



Kentucky Academy of Science

NEWSLETTER

*The Voice of Science
in Kentucky*

www.kyscience.org

Susan Templeton, Editor

May 2011

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- Spalding University
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Faculty, staff and students at Enhanced Affiliates receive:

- free KAS membership
- online access to KAS Journal
- KAS Newsletter via e-mail

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...

As we all begin to enjoy the spring and summer weather, we cannot ignore concerns that are facing science in Kentucky. The Academy continues to monitor activities in Frankfort. With the conclusion of the latest session of the Legislature, there is one bill that specifically drew our attention. HB 464 deals with "the correction of factual error in state-adopted textbooks." The wording of the bill is as follows: "1) The Kentucky Board of Education shall promulgate administrative regulations to establish procedures for reviewing and resolving claims of factual errors found in textbooks after adoption by the State Textbook Commission. The administrative regulations shall include: ... (b) A methodology for validating the accuracy of a claim of factual error;..." [<http://www.lrc.ky.gov/record/11RS/HB464.htm>] Although this bill applies to all disciplines, the KAS Board of Directors felt it important that the Academy offer its services to the Kentucky Board of Education in providing expert opinions in the areas of science. A letter conveying our offer has been sent, and, if our offer is accepted, we need to have ready panels that would serve as advisors to the state Board. Therefore, a list of KAS members who would be willing to serve on review panels in the various areas of science should be developed. This is an important task that can insure that Kentucky's students will continue to have accurate information in all realms of science. If you are interested in serving on panels that encompass the broad areas of scientific disciplines (e.g., biology, chemistry, physics, etc.) please contact our Executive Director, Jeanne Harris.

I wish to thank all members of the Academy who have stepped up and contributed to the fund raising campaign for undergraduate research. We have received to date approximately \$1200. This amount has certainly ensured that we will be able to fund some of our undergraduate projects. However, this is not the end of this campaign. Please remember that 2011 is a new fiscal year, and that your tax-deductible contribution this year will still be of value in allowing us to continue to support worthy students.

As a service to the Academy, I wish to remind you to submit nominees for the KAS Superlative Awards. You will find an article on the Awards in the interior of the Newsletter; please consider colleagues that deserve recognition and submit their names to Cheryl Davis by June. I also wish to encourage you to consider running for the various elected positions that will be open this year. Serving on the Board is an excellent way to become acquainted with the workings of the Academy and promoting our efforts across the Commonwealth.

I know many of you are hard at work on research projects this summer; please consider presenting your findings at our fall meeting at Murray State University. The Program Committee is hard at work preparing an exciting meeting, including an interesting Symposium for Friday night. We look forward to seeing you at Murray on November 4 and 5!

-- Barbara Ramey, KAS President

Inside this issue

Messages from the Executive Director	2	<i>Science Across the Commonwealth</i>
2011 Annual Meeting Information	2	Posters at the Capitol 2011
WKU's Hoffman Environmental Research Institute Hosts International Conference	3	Transforming Education for a Brighter Tomorrow
Geology and Microbiology Officer Updates	3	Kentucky Junior Academy of Science
Passing of Dr. Timothy D. Murphy	3	2011 Kentucky Science and Engineering Fair (KY-SEF)
KAS Research Funds Awarded	3	Spotlight on Mentors: Felix Akojie
Support Undergraduate Research Grants	3	Third Annual KY Girls STEM Collaborative Conference
Call for Nominations for the KAS Governing Board	4	Kentucky Heritage Land Conservation Fund Invasive Species (Part I): Aquatic Ecosystems
Journal Editor Needed!	4	
Call for Nominations for Superlative Awards ..	4	
Postdoctoral Position Opening	4	

Messages from the Executive Director

KAS continues to grow! Midway College recently joined KAS as an enhanced affiliate. Also, please welcome Barry Nichols as our newest Lifetime Member. Thank you for your support!

I encourage all faculty, staff, and students at our 17 enhanced affiliates to tell your colleagues about the complimentary KAS memberships available to them. To join KAS as an enhanced complimentary member go to the KAS website:

www.kyscience.org, click join on the top tool bar, click join and pay online, select enhanced "Yes"/submit and join KAS using your email address affiliated with your organization, i.e., Sophiejones@yourschool.edu. To receive discounts you must join KAS and activate your account prior to pre registering for the annual meeting.

As a KAS member, you have access to the online KAS membership directory. Please note some of our members have selected the privacy option and hence, their names are not displayed in the directory. If you are a member and would like your name displayed in the online directory but do not see your name listed, please check your privacy option.

I look forward to seeing many of you at the 2011 Annual Meeting at Murray State! Please note a change regarding online pre registration. In 2011, KAS will be charging a \$5 fee for Undergraduate Research Competition (URC) and Graduate Research Competition (GRC) participants to attend the annual awards banquet. We have seen a growing number of URC participants request free tickets and then not attend the banquet. In fact, we counted approximately 70 empty seats at the 2010 banquet and KAS was required to pay for these open seats. Also note in 2010, GRC participants paid \$25 for banquet tickets. To address these concerns, the Governing Board of KAS has implemented a modest \$5 banquet fee for URC and GRC participants in hope this action results in not only a better attendance at the banquet, but also a better utilization of the assets of KAS.

Lastly, if you would like to follow KAS on Facebook, sign up on the new Facebook link off the KAS homepage:

www.kyscience.org

Best wishes,

Jeanne Harris, KAS Executive Director
executivedirector@kyscience.org



KAS 97th ANNUAL MEETING

Hosted by Murray State University

(TENTATIVE PROGRAM)

FRIDAY, NOVEMBER 4, 2011

- 3:30 p.m. - 6:00 p.m. KAS Governing Board Meeting
- 6:00 p.m. - 7:30 p.m. Registration
- 7:00 p.m. - 8:00 p.m. SYMPOSIUM
- 8:15 p.m. - 9:00 p.m. KAS Sectional Officers Meeting
- 8:15 p.m. - 10:30 p.m. Social

SATURDAY, NOVEMBER 5, 2011

- 7:00 a.m. - 5:00 p.m. Registration
- 8:00 a.m. - 4:00 p.m. Exhibitors
- 8:00 a.m. - 4:00 p.m. Power Point Presentations
- 8:00 a.m. - 4:00 p.m. Scientific Posters on Display
- 9:30 a.m. - 9:45 a.m. Refreshment Break
- 9:45 a.m. - 11:30 a.m. Power Point Presentations
- 10:00 a.m. - 11:30 a.m. Kentucky Community & Technical College Meetings
 - Faculty Meeting
 - Biology Faculty
 - Chemistry Faculty
 - Physics Faculty
- 11:30 a.m. - 12:45 p.m. Lunch
- 11:30 a.m. - 12:45 p.m. KAS Past President's Luncheon
- 1:00 p.m. - 2:15 p.m. Power Point Presentations
- 2:15 p.m. - 2:30 p.m. Refreshment Break
- 2:30 p.m. - 4:00 p.m. Power Point Presentations
- 4:15 p.m. - 5:15 p.m. PLENARY SESSION
- 5:30 p.m. - 6:30 p.m. Annual KAS Business Meeting /Reception
- 6:30 p.m. - 9:00 p.m. ANNUAL AWARDS BANQUET

Hotel rooms blocked for the KAS meeting (cutoff date is Oct1st):

Hampton Inn and Suites (25 rooms) - \$99.00 plus tax
1415 Lowes Drive, Murray, KY 42071
Phone: 270-767-2226

Holiday Inn and Suites (20 rooms) - \$94.50 plus tax
1504 N 12th Street, Murray, KY 42071
Phone: 270-759-4449

Baymont Inn and Suites (30 rooms) - \$69.00 plus tax
1210 N 12th Street, Murray, KY 42071
Phone: 270-759-5910

WKU's Hoffman Environmental Research Institute Hosts International Conference



Western Kentucky University's Hoffman Environmental Research Institute is pleased to host the International Conference on Karst Hydrogeology and Ecosystems, June 8-10, 2011 in Bowling Green, Kentucky.

This will be a joint meeting of the Karst Commissions of the International Association of Hydrogeologists, the Union Internationale de Spéléologie, and UNESCO's International Geoscience Program. There will be a pre conference field trip June 4-7 to eastern Tennessee.

Regular Registration is open from April 16, 2011 through June 3, 2011. Please see <http://hoffman.wku.edu/2011karstconference/> for more information.

Geology and Microbiology Sectional Officer Updates

Thomas Brackman (brackmant1@nku.edu) will fill the vacant office of Secretary of the Geology Section for 2011. Andrew C. Kellie (andy.kellie@murraystate.edu) serves as the Section Chair. Janelle Hare (jm.hare@morehead-st.edu) will serve as the 2011 Microbiology Section Chair and Marcia Pierce (marcia.pierce@eku.edu) will be Secretary of this section.

Passing of Dr. Timothy D. Murphy

Northern Kentucky University Anthropology Professor Dr. Timothy D. Murphy passed away on January 24. He had been unable to return to teaching after suffering a stroke in August 2010 just before the beginning of fall semester. He died in Pennsylvania, near the home of one of his sons, surrounded by his family. His colleagues, students, and former students are in shocked disbelief because we had so wished for his recovery and thought that he was making progress.

Tim earned his Ph.D. in anthropology in 1984 from the University of Pittsburgh and was with NKU for 21 years teaching courses for anthropology, international studies, Latin American and Caribbean studies, and Spanish.

Most of his research and publication focused on the contemporary Aztec people of the Tlaxcala/Puebla region of Mexico. On some occasions NKU students accompanied him on his research trips. Tim was a past secretary of the Anthropology Division of the Kentucky Academy of Science. For years he was the faculty sponsor of the NKU Student Anthropology Society.

He will be greatly missed.

*Submitted by Dr. Sharlotte Neely
Northern Kentucky University*

KAS Research Funds Awarded

The following awards were approved by the KAS Governing Board at the February 12 Board Meeting.

Marcia Athey Grant

Judith Metcalf / Sarah Emery, University of Louisville: Effects of an invasive plant (*Microstegium vimineum*) on Arthropod foodwebs in an Eastern deciduous forest (\$3,000)

Botany Funds Grants

Michael Stokes / Andrea Falcetto, Western Kentucky University: Greater galagos as an indicator of forest health (\$750)

Special Research Program Awards

Bruce Schulte / Emily McIntire, Western Kentucky University: Leadership and Personality Attributes in African Elephants (\$4,800)

Undergraduate Research Program Awards

Research Supplies - Matthew Engler, Asbury University: A survey of the distribution and habitat preferences of the crayfish of Hickman and Jessamine Creek (\$490)

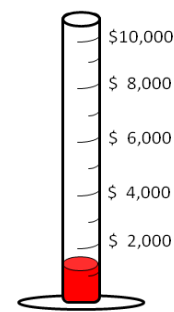
Summer Research - Nilesh Sharma, Western Kentucky University: Studying Effects of Plumbagen on Experimental Ulcerative Colitis (\$3,000)

The efforts of the reviewers (Dr. Antonious, Kentucky State; Dr. K. C. Russell and Dr. Rebecca L. Kelley, Northern; Dr. Gary Ritchison, Eastern; Dr. Ricky Cox, Murray; and Dr. Ilson White, Morehead) are deeply appreciated.

Coming in June! Applications for 2011 Grants will be submitted online. Applications for 2012 grants are due by November 15, 2011. KAS is in the process of updating the website and will notify the membership when the application becomes available. For further information please contact Dr. George Antonious, Awards committee chair, george.antonious@kysu.edu.

Support the Undergraduate Research Grants

At this time, KAS has raised \$1,250 toward our goal. You can donate via credit card or PayPal account at www.kyscience.org by selecting "Donate Support Research Grants" found at the bottom of the KAS homepage OR you can send a check payable to KAS to PO Box 22579 Lexington, KY 40522-2579. KAS is recognized by the IRS as a tax exempt organization under section 501(c)(3) of the Internal Revenue Code. KAS will send a receipt to acknowledge your tax deductible contribution.



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
- Secretary
- Treasurer
- At Large Representative
- Biological 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, 2011** to:

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

Journal Editor Needed!

The Kentucky Academy of Science is looking for a person to assume the role of the Editor of the *Journal of the Kentucky Academy of Science*. The person should be an established scientist and have a solid publication record and preferably some previous editorial experience. The Editor should have a strong grasp of the English language including basic grammar and syntax. The position is open to people in any aspect of science covered by the Academy. Time commitment for the position averages 4-5 hours per week. A modest stipend is provided. For further information, contact David S. White (270-474-2272 or david.white@murraystate.edu) or Jeanne Harris (859-22702837 or executivedirector@kyscience.org) or visit <http://www.kyscience.org/members/employment.php>.

Thank you to Dr. David White who has served as an outstanding Editor of the Journal of KAS since 2006. Dr. White is stepping down from the Editor position but will continue as the Associate Editor to ease the transition for the new Editor.

Call for Nominations for Superlative Awards

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 (non-academic)

Detailed criteria for each category are available online at www.kyscience.org/content/nominations.php. Nomination packets for all awards should include an abbreviated curriculum vitae (5 pages or less) containing information pertinent to the award as well as a list of publications, and letters of recommendation from two to three professional colleagues well acquainted with the candidate's qualifications for the award. Letters of recommendation for secondary school teachers may also come from an administrator or supervisor, a teaching colleague, a student, or a parent.

June 30, 2011, is the 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. Cheryl Davis
1906 College Heights
Department of Biology
Western Kentucky University
Bowling Green, KY 42101
cheryl.davis@wku.edu
270-745-6524

Postdoctoral Position Opening

The selected candidate for this position will be supported by a CAREER grant from the National Science Foundation and will be immediately involved in a collaborative project with a group from Vanderbilt University School of Medicine to carry out structural and functional analysis of evolutionarily conserved components of large ribonucleoprotein complexes from germline stem cells in the fruit fly, *Drosophila*. In addition, proteomics and genetic approaches will be employed to study the molecular mechanisms of germline stem cell development. This position is available immediately in the laboratory of Dr. Alexey Arkov, Department of Biological Sciences, Murray State University (www.murraystate.edu/arkovlab/). Experience in protein expression in eukaryotic cells and protein purification is desirable but not required.

Interested applicants are invited to e-mail a CV and contact information for three references to Dr. Arkov at alexey.arkov@murraystate.edu. Consideration of submitted applications will start immediately and continue until a postdoctoral candidate is identified.



Science Across the Commonwealth

Posters at the Capitol 2011

Posters-at-the-Capitol (P@C), the annual exhibition of undergraduate research from state-supported Kentucky four-year colleges and universities, plus the Kentucky

Community & Technical College System (KCTCS), was held on Thursday, February 10, 2011, at the Capitol Rotunda in Frankfort. Research projects in areas of the sciences were represented in themes including physiology and cell biology, combinations of organic and metallic elements, environmental science and natural or organic solutions to farming problems. Medical applications of research findings and industry-driven research themes were also important themes.

Environmental quality studies were represented by evaluations of habitats of several species across Kentucky. John Yeiser, guided by faculty members Stephen Richter and Alice Jones of Eastern Kentucky University, measured abundance of *Desmognathus* salamanders and sediment quality in three streams differentially affected by coal mining and other human land-use practices, finding a decline in salamanders in waters affected by mining practices. Cory Cecil, also under the faculty guidance of Alice Jones, reported mapping of locations of water samples to delineate drainage areas of each site on watersheds that drain Kentucky's Appalachia coalfields. Concentrations of the environmental pollutants triclosan in wastewater and bisphenol-A in bottled drinking water and free-flowing water from western Kentucky were measured by Dylan Benningfield and Brianna Cassidy, under the guidance of Bommanna Loganathan of Murray State University. Research into possible causes of the decline in Eastern bluebirds (*Sialia sialis*) was done by Gregg Janos, guided by David Brown of Eastern Kentucky University, using mist nets and vocal playback to capture, tag, and record foraging and home-range data for correlation with weather data from the Lexington National Weather Service.

Other research reported projects aimed at mitigating the effects of pesticides, and efforts to use natural cycles of plants and insects to regulate agricultural production. Several research projects came from Kentucky State University (KSU), the site of the USDA Repository for pawpaw (*Asimina triloba* [L.] Dunal) species and germplasm evaluation and collection. Branden Bell, guided by Kentucky State University faculty Kirk Pomper, Jeremiah Lowe, and Sheri Crabtree, reported on the identification of repository plants with high fruit acetogenin activity to serve as sources for extract of acetogenin, which displays antiviral, antimicrobial, and pesticidal qualities. Screening of hot pepper (*Capsicum chinense*) genotypes obtained from Central and South America for antioxidant content was carried out by McKenzie Johnson, under the direction of Kentucky State University faculty George Antonius, Tejinder Kochhar, and Eric Turley. Seeds were grown at KSU and fruits analyzed in order to select candidate accessions of hot peppers with potential to produce high amounts of antioxidants. The proper timing of safe entry of pepper harvesters relative to application of the broad-spectrum insecticide

Endosulfan resulted from research carried out by Kyla Ross, under the guidance of George Antonius, Tejinder Kochhar, and Regina Hill. Results showed persistence of isomers of endosulfan toxic to mammals on pepper leaves and fruit, which should necessitate keeping multiple spraying of these crops to a minimum.

Organic management of stink bug pests in Kentucky blackberry crop production was reported for the first time in a project by Marquita Grayson-Holt, Rachel Hayden, and Christopher M. Wales, under the direction of John D. Sedlacek, Karen L. Friley, Kirk Pomper, and Jeremy Lowe of Kentucky State University. Tactics used to avoid stink bug predation included spring mowing of canes to delay growth and fruiting. Another study by these young researchers, directed by John D. Sedlacek and Karen L. Friley, lured insects beneficial to late-planted sweet corn for identification and enumeration. Other environmental research focused on white nose syndrome (WNS) caused by the fungus *Geomyces destructans* (*G. destructans*) in bats, by Samantha Kaiser and Virginia Shelley, guided by Hazel Barton and Marcelo Kramer of Northern Kentucky University. These researchers sampled natural commensal fungi on bats, and tested natural organic compounds that may be able to prevent the spread of *G. destructans*.

Biofuels as alternatives to petroleum-based fuels and replacement of petroleum-based resins, feedstocks, and polymers were studied by Jennifer Armstrong, Andrew Preston, Michael Mazzotta, Andrew Sharits, and Alexander Montavon, under the guidance of Nathan Tice, Darren Smith, Buchang Shi, and Laurel Morton of Eastern Kentucky University. Furans, organic "biopolymers" derived from carbohydrates, were the starting point for development of new organic and organometallic compounds that could in future be incorporated into electronic transistors and organic light-emitting diodes (OLEDs). In the area of liquid biofuels, the ability of ionic liquids to function as solvents for the dissolution of cellulose and grain was the starting point for the study of the use of reactive metalloporphyrins in dissolving ionic liquids for dissolution and oxidation of lignin.

Nanoscale particles derived from silicon can be applied in electronic and biological uses that include biological carriers and fluorescent markers. Research describing preparation and manipulation of fluorescent siloxane nanoparticles was described and their effectiveness as biocarriers was reported by John Ferguson, under the guidance of Hemali Rathnayake of Western Kentucky University. Other research on the use of metals in biomedical chemistry was the development of a method of synthesizing gold nanoparticles for use in biomedical applications by Jane J. Bartonjo, Vivek D. Badwaik, Jesse W. Evans, and Chad Willis, under the direction of faculty mentors Shivendra V. Sahi and Rajalingam Dakshinamurthy of Western Kentucky University. Tim Cook, under the direction of Hunter Moseley at the University of Louisville, studied the functional role of zinc in metal binding proteins that bind zinc, iron, or copper in human



Students and mentors gathered in Frankfort for the Posters-at-the-Capitol 2011 event.

cells. Using the worldwide Protein Data Bank, 5965 proteins that bind zinc were identified and the coordination geometry of each zinc site was classified as tetrahedral, trigonal bipyramidal, or octahedral.

Other research describing a cost-effective and efficient purification process for heparin-binding proteins, important in human cellular processes such as wound-healing, was reported by a group of young researchers from Western Kentucky University, Sumit Batra, Kristen Mikulcik, Nilesh Sahi, Heather Shockley, guided by Eric Conte and Rajalingam Dakshinamurthy. This project included two students, Zachary Laux and Camille Turner from the Gatton Academy of Mathematics and Science of Kentucky, at Western Kentucky University. Work submitted through the high school outreach efforts of Felix Akojie was reported by students from Paducah Tilghman High School, in collaboration with students from West Kentucky Community and Technical College. These researchers, Gordon Beck, Devin Harris, Reid Herndon, and Leah Hoffman, studied characteristics of catalyze enzyme in liver and muscle tissue by analyzing effects of temperature, pH, presence of inhibitors, and enzyme concentration.

The molecular basis of the binding activity of calmodulin (CaM), the central calcium signalling transducer, was studied by Michael Bricken under the direction of mentor Luke Bradley of the University of Kentucky. Starting with the fact that CaM binding affinity arises from amino acid contacts, protein combinatorial libraries were used to sample regions of protein sequences having varied conformations in the presence and absence of calcium. The technique can be used to facilitate investigations of selected proteins with altered CaM binding specificity.

Other areas of scientific investigation were represented by a study assessing validity and reliability of a scale measuring susceptibility to persuasion by Kelly Burton, Joshua Hager, and Jessica

Rapier, guided by Richard Osbaldiston and Dustin Wygant of Eastern Kentucky University. A report on stone tools recovered from an archaeological excavation in Thailand was made by Aleshia Hospelhorn, Matthew Buttacavoli, and Emrys Lynch, under the direction of Judy Voelker of Northern Kentucky University.

A report on activities by Kentucky Space in collaboration with partners in Italy and Russia was presented by Tyler Rose, Nathan Fite, Daniel Graves, Tyler Burba, Brandon Molton, Johnathan Fitzpatrick, and James Goble, with mentors Benjamin K. Malphrus, Kevin Brown, and Bob Twiggs, from Morehead State University. Students from the Kentucky Space Science Center at Morehead State University designed a very small (<1 kg) satellite to be launched from EduSat, a micro-satellite (12kg) designed at the University of Rome Sapienza and launched from a base in Russia.

The exhibition marked the 10th anniversary of Posters@Capitol, under the leadership of John Mateja, Director of Undergraduate Research at Murray State University, and a former president of the Kentucky Academy of Science. The event began with a Roundtable Breakfast of academic and industry leaders (see article on page 7). While heavy snowfall prevented the attendance of most Murray State University students and their mentors, abstracts of their submissions can be found in the P@C Program Book at <http://campus.murraystate.edu/services/URSA/>.

Some of these young researchers will become scientists in their home locations in the Commonwealth, and are therefore to be counted among Kentucky's greatest wealth. Posters@Capitol is one way of recognizing and encouraging their efforts in science.

*Submitted by Mary Janssen, Ph.D.
Member-at-Large, Governing Board, KAS*

Transforming Education for a Brighter Tomorrow

The Posters-at-the-Capitol Organizing Committee and the Kentucky Council on Postsecondary Education hosted a roundtable breakfast in conjunction with the 2011 Posters-at-the-Capitol. The purpose of the breakfast was to review the progress of undergraduate faculty-mentored research at Kentucky's public universities and community colleges and to plan toward future development of these programs. Kentucky educators are seeing that undergraduate research develops students with the critical thinking and problem solving skills and these skills are necessary to make the Commonwealth competitive in today's global marketplace.

Invited guests included Presidents and research leaders from Eastern Kentucky University, Kentucky Community and Technical College System, Kentucky State University, Morehead State University, Murray State University, Northern Kentucky University, University of Kentucky, University of Louisville, Western Kentucky University; Legislative leaders focused on improving education in the Commonwealth, industry leaders, and other guests with an interest in education in Kentucky. Despite blizzard conditions in parts of the Commonwealth, the breakfast was well attended. However, the weather prevented Dr. John Mateja, Chair of the Posters-at the Capitol Organizing Committee, from attending and Dr. Blaine Ferrell, Western Kentucky University, presented Dr. Mateja's welcoming remarks in his absence.

Industry leaders, Terry Samuel, VP with Lexmark International and Steve Matherly, VP with Fifth Third Bank, presented "What Skills Do Kentucky Businesses Need to Ensure a Brighter Tomorrow?". Mr. Samuel and Mr. Matherly stressed the importance of students mastering not only "Hard Skills" but also "Soft Skills". Mr. Samuel stated "Hard skills" are acquired through mastering superior technical skills, participating in rigorous curriculums, and real work (internship type) experiences. For example, at Fifth Third hard skills include reading and interpreting a balance sheet and at Lexmark International, job applicants must be able to write code. These skills are a basic requirement to employment, but to be offered a position and succeed, applicants must also have soft skills. Soft skills include critical thinking, thinking on one's feet, project and people leadership skills, as well as a strong work ethic, good time management skills, a variety of work experiences, cross functional experiences, cultural awareness, international experience, fluent in multiple languages (60% of Lexmark International business is out of the US), communication and interpersonal skills, empathy, risk management, and entrepreneurial spirit.

Dr. Blaine Ferrell, Western Kentucky University, moderated the discussion following Mr. Samuel's and Mr. Matherly's presentation. The breakfast attendees all agreed industry and education leaders need to work together and provide feedback so that educational leaders know what skill sets students need to master so they can meet the needs of Kentucky's businesses. The group also discussed the importance of internships to better equip students with real work skills.

Kris Kimel, President of Kentucky Science and Technology Corporation presented "Kentucky Universities-Engines for Innovative and Creative Thinking". Mr. Kimel stressed high tech employers want employees who are critical non linear thinkers with an entrepreneurial spirit. He shared a skill set of success which includes: knowledge, critical innovative thinking (which he believes can be taught), and speed (ability to work quickly and maintain focus, i.e. 50% of Apples' profit is from products not available three years prior). He also stressed the importance of being a "conversion thinker" which he defines as an individual who identifies knowledge, synthesizes knowledge, and then reconstruct this knowledge and applies it. He believes there is no such thing as useless knowledge; all knowledge is important and any knowledge learned can and will be applied in some fashion.

Mr. Kimel also shared information regarding the Kentucky Space project. Students working on this important program have ready access to the Space Station technology and are doing microgravity research. These students are working on real problems.

Discussion following Mr. Kimel's presentation was moderated by Dr. Pamela Feldhoff, University of Louisville. Breakfast participants discussed possible ways educators can help attract technical companies to Kentucky. Mr. Kimel stated in Kentucky, we often underestimate our ability to do great things. Kentuckians need to start a culture of innovation which would be more conducive to supplying outstanding high tech employees to high tech companies and giving companies the incentive to do business in Kentucky.

Lee Todd, Jr. President of the University of Kentucky, discussed "Engaged Learning-The Value of Undergraduate Research". Dr. Todd believes Kentucky students often need to overcome intimidation and our Commonwealth needs to develop a culture that encourages taking risks. As educators we must break down intimidation and encourage innovation and creativity. We must instill in our students to attend college not just to get a job but to make jobs for many by starting companies. UK has developed programs which encouraged their faculty to start companies.

Discussion following Dr. Todd's presentation was moderated by Dr. Bruce Mattingly, Morehead State University. The discussion focused on how to encourage professors to be research mentors to undergraduate students. Possible options discussed by the group: including research mentorships in tenure criteria and rewarding (perhaps extra compensation) professors who work with undergraduate students completing research so that it eventually becomes part of their day to day job as a professor.

Everyone agreed Kentucky has work to be done and we can better accomplish our goals if leaders in business and education work together and communicate with one another.

*Submitted by Jeanne Harris, Executive Director
Kentucky Academy of Science*

KJAS Kentucky Junior Academy of Science

The 2011 meeting of the Kentucky Junior Academy of Science was held on Saturday April 23rd, 2011 at the University of Kentucky. Sixty three high school students participated in the event.

The Grand Prize Winners this year were Mary Richardson, Vivek Raj, Stephanie Biecker and Ankush Gupta. KJAS Grand Prize Winners are eligible to compete at the annual meeting of the American Junior Academy of Sciences, held in conjunction with the American Association for the Advancement of Science (AAAS) Annual Meeting. The 2012 AAAS meeting will be held February 16-20 in Vancouver, B.C. The Kentucky Academy of Science will provide financial support for travel to the meeting for these students and their chaperones.

The following KJAS Officers for 2012 were elected at the meeting: President Stephanie Biecker, Vice-President Orsolya Hegyi, and Secretary Vivey Raj.



Kentucky Junior Academy of Science 2011 Grand Prize Winners (left to right) Ankush Gupta, Stephanie Biecker, Vivek Raj, and Mary Richardson, with KAS President Barbara Ramey (center).



Left to right: KJAS President Stephanie Biecker, KJAS Vice-President Orsolya Hegyi, KAS President Barbara Ramey, and KJAS Secretary Vivey Raj.



Kentucky Junior Academy of Science 2011 Category Winners with KAS President Barbara Ramey (far right).

2011 KJAS Annual Meeting Category Winners

Category

Behavioral and Social Sciences

Biological Sciences

Botany and Zoology

Chemistry

Computer Science, Mathematics and Physics

Engineering

Environmental Science

Microbiology

First Place

Vivek Raj

Mary Richardson

Morgan Van Rijswijk

Katelyn Stenger

Ankush Gupta

Kelly Kleier

Orsolya Hegyi

Pratik Bhade

Second Place

Joyce Chen

Serena Lian and Robin Zhao

Allison Pecaro

Naethan Mundkur

Andrew Bratton

Vinay Raj

Monica McFadden

Joy Kumar

Third Place

Sanjun Park

Jingjing Xiao

Alex Yson

Maggie McLeod

Ankur Kanotra

Ava Chen

Szofia Komaromg-Hiller

Nolan Anderson

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

2011 Kentucky Science and Engineering Fair (KY-SEF)

Eastern Kentucky University hosted the ninth annual Kentucky Science and Engineering Fair (KY-SEF) for middle school and high school students Saturday, April 2, 2011. **High School Best of Fair** winners were: Life Science - 1st, Roshan Palli & Joseph Ferguson of Paul Laurence Dunbar; 2nd, Brian Rinehart of duPont Manual H.S.; and 3rd, Induja Nimma of duPont Manual H.S.; Physical Science - 1st, Ankush Gupta of duPont Manual H.S.; 2nd, Megan Perkins of duPont Manual H.S., and 3rd, Vinay Raj of duPont Manual H.S. **Middle School Best of Fair** winners were: Life Science - 1st, Muadh Ghuneim of Lexington Universal Acad.; 2nd, Brad Woodie of Royal Spring M.S.; Physical Science - 1st, Sahil Nair of Beaumont M.S.; 2nd, Logan Jelsma of Meyzeek M.S. Individual category winners are listed below.

Category	HIGH SCHOOL		MIDDLE SCHOOL	
	1st Place	2nd Place	1st Place	2nd Place
Animal Science	Paul Parell Paul Laurence Dunbar	Tamas Nagy Paul Laurence Dunbar	Lucy Wan Winburn M.S.	Emily Hagan Holy Trinity Parish School
Behavioral & Social Science	Kelsey Randhawa Paul Laurence Dunbar	Jane Mullen Sloan Goldberg Ballard H.S.	Noah Hughes Meyzeek M. S.	Stephanie Stumbar SCAPA Bluegrass
Biochemistry	Robin Zhao Serena Lian duPont Manual H.S.	Rachel Bischoff Ballard H.S.	Brad Woodie Royal Spring M.S.	Caryl Lyle Meyzeek M. S.
Cell & Molecular Biology	Roshan Palli Joseph Ferguson Paul Laurence Dunbar	Yuyao Ding duPont Manual H.S.	Cassie Drury St. Francis of Assisi	Justin Gallagher St. Pius X
Environmental Management	Monica McFadden Notre Dame Academy	Orsolya Hegyi Paul Laurence Dunbar	Tate McGarvey	Logan Franxman St. Pius X
Medicine & Health	Mary Richardson duPont Manual H.S.	Anmol Kanotra duPont Manual H.S.	Katie Harris St. Francis of Assisi	Jeremy Borden St. Francis of Assisi
Microbiology	Induja Nimma duPont Manual H.S.	Mark Gannott Ballard H.S.	Muadh Ghuneim Lex. Universal Acad.	Jessica Rayome St. Francis of Assisi
Plant Sciences	Brian Rinehart duPont Manual H.S.	Morgan Van Rijswijk Notre Dame Academy	Lindsay Haffnerr St. Francis of Assisi	Nathan Stromberg St. Francis of Assisi
Chemistry	Christopher Sato Paul Laurence Dunbar	Isaac Kresse duPont Manual H.S.	Uma Subrayan Meyzeek M.S.	Michael Head Gendover Elementary
Computer Science	Ankush Gupta duPont Manual H.S.	Yuki Inoue Edward DiLoreto Paul Laurence Dunbar	Arthur Sonzogni Erpenbeck Elem.	Akanksha Gupta Meyzeek M.S.
Earth Science	Brooke Raque Ballard H.S.	Ijeoma Okorie duPont Manual H.S.	Dianna Lauroesch Meyzeek M.S.	Kate Jones St. Francis of Assisi
Energy & Transportation	Megan Perkins duPont Manual H.S.	Idrees Kahloon Paul Laurence Dunbar	Joseph Marino III St. Agnes	Marcus Grady St. Francis of Assisi
Engineering			Erik Rosenstrom & Andrew Rosenstrom Barrett TMS	Mitch MacKnight St. Pius X Elem.
Electrical & Mechanical	Matthew Russell Home School	Megan Mercer Ballard High School		
Materials & Bioengineering	Vinay Raj duPont Manual H.S.	Sarah Wang Michelle Liu duPont Manual H.S.		
Environmental Science	Aimee Turner Ballard High School	Szofia Komaromy-Hiller Notre Dame Academy	Logan Jelsma Meyzeek M.S.	Divyesh Doddapaneni Meyzeek M.S.
Mathematical Science	Casey Biles Mercey Academy	Shrinivas (Gautam) Malegaonkar duPont Manual H.S.	Rishi Talati Meyzeek M.S.	Nick Croyle Mary, Queen of Heaven
Physics & Astronomy	Arunita Kar Paul Laurence Dunbar	Cassie Schoborg Notre Dame Academy	Sahil Nair Beaumont M.S.	Libby Greenwell Blessed Sacrament



KY-SEF 2011 High School Best of Fair winners



KY-SEF 2011 Middle School Best of Fair winners

Dr. Bob Creek, KY-SEF Director, will accompany the High School *1st Place* and *2nd Place Best of Fair* winners when they attend the Intel International Science and Engineering Fair 2011, to be held in Los Angeles, California, on May 8-13, 2011. In addition to providing financial support for KY-SEF, the Kentucky Academy of Science also supports the fair through its many members who participate as judges. The KY-SEF organizers and student participants would like to thank the following:

- Dr. Sanjeev Adhikari, Morehead State University
- Dr. Dawn Anderson, Berea College
- Dr. Ruth Beattie, University of Kentucky
- Dr. Amy Braccia, Eastern Kentucky University
- Dr. Ben Brammell, Asbury University
- Dr. Martin Brock, Eastern Kentucky University
- Dr. Suzanne Byrd, Eastern Kentucky University
- Dr. Doug Chatham, Morehead State University
- Dr. Paul Cupp, Eastern Kentucky University
- Dr. John Delfino, Midway College
- Mr. Robert Denton, Eastern Kentucky University
- Dr. Tim Dowling, University of Louisville
- Mr. Brent Eldridge, Bluegrass Community & Technical College
- Dr. Charles Elliott, Eastern Kentucky University
- Mr. Jon Faughn, Western Kentucky University
- Dr. Wilson Gonzalez-Espada, Morehead State University
- Dr. John Hoppe, KCTCS (Retired)
- Dr. Ronald Jones, Eastern Kentucky University
- Dr. Karan Kaul, Kentucky State University
- Dr. Sherie Kendall, Midway College
- Dr. Syed Khundmiri, University of Louisville
- Miss Kari Kratzenberg, Advanced Testing Laboratory
- Dr. Sadeta Krijestorac, Morehead State University

- Dr. Chris Laird, Eastern Kentucky University
- Miss Meghan Langley, University of Louisville
- Dr. Rajeev Madhavannair, Morehead State University
- Dr. Andy Martin, Kentucky State University
- Dr. William McGowan, Midway College
- Dr. Laurel Morton, Eastern Kentucky University
- Dr. M. Paul Murphy, University of Kentucky
- Mr. Pramod Poudel, Univ. of Kentucky
- Dr. Narayanan Rajendran, Kentucky State University
- Dr. Robert Rosenberg, Transylvania University
- Dr. Bill Staddon, Eastern Kentucky University
- Mrs. Melony Stambaugh, Northern Kentucky University
- Dr. Nathan Tice, Eastern Kentucky University
- Dr. D. Alexander Varakin, Eastern Kentucky University
- Dr. Jing Wang, Eastern Kentucky University
- Mr. Todd Weinkam, Eastern Kentucky University
- Dr. Ilsun White, Morehead State University
- Dr. Andrew Wigginton, University of Kentucky
- Dr. Lori Wilson, Eastern Kentucky University
- Dr. Demetrio Zourarakis, Kentucky Division of Geographic Information

*Submitted by Barbara Ramey, President of KAS
KY-SEF Chair - Local Arrangement*



Spotlight on Mentors: Felix Akojie

Felix Akojie, chosen as 2002-2003 Teacher of the Year at West Kentucky Community & Technical College (WKCTC), has been a mentor of under-graduate students in areas of microbiology and biochemistry for many years, guiding them in real-time, hands-on projects using the scientific method.

Felix Akojie obtained his Ph.D. in biochemistry in 1985 from the University of Ife (Obafemi Awolowo University), Ile-Ise, Nigeria, and did post-doctoral work at the University of Vienna, Austria, and Loyola University in Chicago. In 1991 Felix Akojie came to West Kentucky Community & Technical College in Paducah, where he is Professor in Biology. Dr. Akojie's own work has been in the areas of sickle cell, including antisickling activities of hydroxybenzoic acid in the plant *Cajanus cajan*, and antisickling potential of bat interferon.

With his students, Felix Akojie has carried out research projects analyzing the nutrient content in various plants cultivated for food. Using the Biuret method, his students analyzed concentrations of water-soluble proteins in collard greens, and other leafy green vegetables.

Other projects analyzed sugar content of various vegetables. Dr. Akojie's students tested potatoes, onions, cauliflower, celery, lettuce, and squash. Using the enzymes invertase and glucose hexokinase, they found red and russet potatoes had low levels of glucose, with sweet potatoes having the highest glucose levels.

In two research projects, the accuracy of labels on soft drinks was examined by analyzing the glucose concentration of a variety of soft drinks and their "diet" counterparts. Using a spectrophotometer, the absorbance of reduced nicotinamide adenine dinucleotide (NADH) released by the reaction of glucose hexokinase enzyme on glucose standards and the sodas was measured. Students were able to show that soft drinks advertising "reduced caloric content" might still have high glucose concentrations. While consistent with manufacturers' claims, these soft drinks require careful examination of labels by consumers. Further study focused on sucrose in order to obtain more accurate results of sugar content. Soft drinks were incubated with the enzyme invertase, breaking down sucrose to glucose and fructose. Elevated levels of glucose compared to samples without the enzyme would indicate the presence of sucrose. However, results showed no differences in glucose concentrations with and without the enzyme invertase.

Through studies like these, Dr. Akojie teaches his students how to pose hypotheses that suggest proper comparison conditions to be answered using data gathered. These experiments introduce students to techniques and instrumentation used in the scientific laboratory. In 2005, Felix Akojie published *A Laboratory Manual for Introductory Biology* with Pearson Custom Publishing, which is now in its second edition.

Felix Akojie is a cofounder of the Conference for Student Research at Kentucky Community & Technical College System. Several of his students' projects have been selected to be shown at Posters-at-the-Capitol, the annual exhibition of under-graduate research from Kentucky state four-year colleges and universities.

Dr. Akojie's students have included undergraduates, as well as high school students. In February, 2011, two students from Paducah Tilghman High School, along with their college co-researchers, presented their project at Posters@Capitol. Their research showed effects of the catalase enzyme on liver and muscle tissue.

Several of Dr. Akojie's students from WKCTC have gone on to pursue degrees and careers in biology at the University of Kentucky and Murray State University. Kelsey Ladt graduated from WKCTC and from the University of Kentucky with a Bachelor of Science in Biology. She performed a clinical summer research internship at the National Institutes of Health (NIH) in 2008, and received a two-year post-baccalaureate research position at NIH in 2009. She plans to enter an MD/PhD program.



Dr. Felix Akojie and former student Kelsey Ladt.

Since 2003, Dr. Akojie has served on the board of the Kentucky School Board Association, and was appointed by the Governor of Kentucky in 2008 to serve on the board of the Kentucky Advisory Council for the Gifted and Talented, a position he has held since then.

*Submitted by Mary Janssen, Ph.D.
Member-at-Large, KAS Governing Board*



Third Annual KY Girls STEM Collaborative Conference

STEM Opportunities and Needs in Kentucky:
Making the Connection between Education and Industry
Wednesday, June 29, 2011
9am - 3pm (ET)
Northern Kentucky University
Student Union
Registration: \$25/person

<http://www.nkychamber.com/External/WCPages/WCEvents/EventDetail.aspx?EventID=1223>

The Conference works to ensure girls in grades K-12 are aware of potential careers in science, technology, engineering and math (STEM), and encourage them to pursue careers in those fields. Keynote speaker Nancy Holliday, General Manager at Microsoft, and representatives from local industry will be present to talk with local educators, parents, and students about their job and career path.

Kentucky Heritage Land Conservation Fund

Drs. William H. Martin and Richard K. Kessler



Invasive species (Part I): Aquatic Ecosystems

Aquatic non-native species are now often referred to as aquatic nuisance species (ANS). Whatever you call them, they are an important threat to Kentucky's rich aquatic biodiversity, especially for our native fishes, mussels and crayfishes. These alien invaders include, but are not limited to, fishes like the common (*Cyprinus carpio*) and silver carp (*Hypophthalmichthys molitrix*) which are already established and the round goby (*Neogobius melanostomus*) which may become established. These fishes may compete directly with our native suckers and darters or may modify the habitat their life histories require. Invasive mussels such as the zebra mussel (*Dreissena polymorpha*) are known to cover and choke our native mussels and directly compete with them for food and oxygen. Even nuisance non-native aquatic plants can influence native habitats and negatively affect native aquatic communities.

Aquatic nuisance species are very difficult to manage once they are established. Unlike various exotic terrestrial species that can be effectively controlled by manual removal or chemical application, these approaches are often neither advisable nor feasible in the aquatic system. In addition, the spread of ANS can be rapid and difficult to ascertain as these species, once introduced, use our streams and rivers like a great network of interconnected highways to reach their destinations.

Many KHLCF-funded projects are associated with significant aquatic resources including sites along the Terrapin Creek in western Kentucky (Kentucky State Nature Preserves Commission) and the upper Green River in south-central Kentucky (Western Kentucky University and Kentucky Division of Water Wild Rivers Program), two of our state's most biologically diverse stream ecosystems. These and a number of other aquatic-related projects meet multiple KHLCF criteria including providing habitat for rare, threatened or endangered aquatic fauna or sites whose natural functions may be subject to loss or alteration.

Among the most important measures we can take to protect our native aquatic biodiversity from the ANS threat are:

- (1) preventing the introduction of ANS,
- (2) maintaining ecologically intact and environmentally sustainable aquatic ecosystems and communities which tend to be more resistant to invasion, and
- (3) detecting the presence of new ANS invasions early so that the future threat may be minimized.

Protection of aquatic-related KHLCF sites against alteration or loss of native aquatic habitats can promote resistance to ANS invasions by maintaining the ecological integrity of the aquatic resources at the site via reducing local impacts to the site from pollution, development, erosion, instream mining, etc. In addition, KHLCF projects can aid in the early detection of ANS invasions or range expansions. KHLCF projects are required to complete biological inventories which would include inventories of the aquatic fauna if the aquatic system was cited as a significant reason for the purchase of the tract. Such inventories could enhance ongoing efforts to better understand and manage the ANS which currently threaten the Commonwealth's rich aquatic natural heritage.

Note: *Part II of this series will appear in the August issue of the KAS Newsletter, and will discuss invasive species on land and in Kentucky's natural areas.*

For additional information about the Fund visit our web site at:

<http://heritageland.ky.gov>

All KAS members can support the KHLCF by buying a nature license plate at their next renewal; ten dollars goes to the Fund for each plate sold.



Zebra mussels (*Dreissena polymorpha*) attached to a native clam (*Amblema plicata*). Photo by Randy Westbrooks, U.S. Geological Survey, Bugwood.org.

The Aquatic Nuisance Species (ANS) Task Force website (<http://www.anstaskforce.gov>) has a wealth of information on preventing/controlling aquatic nuisance species. Ron Brooks, Fisheries Division Director in the Kentucky Department of Fish and Wildlife Resources (KDFWR), participated in ANS Task Force meeting held in Little Rock this month. The KDFWR Fisheries Division annually receives limited funding to address aquatic species and routinely interacts with ANS concerning these issues. The funding is most often used to combat invasive aquatic plant species, but will soon be used to implement control measures for Asian carp populations in Kentucky as well. KDFWR has joined 28 states in an appeal to the federal government for an increase in ANS funding to further help with aquatic nuisance species control. You can contact him at ron.brooks@ky.gov or by phone at 502-564-7109 x. 4466.