kentucky Community & Technical College System (KCTCS) displayed results of their research projects in fields of natural and physical sciences, computer and social sciences, arts and humanities.

Choice of Research Projects for P@C

At Posters-at-the-Capitol, four-year colleges are allocated about 14 spaces; KCTCS is given 7, for a total of 120 spaces. At each institution, faculty are invited to submit their students' projects from all disciplines to P@C organizing members.

At the University of Kentucky, the process of choosing a research project for exhibition is carried out through the Office of Undergraduate Research and Creativity. A team reviews abstracts and those accepted represent disciplines of general and medical sciences, engineering, humanities, social sciences, and fine arts. Research projects with direct implications for the state of Kentucky, such as tobacco research, are favored.

Since the P@C abstract submission deadline is each fall, University of Louisville students submit work carried out during the previous spring semester or summer. Consideration is given to the seniority of the student; juniors have an opportunity to submit again in the following year. Science projects outnumber other areas by about 15 to 1, due to the emphasis on undergraduate science research and faculty in research-intensive fields who support summer projects by undergraduates.

In 2010, Northern Kentucky University had about equal numbers of projects in areas of chemistry and social sciences/humanities. Murray State University was represented by about 66% projects in sciences, and about 35% in humanities. KCTCS undergraduate projects are chosen from science projects displayed at the Conference for Student Research and its Spring Session. However, faculty mentors from colleges across KCTCS may submit research projects.

At Western Kentucky University, project submissions include those from high school students enrolled in the Carol Martin Gatton Academy of Mathematics and Science in Kentucky.

Every effort is made to ensure that undergraduates who carry out research projects adhering to the standards of P@C have the chance to display their results. In recent years, since submissions have outnumbered space allocations, John Mateja, Chair of the Organizing Committee of P@C, has extended capacity by allowing two projects to share poster space.

Research Projects at the 2010 P@C

Posters displayed represented such diverse areas as ecology, microbiology, earth and space sciences, physics and mathematics, and social sciences, with basic and applied research themes.

Kentucky Space, a multi-university consortium, was the theme of a report on "Establishing a Spaceflight Heritage for the Commonwealth," by Morehead State University students Daniel Graves and Nathan Fite, under the guidance of Benjamin Malphrus and James Lumpp. Kentucky Space carries out mission-based student team projects, from high-altitude balloons at the edge of space to its first sub-orbital space mission in 2007.

Jacob Gamsky and Amber Gay and their mentors, Philip Metzger and Alan Male of the University of Kentucky, analyzed lunar soil from the permanently-shadowed craters of the moon; Garrett Ridge and faculty guides Olfa Nasraoui and Nurcan Durak of the University of Louisville facilitated analysis of databases of solar satellite images by a computer algorithm for finding coronal loops; and Joseph Wilkins and mentor Benjamin MacCall of the University of Louisville transposed governing equations that describe the dynamics of a fluid to a series of calculations that could be done on a computer.

Sudan Loganathan (left) and Michael Creed (right), both of Murray State University, explain their research to Dr. Melvin Henley, State Representative and former educator.

Bat populations were studied for the accumulation of mercury in their fur by Melinda Rucks and Natosha Mulholland, and faculty mentor Cathleen Webb of Western Kentucky University. "Decontamination Strategies to Stop the Spread of White-Nose Syndrome," a deadly infestation of hibernating bats caused by the fungus *Geomyces destructans* and spread by humans from cave to cave, was the report of Elizabeth Shelley, guided by Hazel Barton of Northern Kentucky University. Other ecological themes included the environmental monitoring of Bee Creek and Clarks River in Kentucky by Erica Riley, Kristi Adair, Harry Anderson, Ashley Driver, Emily Morris, and Ashley Winkler, under the guidance of Bommanna Loganathan, from Murray State University; a report on efforts in conservation of eastern bluebird (*Sialia sialis*), by Matthew Kessinger and Jordan Myers, guided by Micah Perkins, of Owensboro Community & Technical College; and the establishment of Griffith Woods Research Farm to preserve the bur-oak/blue-ash ecosystem of the Inner Bluegrass region, by Richard Coy and Philip Houtz, guided by Lynne Rieske-Kinney and Bruce Webb, of the University of Kentucky.

Several projects represented the Gatton Academy for Mathematics and Science of Western Kentucky University, in which students obtain high school credits while simultaneously starting their college careers in science. Alexander Hare, Ben Neal, Jae Lee, and Paul Kasinski, with the guidance of Claire Rinehart and Kinchel Doerner, compared genome sequences of *Clostridium scatologenes* to *Moorella thermoacetica* in order to determine their functions and proteins.

Research with applications were projects in agriculture by students from Kentucky State University. La'Quida Bowie, guided by Kirk Pomper, Li Lu, Jeremiah Lowe, and Sheri Crabtree, studied genetic diversity in the North American paw-paw (*Asimina triloba L. Dunal*). Fellow student Ashley Mack, guided by John Sedlacek, Karen Friley, Kirk Pomper, and Jeremiah Lowe, studied the insecticidal activity of "Ripe Paw-Paw Fruit Extract for Managing Striped Cucumber Beetle on Squash." Kentucky State University serves as the USDA Clonal Germplasm Repository for pawpaw. James Morris, guided by Norman Strobel, from Bluegrass Community & Technical College, assessed three culture media on production of *Xanthomonas campestris* pathovar *vesciatoria*, a bacterium which produces a potentially useful antioxidant in its cell wall.

Other applied research provided a look at the importance of the defendant's demeanor and direction of gaze in the courtroom, by Alexandra Domatov, Elizabeth Dunn, Lauren Fields, and Theresa Simcic, guided by Jonathan Golding of the University of Kentucky. "Household Niches of *Pseudomonas aeruginosa*," a bacterium that often affects cystic fibrosis patients unable to battle bacterial infections in the lung, were analyzed by Aakriti Mehta under the direction of Susanna Remold of the University of Louisville. A field study assessing the impact of sewage sludge or yard waste compost as soil amendments on herbicide mobility was carried out by Rachel Hayden, guided by George Antonious and Tejinder Kochhar of Kentucky State University.

An Investment in the Future of Kentucky

The exhibition Posters-at-the-Capitol is vital to its participants and to the life of the colleges and universities that sustain undergraduate research. On this day, legislators have a chance to talk directly with their young constituents, and see the products of their research efforts. Students spoke of plans to return to their home states or to enter Kentucky graduate schools in science areas. Some of these students will continue to pursue themes of research started as undergraduates. Some project themes will evolve as the life work of their researchers.

The efforts of faculty mentors who bring opportunities to undergraduate students in Kentucky colleges and universities cannot be overestimated. Through real-time, hands-on research experiences, students are shaped who will become scientists and a scientifically-informed workforce. Bruce Kessler, Professor of Mathematics and Assistant Dean of Ogden College of Science & Engineering at Western Kentucky University commented on the event: "P@C ...was an excellent learning and growing experience for our students that were invited. The capitol building is an excellent venue for displaying their high-quality research with our faculty, and the peer group they interacted with at the event helped them gauge their own abilities. The students...enjoyed having a role

Student participants and faculty mentors from the 9th annual Posters-at-the-Capitol gather for a photograph with Council on Postsecondary Education Interim Vice-President Aaron Thompson (pictured far left, second row front).

in the advocacy for higher education and undergraduate research. ..I fear that, too often, 'higher education' is just a line in the budget- a potential cut when the budget needs balancing. When a legislator takes the time to look these students in the eye and listen to the research in which they are engaged, it personalizes the process, and really drives home the point that these students are the future of Kentucky, and they need our help."

In 2011, P@C will celebrate 10 years in the capitol rotunda with festivities, but perhaps more importantly, with research projects that demonstrate the values and purpose of the Kentucky state colleges and universities.

Members of the P@C organizing committee and their colleges and universities and email addresses are below. Please contact them with your questions about how to submit a research project.

John Mateja, Chair of the P@C Organizing Committee, Murray State University, john.mateja@murraystate.edu
Jody Cofer, Murray State University, Jody.cofer@murraystate.edu
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Daniel Curtin, Northern Kentucky University, curtin@nku.edu
Mary Janssen, Kentucky Community & Technical College System, marye.janssen@kctcs.edu

Submitted by Mary Janssen,
KCTCS Representative, P@C Organizing Committee,
At-Large Prepresentative, KAS Governing Board

Carol Martin Gatton Academy of Mathematics and Science in Ky

Students at the Carol Martin Gatton Academy of Mathematics and Science in Kentucky spend their junior and senior years of high school taking college classes at Western Kentucky University. While the classroom environment affords students the opportunity to study advanced mathematical and scientific concepts, the opportunity to conduct and share scholarly research alongside faculty members allows them to see those concepts in the real world.

During the fall 2009 semester, 70 Gatton Academy students participated in mentored research projects with WKU professors. Fourteen of these students presented their research at local, state, and national academic conferences. These are big opportunities for our students and would not be possible without the strategic partnership the Gatton Academy has with WKU and the Ogden College of Science and Engineering.

Katie Brown, a class of 2010 student from Shelby County, presented at The University of Nebraska - Lincoln's 2009 Conference for Undergraduate Women in Physics. The conference presented an outstanding opportunity for students like Katie to expand upon their current research experiences, interact with physics students from other universities, and attend scientific talks given by invited physicists from other Midwestern universities.

As one of the conference's youngest participants, Katie expressed she was a bit nervous leading up the session: "Presenting to such a large community of my peers was a nerve racking prospect, but after getting on stage I was able to focus on my research and connect with the audience."

In addition to lectures, social activities provided time for participants to share their experiences and interests with other students. These experiences provided opportunities for students to develop their ability to convey ideas, establish relationships with other physicists, and obtain advice and guidance for pursuing career goals.

Katie, like other Academy students, sees research as an important first step in preparing for careers in STEM disciplines. "Research is a very important part of the Academy experience because it allows you to apply the knowledge you learned in the classroom - practically," Katie noted. "If you foresee research in your career, it is a great way of actively preparing for your future educational prospects and even your occupation."

Derick Strode, the Gatton Academy's coordinator for research, scholarships, and internships, sees a variety of benefits for students participating in research. "When Gatton Academy students engage in research, they have the incredible opportunity to actually create new knowledge," Derick said. "By understanding the relationship of textbook knowledge to real-world applications early, our students will be the scientists, engineers, and mathematicians that find ways to improve each of our lives in the future."

Ballard Metcalfe, a class of 2010 student from Henry County, thinks that a student's role in creating that kind of change doesn't have to wait. Ballard, along with representatives from six other specialized high schools, shared research on reducing greenhouse gas emissions to The Keystone Center's National Energy Board in a session held in Washington, D.C. The Energy Board is a unique group of 50 national leaders on energy policy issues.

Schneider Hall proves a living/learning environment for the Academy. Student wings provide housing with residential counselors; academy offices are located on the first floor.

Ballard wasn't worried that his audience would dismiss the group's message because of their age. Instead, it made him all the more confident. "Students are able to create solutions that are ultimately bipartisan and pragmatic solutions, without many of the anxieties our current leaders face, such as protecting their own power," Ballard said. "We are objective, and our only goal is for the future."

Sustainability and practical energy solutions were also on Thomas Choate's mind when presenting to the Bowling Green City Commission. Thomas, a class of 2010 student from Warren County, conducted applied research under the supervision of Nancy Givens, Sustainability Programs Development Coordinator with the WKU Center for Environmental Education and Sustainability.

Sustainability indicators recognize the essential links between the economic, social, and environmental aspects of a community and are used to identify problem areas and develop solutions that impact all areas. For example, poor air quality (environmental) may affect asthma rates (social) and worker productivity (economic).

By improving air quality, cities can positively impact social and economic factors in the community as well. Within a sustainability framework, "development is about improving aspects of the community and the environment that contains that community without detrimental effects to other aspects; it is not about growth beyond our means or growth at the expense of others or our environment," said Thomas.

While students like Katie, Ballard, and Thomas were sharing findings developed over the last year, many students were engaging in research for the first time.

"The fall semester 2009 was a huge success, too, because three out of every five first-year students started a research project," Derick said. "These students will have the opportunity to develop their projects over the course of their two years at the Gatton Academy, which will lead to richer and more meaningful research experiences."

Submitted by Corey Alderdice, Asst. Director, Admissions and Public Relations, The Carol Martin Gatton Academy of Mathematics and Science in Kentucky

Kentucky In Space

At 10:11 AM Saturday, March 27, 2010, the Kentucky Space (KS) spacecraft Frontier 1 was successfully launched and inserted into space reaching an altitude of approximately 270 kilometers. The spacecraft, which weighs about four pounds, was launched at the NASA Wallops Flight Facility in Virginia on a Terrier-Improved Malemute NASA rocket.

This mission represents the first time that Kentucky has ever developed, built and successfully inserted a free-flying spacecraft into space. At T+72 seconds after launch, Frontier 1 (codename: ADAMASat) was successfully ejected from the NASA launch vehicle into space. After fulfilling its mission objectives, Frontier 1 began the normal decay of its trajectory, burning-up as it reentered the Earth's atmosphere.

The spacecraft was designed and built in Kentucky by KS to test hardware and software subsystems that will be flown on an orbital satellite called KentuckySat 1 (KySat 1) scheduled to be launched with the NASA Glory Mission in November 2010.

"Advances in micro-technology and miniaturized systems have made possible the development of small but potentially high-value spacecraft and payloads," said Kris Kimel, president of the Kentucky Science and Technology Corporation, managing partner of Kentucky Space.

A team of Kentucky Space students and faculty mission advisors were on-site for the spacecraft integration, countdown process and launch. The students also managed ground stations at Wallops and were supported by stations at Morehead State University, the University of Kentucky and the U.S. Naval Academy in Annapolis. The launch was broadcast live on NASA TV. Launch images (right) and more information on this mission are available at www.kentuckyspace.com.

Kentucky Space is a nonprofit enterprise involved in designing and developing educational, R&D and entrepreneurial space platforms. It is a consortium involving students and the combined resources and capacity of the University of Kentucky, Morehead State University, the University of Louisville, Western Kentucky University, Murray State University, the Kentucky Community and Technical College System, the Kentucky Space Grant Consortium, and Belcan…with support from the Kentucky Council on Postsecondary Education. The managing partner and founder of Kentucky Space is the Kentucky Science and Technology Corporation.

Kentucky Space recently formed a joint venture with NanoRacks LLC, a Houston-based aerospace company, to facilitate and undertake scientific research and related activities on the International Space Station (ISS).

On Monday, April 5, 2010, unique space technology developed by Kentucky Space and its partner, Houston-based NanoRacks LLC (NR), was flown on the shuttle Discovery to the International Space Station (ISS). As part of the mission, the crew delivered to ISS the first NanoRack R&D platform and initial two CubeLab™ research modules, co-designed and built by NanoRacks and Kentucky Space. The CubeLab modules are designed for use within the NanoRacks platform in the pressurized space station environment, with length, width and height of 10 cm each and a mass of 1kg…larger extended CubeLabs are also possible. Each CubeLab module serves as a mini-laboratory uniquely configured to conduct a particular type or set of experiments.

Up to 16 of NR/KS CubeLab modules can be inserted into a NR platform on the ISS. Each is designed to plug into a standard USB connecter providing structural, electrical, and data connectivity in one single operation. A second NR and set of CubeLabs are scheduled to go to ISS on a May 2010 shuttle launch. Once fully operational the NR Platforms will serve as a ongoing R&D lab for educational and commercial users…helping to further extend a new era of entrepreneurial space opportunities.

Continuity of flights to the International Space Station for the NanoRacks/Kentucky Space venture is assured even after the retirement of the space shuttle fleet. NanoRacks is negotiating with NASA for access to the Russian cargo ship called Progress, the Japanese cargo launch vehicle H-II Transfer Vehicle and the French Automated Transfer Vehicle (ATV). These vehicles are available now and will assure regular access for NanoRacks/ Kentucky Space payloads to the space station. Return of actual payloads, when necessary, will be accomplished via the Russian Soyuz vehicle. Further on NanoRacks will work with the new generation of U.S. launch vehicle companies.

"This NR/KS initiative seeks to encourage space station and microgravity research at affordable prices and on a regular basis," explained NanoRacks Managing Director Jeffrey Manber. "By adopting this versatile and accessible platform for industrial and educational space research, we expect to stimulate a new generation of space station users, just as CubeSats have done for microsatellites."

Experiments in biomedicine, pharmaceuticals, novel materials, energy, education and other areas can be undertaken on this platform.

"Advances in nanotechnology and the ever increasing miniaturization of electronics, is making possible the development of lower cost, but potentially high-value ISS payloads…" said Kris Kimel of Kentucky Space.

For more information, please contact Kris Kimel at (859) 229-6161 (cell) or kkimel@kstc.com or Jeffrey Manber (202) 413-0621 (cell) or jmanber@rocketmail.com. Pictures and more information on the mission should be available after the shuttle launch on the Kentucky Space and NASA web sites (NASA.gov).

Submitted by Dr. John Matega, Murray State University

Kentucky Junior Academy of Science

The 2010 meeting of the Kentucky Junior Academy of Science was held on Saturday 17th April on the campus of the University of Kentucky. Over 100 students from 9 schools participated in the event. Many thanks are due to all the judges who gave of their time on April 17th.

Grand Prize Winners
Alice Darling, DuPont Manual
Jack Grundy, DuPont Manual
Kartik Malhotra and Rohun Kulkarni (Team), Dupont Manual
Tamas Nagy and Patrick Michael (Team), P. L. Dunbar

KJAS 2010 grand prize winners with KAS President Dr. Nancy Martin.These students will represent Kentucky at the American Junior Academies of Sciences national meeting to be held in conjunction with the AAAS/NAAS February 2011 meeting.

New KJAS officers with KAS President Dr. Nancy Martin: (left to right) Secretary Monica McFadden, Vice-President Jayan Hewdparakrama, and President Patrick Michael.

All 2010 KJAS award winners.

Middle School Winners
Daniel Sedlaceck
Muadh Ghuneim
Philip An
Ben Smith
Halis Karic

Behavioral and Social Sciences

1st Place	Miriam Abbas
2nd Place	Zack Uhlenhuth
3rd Place	Matthew Graves

Biological Topics I, II

1st Place	Alice Darling, Yuyao Ding
2nd Place	Dihu Godage, Mary Richardson
3rd Place	Thwisha Joshi, Justin Grall

Botany and Zoology

1st Place	Nick Uhlenhuth
2nd Place	Alexander Yson
3rd Place	Anna Zolg

Chemistry

1st Place	Rohun Kulkarni and Kardik Malhotra (Team)
2nd Place	Camille Turner
3rd Place	Margaret Chopra

Computer Science and Mathematics

1st Place	Vedant Kumar
2nd Place	Ankush Gupta
3rd Place	Oreoluwa Babarinsa

Engineering/Physics/Earth/Space Groups I , II

1st Place	Suhas Bharadwaj, Jayan Hewdparakrama
2nd Place	Lori Wilson, Kelly Kleier
3rd Place	Lucas Do, Anuj Patwardhan

Environmental Science

1st Place	Jack Grundy
2nd Place	Monica McFadden
3rd Place	Kyle Ritter

Microbiology

1st Place	Tamas Nagy and Patrick Michael
2nd Place	Pratik Bhade
3rd Place	Jonathan Chen

Submitted by Ruth E. Beattie, Director
Kentucky Junior Academy of Science

2010 Kentucky Science and Engineering Fair

Eastern Kentucky University hosted the eighth annual Kentucky Science and Engineering Fair (KY-SEF) for middle school and high school students Saturday, April 3, 2010. There were 114 projects entered; the Best of Fair winners are listed below.

HIGH SCHOOL DIVISION

Physical Sciences
1st Megan Perkins (Energy & Transportation) - duPont Manual
2nd Suhas Bharadwaj (Engineering -Mat. & Bio) - duPont Manual
3rd Megan Mercer (Engineering -Elect. & Mech) - Ballard

Life Sciences
1st Jeremy Zhao (Medicine & Health Sci.) - Paul L. Dunbar
2nd Vedant Kumar (Animal Sciences) - duPont Manual
3rd Joshi Thwisha (Microbiology) - duPont Manual

Team
1st Kush Nijhawan/Neil Nijhawan - duPont Manual
2nd Tamas Nagy/Patrick Michael - Paul L. Dunbar
3rd Kartik Malhotra/Rohun Kulkarni - duPont Manual

High school Best in Fair winners.

MIDDLE SCHOOL DIVISION

Physical Sciences
1st Erik Rosenstrom (Physics & Astronomy) - Barrett Traditional
2nd Matthew Russell (Engineering) - Home School
3rd Andrew Hardy (Energy & Transportation) - Winburn

Life Sciences
1st Catherine O'Conner (Med. & Health Sci.) - St. Francis of Assisi
2nd Poonum Haldankar (Biochemistry) - Meyzeek
3rd Samantha Grace-Mudd (Plant Science) - St. Francis of Assisi

Team
1st Breckinridge Stodghill/Sammy Moorin - Meyzeek
2nd Jake Adams/Andrew Brooks - Sayre

Middle school Best in Fair winners.

Continued on page 12

KY Girls STEM Collaborative Conference

On Monday, June 21, 2010, the Kentucky Girls STEM (Science, Technology, Engineering and Math) Collaborative, in partnership with the University of Louisville, will hold its Second Annual Conference, "STEM Innovations: Next Generation, Pathways to Success for Girls," at the University of Louisville Shelby Campus.

Educators, business and community leaders, parents and girls are invited to come explore up-and-coming career opportunities in science, technology, engineering and math and to learn proactive steps to help girls overcome roadblocks to their success in these fields.

Executive Vice President and University Provost of the University of Louisville, Dr. Shirley Willihnganz, will kick off the conference with a welcome message at 9:00 a.m. Following this, Kris Kimel, President of the Kentucky Science and Technology Corporation and an expert in the fields of science and technology policy, programs and entrepreneurship, will speak about ground-breaking opportunities in STEM fields in the next few years.

Morning events will also include an Industry Showcase, in which attendees will have the opportunity to visit with representatives from prominent Kentucky businesses who will talk more specifically about their organization's state-of-the-art technology, their workforce needs and future opportunities for girls.

Following the showcase, Catherine (Kitty) Didion, Director of the Committee on Women in Science, Engineering, and Medicine (CWSEM) of the National Academies will speak about current national STEM issues. In addition to her work for CWSEM, Didion is a Senior Program Officer at the National Academy of Engineering and is Project Director for the Engineering Equity Extension Service Project. Didion is an internationally recognized expert on issues of equity and gender in science and engineering.

Lunch will be provided on-site. Throughout the lunch hour participants will have the opportunity to network with other guests and interact with past mini-grant recipients at a Mini-grant Exhibition.

The keynote speaker for the afternoon, Dr. Andresse St. Rose, will present on the latest studies released in the book she co-authored, Why So Few? Women in Science, Technology, Engineering, and Mathematics. St. Rose is a research associate at the American Association of University Women (AAUW), where she focuses on gender equity in education and the workplace, and is a co-author of another publication, Where the Girls Are: The Facts About Gender Equity in Education.

The afternoon will also feature smaller group discussions on implementing recommendations that will increase the representation of females in the STEM classrooms and in the STEM workforce.

Door prizes from local and state sponsors will be raffled off at the end of the conference!

Please visit www.ngcproject.org/events/events.cfm to register for the conference. We look forward to seeing you there!

Submitted by Andrea Lamb, KY Girls STEM Collaborative Conference Coordinator

KCTCS Science Faculty in Agreement with American Chemical Society Statement on Laboratory Simulations

At the KCTCS Science Faculty session during the annual meeting of the Kentucky Academy of Science, members present expressed concern over the increasing substitution of lab simulations for real-time labs in areas of sciences, and the resulting decrease in opportunities for community college students to gain experience with real materials and procedures.

Members agreed with the statement of the American Chemical Society (ACS) regarding the need for real-time labs using real materials in science courses. In accordance with that statement, members agreed that "Computer simulations that mimic laboratory procedures have the potential to be useful supplements, but should not be considered equivalent replacements for hands-on experiences critical to chemistry courses at any level" (American Chemical Society Committee on Education, ACS Guidelines for Chemistry in Two-Year College Programs, Spring 2009, www.acs.org/education; also Public Policy Statement 2008-2011, www.acs.org/policy)

While it was recognized that use of online labs sustains enrollment numbers, and may be advantageous for students who are unable to get to campuses, several objections to online labs were voiced. These included the predictable nature of online simulations which often produces disinterested students. Prepared outcomes in computer simulations do not allow for the anomalies, the surprising results, the unpredicted failures that arise from real-time science projects using real materials. These unexpected findings are often the basis of new questions and research, and can excite and engage students in the "here-and-now." It was noted that during online computer tasks and laboratories, problems arise not from the content of the science but from the use of the computer technology. Lack of control over non-proctored tests, and the use of "surrogate students" and "group work" for performing online tasks are problems generally encountered across colleges and universities using online materials.

Since the experiences of laboratories with real materials and online simulations are different, the KCTCS science faculty further agreed with the ACS recommendation for a distinction between online and hands-on labs on official transcripts: "Because computer simulations are not a substitute for hands-on laboratory experience, academic transcripts should clearly disclose whether a...laboratory course is hands-on or simulated." (ACS Public Policy Statement 2008-2011).

About twenty members of the KCTCS science faculty signed a letter to KCTCS Chancellor Box stating agreement with the American Chemical Society position. Faculty signatures represented KCTCS colleges of Ashland, Big Sandy, Jefferson, Madisonville, Maysville, Somerset, Southeast Kentucky, and West Kentucky Community & Technical College Districts. Acting in accordance with further recommendations of the APS for two-year college programs, science faculty at KCTCS continue to pursue research projects using the scientific method in and out of regularly-scheduled course/lab time: "Student-centered research projects can be pursued independently or integrated into the curriculum. Projects can be conducted on campus, in the facilities of partnering institutions, or in other scientific facilities...Student-centered research, which provides exceptional mentoring opportunities, can can be an enriching experience for faculty members as well." (ACS Guidelines for Chemistry in Two-Year College Programs)

In recent years, KCTCS has become an Enhanced Affiliate member of the Kentucky Academy of Science, giving formal recognition to the meeting of community college science faculty traditionally held in conjunction with the KAS annual meeting. It is hoped that the letter to Chancellor Box may start a dialog between KCTCS science faculty and administration, through the newsletter of the Kentucky Academy of Science, and through direct communications to administrators from the science faculty as members of the Kentucky Academy of Science.

Submitted by Mary Janssen
Member-at-Large, KAS Governing Board

2010 KY-SEF...continued

KAS members who served as judges for the 2010 KY-SEF were:

Sanjeev Adhikari
Ruth Beattie
Rob Bragg
Martin Brock
Doug Chatham
Ann Cooper
Barbara Davis
John Delfino
Timothy Dowling
Rick Dye
Brent Eldridge
Charles Elliott
Benjamin Freed
Malcolm Frisbie
Mary Robert Garrett
Donna Gaus
Wilson Gonzalez-Espada
Patrick Gooding
Sarah L Hall
Eve Hiatt
John Hoppe
Jennifer Jackson
Ronald Jones
Karan Kaul
Sherie Kendall
Syed Khundmiri
Kari Kratzenberg
Sadeta Krijestorac
Chris Laird
Joseph Lutz
Rajeev Madhavannair
Andy Martin
John Medley
Ron Miller
Laurel Morton
Schyler Nunziata
Marcia Pierce
Jerry Pogatshnik
Narayanan Rajendran
Tanea Reed
Robert Rosenberg
Bill Staddon
Melony Stambaugh
Nathan Tice
Avinash Tope
Jing Wang
Ilsun White
Andrew Wigginton
Demetrio Zourarakis

Submitted by Robert Creek, KY-SEF State Fair Director and Barbara Ramey, Chair, KY-SEF Local Arrangement Committee

High school and middle school competitors await the judges at the 2010 KY-SEF held April 3rd in EKU's Alumni Coliseum.(Photo by John Sedlacek)